"Dr Arif has written a must-read primer for anyone who wants to know the A–Z of allergies—patients and doctors alike."
— BOMAN IRANI, Indian theatre and film actor

Winning Over Allergies

Myths and Facts

Includes a bonus chapter on Covid-19

Dr Arif Ahmed

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Dedication

The book is dedicated to my parents who inspired and guided me to serve my country and community.

CONTENTS

FOREWORD

Lots of people continue to live with allergies. Although a few are a full bottle and know a lot about their allergy, many have little knowledge of what it is all about. Others are misinformed about their disease in this rapidly changing area of medicine. Dr Arif Ahmed's book, *Winning Over Allergies: Myths and Facts*, helps to address this gap in the understanding about allergies by many non-specialists, patients, and their families. It is written keeping in mind his compatriots, both patients and other doctors, living in his native country, India, and as such is even more valuable, particularly to the local Southern Asian audience.

The book covers the main topics in allergy from eczema, asthma, and hay fever, to food and drug allergy and anaphylaxis which are life-threatening allergies. It also discusses the importance of community education, counselling, and environmental control of allergies, as well as allergy tests, medicines, and even traditional Indian practices. Chapters do vary in their complexity, but there are case histories, entertaining anecdotes, and metaphors as well as Frequently Asked Questions sections, which are great for a reader who wants to 'test the water' before getting immersed in the subject completely. And for those that do indulge, this book should provide a springboard for further learning using the biography and suggested further reading.

Francis Bacon, the father of scientific method, is typically accredited as saying 'Knowledge is Power'. For a country

with over a billion people, what can a solitary doctor do more effectively, than to live up to his name, as Dr Ahmed has done with this book and teach (Latin *docere*) to as many people who are willing to listen, read, and explore the common and fascinating area of allergies.

— Dr Peter Arkwright,
Senior Lecturer in Paediatric Allergy and Immunology,
Lydia Becker Institute of Immunology and
Inflammation, University of Manchester,
Royal Manchester Children's Hospital, Manchester,
United Kingdom

Why I Wrote the Book

The book, *Winning Over Allergies: Myths and Facts,* is my attempt to share with readers the information acquired on the subject through the years from training (India and abroad), participating in educational conferences, familiarity with current scientific literature, and most importantly, from direct patient care.

Treating patients has been a great learning experience. I have seen their suffering, and their keenness to learn about the disease. One of the major reasons for their suffering is a lack of awareness on the subject

My interaction with primary physicians while touring the country delivering lectures (more than 200) on allergy indicated the same lack of information among them and the desire for knowledge. This lack of awareness may be due to inadequate attention to the subject of allergy in the undergraduate syllabus.

My extensive experience clearly indicated that allergies were rampant and there was a need for a handbook on the above subject for both the patients and primary physicians. Every individual, at some time or the other, is affected by some kind of allergy. And on such occasions, many do not know that it is an allergy and consider it to be a serious disease. What people fail to recognise is that what they think as a serious illness may only be an allergy.

Hence, I decided to write a book to fill the void in patient education as well as to fill in the gaps for busy healthcare

personnel and practitioners who wish to become more knowledgeable and proficient in allergy immunology.

I have attempted to write as simply as possible with the objective that anyone from a tenth grader to a PhD professor can read and enjoy the book without having to Google the medical jargon that comes with books on similar subjects. One of the purposes of the book is to make the book accessible to the layman also and thereby create larger awareness. It is not intended to be a textbook for an examination or for reference.

The book has the following features: case studies, coverage of the different types of allergies followed by common FAQs. While the case studies take you through live situations to give you a better insight, care has been made to protect the identities of people involved.

While covering different types of allergies, more emphasis is given to more common conditions like allergic rhinitis, asthma, food allergy, and urticaria. However, different aspects of treatment have not been enlisted. If anyone is interested in them, they can refer to the international guideline charts at the end of the book.

The treatment gives more importance to the practical aspects of management. These are the points which are not mentioned in any standard medical books and very few physicians have the time to explain.

Also, throughout the book, there may be a repetition of some sentences, but these are deliberate to emphasise their importance. In the end, there is a glossary of words of medical importance that need an explanation.

On complete reading of the book, the individual will get a more holistic and clearer understanding of allergies and its causes. The book will also teach patients to ask lots of questions to doctors till they understand what the diagnosis is.

The chapter on community work describes the work our charitable organisation, SOWED (specialists on wheels for the economically deprived) has been doing in teaching the deprived sections of the community the basics of patient care in their neighbourhoods without requiring them to travel. I

have highlighted the simple modules used in SOWED so as to create an opportunity on an individual basis to teach basic healthcare based on accurate, scientific evidence. It would be wonderful if similar modules were practised in the country so that a healthcare awareness movement takes place.

How to Use the Book

If you are reading this book, you could be a person suffering or that has a near and dear one suffering from some form of allergy. You could also be from the medical field and thus the interest. Lastly, you are an enlightened person seeking knowledge. Whoever you are, I suggest just read the book cover to cover because it requires no prior medical or scientific knowledge. There are some medical words which just prop up once in a while. If you want to understand these terms, please refer to the glossary. If you need to have more data and scientific knowledge, refer to the guidelines at the end. If you need further reading, refer to the references at the end of the book. If there is a need to understand through colour images and videos, then you can access the 'Images' section on my website: www.allermy.com.

You can directly go to the index if you are just concerned about a particular disease. As an example, if you are interested to know about allergic rhinitis then the index will mention several different pages in different sections for allergic rhinitis. This one disease will need to be looked up under the principal chapter of allergic rhinitis followed by certain sections in the laboratory, allergen testing, drug devices, environmental control, immunotherapy, and lastly, under counselling. Also, the case studies mentioned could be like your own case or it could be somewhat similar with certain deviations.

The chapter on drug allergy might sound difficult but this area of allergy is very ambiguous and very difficult to prove

because of the lack of testing facilities. Similarly, food intolerance, too, has many grey areas which cannot be explained fully. We have used many analogies in the development of allergies. This has been done to make a very technical subject lively. I hope you would enjoy every chapter and enlighten yourself.

At the end of the book, the chapter on community education may look out of place, but this is very dear to me and a part of my life mission. I hope you would appreciate it.

Section 1

INTRODUCTION

1

Allergy Overview

This chapter briefly discusses the terms allergy, allergic march, and atopy. It also clarifies the misconceptions prevalent in the community.

Allergy refers to a hypersensitivity reaction i.e. an exaggerated response of the body to innocuous stimuli. This usually happens when a person susceptible to developing allergies is exposed repeatedly to the same protein allergen. A living molecule is a substance which has come from an organic source such as plants, animal dander, birds or insect droppings or secretions. In brief, when a patient comes to me with a rash and I ask him, 'Have you eaten fish?', his reflex answer is '… but sir, I've eaten it before and nothing happened then'. This is the key to the diagnosis. There is always a history of previous exposure to the same allergen, which may not have affected the patient on previous accounts.

In my lectures, throughout the length and breadth of the country, a common question I pose to medical professionals is whether one can be allergic to smoke, perfume, and chemicals. Most say yes when in fact the categorical answer is a 'No'. This is because one cannot be allergic in the true sense of the word to the non-living sources which may be physical stimuli such as hot and cold or chemicals. However, many patients complain of 'allergies' on exposure to these substances. These non-living substances cause symptoms partially mimicking an allergic reaction due to their irritant effects on the superficial lining of the airway like nose, throat, and the skin. For a patient with allergy, their response can be explained as *zakhm pe mirchi* or adding insult to injury, meaning further worsening

the underlying allergy. If it were to be simply put, it is like applying an irritant substance on an abraded or broken skin. But if ignored, over the years, allergy can impair quality of life. This can be compared to a snowball rolling down a snow mountain.

Atopy is a term or a word referring to the genetic makeup of the individual. It's the propensity of the individual to develop an allergy. For a person under consideration, high atopy implies that he or she is more prone to develop allergies because of a genetic state of hyper-responsiveness to produce antibody IgE (one of the five immunologic proteins in our body's immune system) in response to the allergens resulting in a range of allergic diseases such as asthma, allergic rhinitis (nasal inflammation), and atopic dermatitis (eczema) alone or in combination of two or all three. Atopic patients usually, but not always, have a family history. Thus, you need to be atopic to become allergic but if you are atopic you will not necessarily progress to an allergic state.

The natural course of allergy in an atopic individual i.e. a person more susceptible to allergies follows a more classic or standard pattern of presentation. Initially, the gastrointestinal symptoms present in the first 6 months of life. The typical symptoms would be either of a 'colicky' baby or of spitting up of milk. This may be accompanied by some rash around the mouth. But again, like atopy, not all colicky babies are prone to developing allergies and not all allergic individuals have a history of colic. Atopic dermatitis or eczema generally manifests in the first 6 months of life and peaks at around one year of age. Beyond one to two years of age, the baby may often start to wheeze that may coincide with the gradual disappearance of the skin manifestations and it is around 3 years of age when the allergic nasal manifestations present gradually increase throughout childhood to peak in adolescence. It is not always necessary that all of these manifestations may be present in all babies. This usually comes in light when a child comes with the nasal symptom of allergy in adolescence and in retrospect, we find that the child used to spit up milk along with recurrent colicky episodes (refer to the case study of Ayesha in the chapter 'Eczema –

Atopic Dermatitis'). The reality is that the disease was never cured; one form was merely replaced by the other form.

Key Pointers:

- Allergic reactions are generally to proteins.
- One cannot be allergic to non-living irritants like diesel, perfumes, and sprays.
- The difference between allergy and atopy needs to be understood.
- Allergies in individuals often have a characteristic presentation called Atopic or Allergic March.

2

The Burden of the Disease

This chapter gives details along with facts and figures regarding the wide prevalence of diseases, especially in India. It also compares it with the USA in terms of the prevalence and level of education and understanding about the disease.

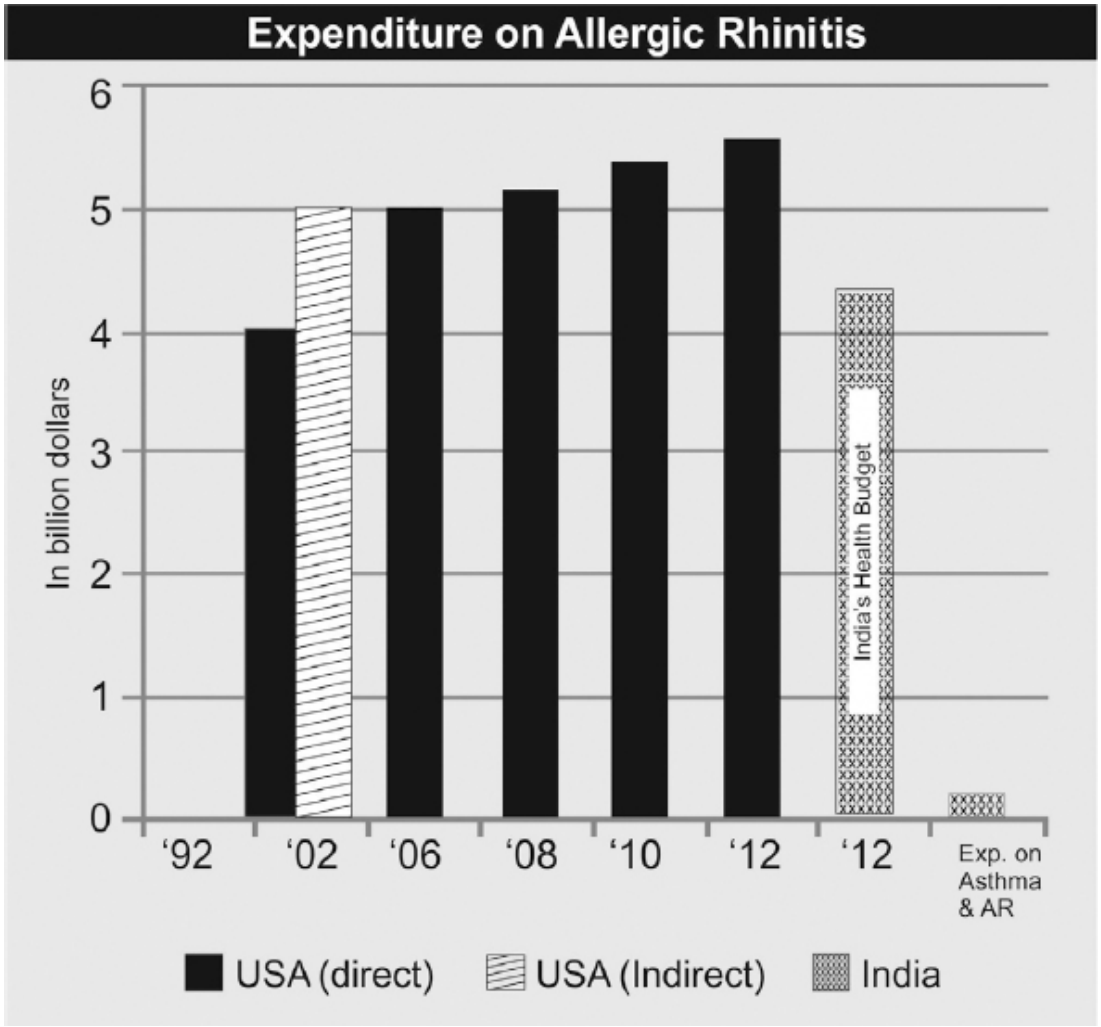
The GA^{2}LEN study was a pan-European multidisciplinary collaboration done in 2005. The study concluded:

'Allergic diseases including allergic rhinitis, asthma, rhinoconjunctivitis, gastrointestinal symptoms, urticaria (hives), and eczema are among the most common chronic diseases in the world and rank first in Europe. Their prevalence continues to grow with one child in three now affected by an allergic disease. Trends indicate that half of all Europeans will suffer from allergy by 2015. There is also significant under-diagnosis and under-treatment in all areas of allergy, with the majority of patients left untreated according to existing medical standards.'

While the above statement is the reflection of the scene in Europe, the most developed area of the world, one can well imagine the situation in India. Every year in June, thousands of individuals suffering from respiratory problems converge in the metropolitan city of Hyderabad to partake of a potion of herbal medicine which is inserted into their gut with a small live fish. It is nothing but a reflection of the ignorance prevalent in the community.

In India, the burden of allergic diseases can be gauged by the prevalence of allergic rhinitis. South Asia has 150 million cases out of the total of 500 million people suffering from allergic rhinitis worldwide. The USA is the largest economically developed country in the world and India is the second most populous country. And unlike the USA, India is a Third-World country, but the lifestyle of India's middle-class population, whose size is same as US population, is equivalent to that of the USA and allergies are more to

do with the western style of living. In the United States, the total annual direct expenditure on the management of allergic diseases is about 5.5 billion dollars.



The indirect expenditure, including man-hours lost and school and work absenteeism, is another 6 billion dollars. The direct expenditure of 5.5 billion dollars is equivalent to the Government of India's annual health budget and the total expenditure including the indirect expenditure is equivalent to the annual budget of the Indian army which is the second-largest army in the world.

The question which arises is why the USA is spending so much on such 'trivial' diseases which do not cause significant morbidity or death other than in the rare case of anaphylaxis which is caused due to a severe food allergy. This can be explained through Quality of Life (QOL).

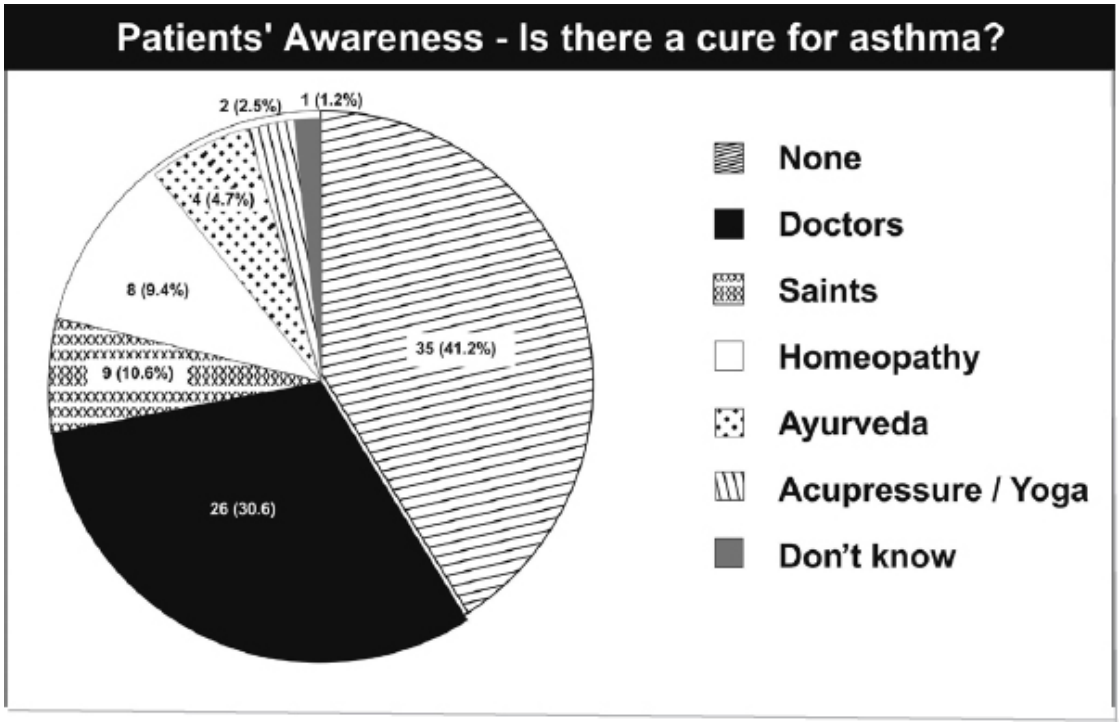
The West, especially the USA, spends a lot on allergic diseases because of its emphasis on quality of life (QOL). In India, one can snore and have a foul-smelling breath and get away with it, even

with their spouses. In our country, people clear their throat and spit in a public place, something that is unacceptable behaviour in the rest of the world. In developed countries, you are most likely to be fined for this and face social consequences. We have a long way to develop socially appropriate and sanitary habits. Thus, we see that in the West, there is a pressure from the society to look good, smell good, and feel good which pushes the people to go in for the treatment.

One realises how insignificant the Indian expenditure is especially when allergic rhinitis affects between 10%-30% of all adults and as many as 40% of children. In India, Allergic Rhinitis (AR) is considered to be a trivial disease, despite a report indicating that symptoms of rhinitis are present in 75% of asthmatic children and 80% of asthmatic adults. The International Study of Asthma and Allergy in Childhood (ISAAC) phase-I data from India revealed that nasal symptoms alone were present in 12% children in the 6-7 years' age group and 19% in the 13-14 years' age group. In India, we spend almost $160 million each year on medications of asthma and allergy. Besides this low budget for allergic diseases, we find that there is also a huge difference in the available specialists in the two countries specialised in allergic diseases.

In such a disparate scenario, it is imperative to find out whether there is over or under expenditure on the treatment and whether factors like the lack of knowledge and education or poverty are contributing to it. Since the purchasing power of the middle class is the same, poverty is less likely to be the cause. Hence, education could be the culprit for this disparity and why we are less aware of allergic diseases as per the data shown below.

In the USA, there is a minimum of 48 fellowship program of three-year duration in allergy and 12 indexed allergy journals. In India, there are no indexed journals and, nor does the Medical Council of India recognise programs in allergy. In a study by Lal et al published in Indian Paediatrics, 30% felt that there is a cure for asthma, with a significant section feeling that it can be cured by alternative medicines. The depressing aspect is that 10% felt that it can be cured by saints. The latter is a popular concept in India reinforced by our culture and films.



(Image adapted from Knowledge of Asthma among parents of Asthmatic children, Ashutosh Lal, Lata Kumar, Savita Malhotra, Indian Paediatrics Vol.32June 1995)

There are also innumerable examples and anecdotal incidents highlighting the lack of awareness by the professional class. At an examination of a diploma in child health at a national university, I found that 70% of the candidates did not mention anything except the oral drugs in the management of allergic rhinitis. That is grossly inadequate management of a chronic condition, where many other medical and non-medical interventions are also necessary and sometimes even more significant in the management of the allergy.

The incidence of asthma and allergic rhinitis has been steadily increasing in the West since the early '60s. However, in the '80s, it plateaued or stabilised due to the increased use of inhaled devices. After a lag phase of at least twenty years, there is now an epidemic of food allergy and eczema. It is only a matter of time that the same scenario would be replicated in India.

Key Pointers:

- Figures show a huge burden of allergic diseases.
- In India, there is a total lack of awareness about allergies in all sections of society, leading to improper management from doctors.
- In many cases, the patients resort to an alternative approach.
- In developed countries, people are willing to spend on allergic diseases because of the severe impairment of the Quality of Life.

3

The Body's Defence System

This chapter is about the body's immune system and how it causes allergies. The complexities of the immune system have been simplified using the analogy of the immigrants at the border and the immigration officer dealing with it. The chapter also utilises analogies to depict that the way the body deals with the allergens is similar to the way a country deals with undesired infiltrators.

The armamentarium of defence for all allergies consists of three lines of defence:

1. **First Line**

   Epithelial cells | Dendritic cells

2. **Second Line**

   Th2 lymphocytes | B cells

3. **Last Line**

   Mast cells | Eosinophils

In a typical case of allergic rhinitis (AR), the allergen after entering the nose has to swim across a river of mucous and then jump over the wall of epithelial cells before encountering the dendritic cells which act as an 'immigration officer'. And just like if there is a suspicious person at the immigration counter of a foreign country, the security officer will make sure to go through his passport and visa with great scrutiny. And even after much scanning and questioning, if the security

officer cannot make the decision whether to let him through, he will take the suspected person to his boss, the chief immigration officer (Th2 cells). Finally, if the boss concludes that he is foreign, the person in question will be sent back. However, when it comes to our bodies, we can't simply put an allergen on the next return flight. Here it also gets more complicated because the allergen is not just foreign but also a potential threat that needs to be dealt with.

There's also a possibility that in future more allergens may try to get in more aggressively and therefore, the immune system should prepare itself for such an eventuality. As a consequence, the chief immigration officer (T cells) sends signals all around the country to the millions of arms production shops to get battle-ready and start producing arms for the future battle against the identified enemy. As far as the soldiers are concerned, they are quickly sent to the battle site. All they need are specific arms against the newly identified enemy.

The 'immigration officer' is the dendritic cell also known as the APC (antigen-presenting cells) will recognise the antigen as foreign and after binding with it, it will deliver it to 'the boss', which in this case are the Th2 cells located in the adjacent draining lymph nodes. The Th2 cell is the 'director' of the entire defence system and will immediately send signals in the form of chemokines and cytokines to the circulating B-lymphocytes. The latter cells will, in response, produce the allergen-specific IgE, the armaments required to deal with the enemy. Ultimately, we need soldiers to carry these armaments for attack and herein the mast cells are the frontline soldiers located in the sub-epithelial area. This sub-epithelial area is the surface border on the nose, air passages, skin, and gut. The circulating IgE molecules which are the armaments are lodged on the surface of the mast cells or the soldiers. At this stage, the person is said to be sensitised and doesn't have any of the symptoms and signs associated with the disease.

Now in future, if the same immigrants or infiltrators try to enter the country, the soldiers would already be primed and trained with the right type of arms and ammunition to deal with the enemy. These soldiers will be capable of coordinating

and easily trapping the infiltrators. And if the number of infiltrators trying to get in is high, the country will step up its counterattacks. But as we all know that this would lead to much noise and destruction at the battlefield, resulting in damages to the soil and environment. Also, the effects of such a battle will be felt in the different parts of the country with adverse effects.

On re-exposure, the allergen is caught between the two arms of the mast cells leading to degranulation or breakdown of mast cells, which in turn, releases a series of inflammatory mediators of which the two most important are histamine and cysteinyl leukotrienes. These cause symptoms of the early phase reaction within a few minutes of exposure (refer to the images on www.allermy.com). The most important symptoms are sneezing and a runny nose and thus are referred to as ‘Runners’. At the same time, there is a release of chemotactic factors which cause infiltration of the area with eosinophils, basophils, monocytes, and lymphocytes leading to the symptoms of late-phase reaction in a few hours. The predominant symptom here is congestion and thus referred to as ‘Blockers’. The allergens as well as the treatment approach will be different in blockers as well as runners. The late-phase response though slow is as strong as the early phase response and acts as a backup response of nature since it takes at least 48 hours for the depleted histamine stores to be replenished. This is nature’s response to deal with an adverse attack.

The site of entry of the infiltrators may be by air, sea, land, or simply through the various rivers traversing the country. But no matter through which point they may enter, they will face the maximum damage. The sites in the human body of entry and damage are the nose, eyes, lungs, skin, and the gastrointestinal tract. Each of these may be affected singly or in combination. The most common being the nose with the lungs or with the eyes. Rarely, as in the case of an anaphylaxis in response to food, drugs, or an insect bite, almost every organ of the human body will be affected. When the remedial measures are instituted immediately and on a war footing, the probability of death in such a case is very low.

Key Pointers:

- The human body defence is no different from that of a country against infiltrators.
- The T lymphocytes are the control and command centres and circulating B lymphocyte the ammunition factory.
- The mast cells are the soldiers carrying the antibodies which are the arms and ammunition.
- If we understand the body's defence system, then the symptomatogy and treatment is very simplified.

4

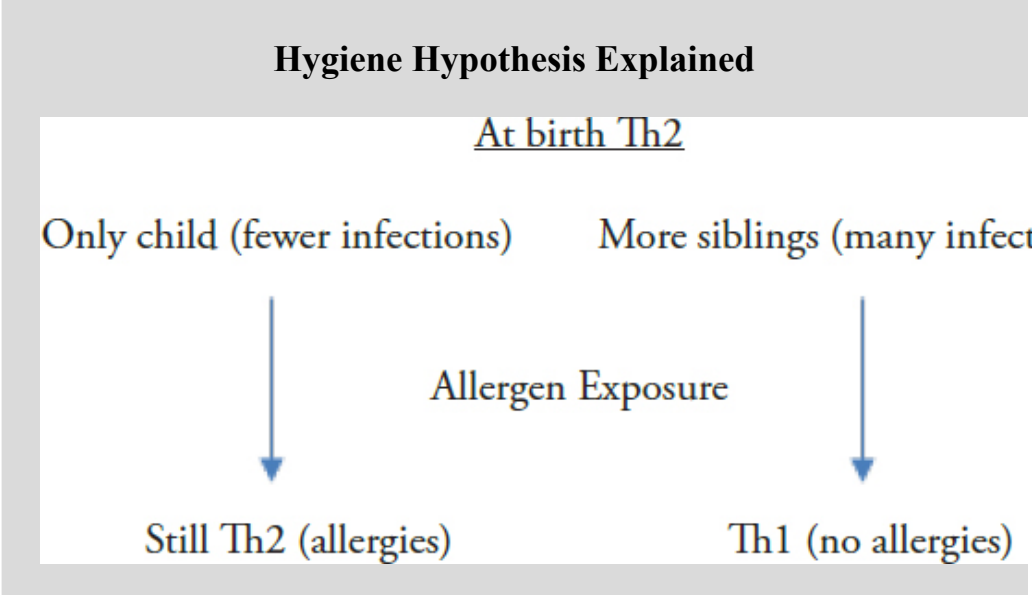
Hygiene Hypothesis

The hygiene hypothesis gives the plausible explanation for the increasing incidence of allergies throughout the world.

'It is suggested that atopic disease is the price paid by some members of the white community for their relative freedom from diseases due to viruses, bacteria, and helminths.' Gerrard J.W. et al, Annals of Allergy, 1976. This was a statement made almost 40 years ago by Dr Gerard J.W., an allergist and a researcher regarding the white community. We can easily replace the term 'white community' by 'westernised society' and see how such diseases have become endemic in the West due to lifestyle changes.

The hygiene hypothesis has been used to explain the increased incidence of allergic diseases. This can be explained on the basis of the family size. When families were large, there would be many children running around the house with repeated viral and sometimes with bacterial infections. These repeated infections would instil certain natural immunity in the children which would prevent the development of allergic diseases. As family size shrunk, children were exposed to fewer infections and therefore developed more allergies. This theory has been validated through studies done in the USA, which showed that children of a particular age when admitted in day care centres had a lower incidence of allergies vis-à-vis those who weren't admitted.

The question that arises here is about the immunological basis of the above theory. At birth, the predominant immune cell is the Th2 cell. With repeated viral and bacterial infections, there is a shift from Th2 to Th1 cells. If the body is not exposed to repeated viral and bacterial infections, there would be no shift to Th1 cells and the predominant cell remains Th2. It is this Th2 cell which triggers the allergen cascade and thus these children are more prone to allergic diseases.



The Essence of Hygiene Hypothesis

- Water and food control (Ascaris species contamination)
- Clean water
- Good sanitation
- Uncontaminated food
- Water chlorination
- Wearing shoes – control of hookworm
- Decreased exposure to farm animals
- Regular antihelmintics

As strange as it may sound, with increasing cleanliness, we have a higher incidence of allergic diseases. Various studies have shown that living off farms, worm infestation, and endotoxins protect against allergies. The Government of India has a programme for the yearly deworming of all children from 15 months to 15 years of age.

Environmental Exposure

It has been observed that infants who are exposed to cigarette smoke often start wheezing. In such cases, medication may not work, and the most appropriate response should be avoiding exposure to perfumes, deodorant, and mosquito repellents since all these would act as irritants. There are studies which have shown an increased incidence of adenoid hypertrophy with constant exposure to cigarette smoke.

Early and repeated exposure to antibiotics also plays a detrimental role in the development of allergies. Antibiotics would interfere with normal intestinal flora and thus predispose to allergies. At the same time, some studies have shown that long-term intake of lactobacillus GG for at least six months has some role in the prevention of some allergies especially eczema in infants.

Key Pointers:

- Early exposure to some microbes is helpful in the development of protection from allergies.
- The decrease in family size has been linked to increasing allergies.
- As we adopt a modern lifestyle with increased amenities and personal cleanliness, allergic disorders have become more common.
- Increased exposure to chemical inhalants has long-term effects.

Section 2

Respiratory Allergies

Respiratory allergies such as asthma and hay fever are interrelated due to the concept of the unified airway. The nose is in direct communication with the lung passages with sideward communication with the sinuses and with the ear through the Eustachian tube. The adenoids are at the centre stage of the respiratory air passages. Hence, any allergic disease in the nasal passages is likely to have an impact on all or some of the connecting structures because of anatomical proximity, direct connectivity, and lymphatic drainage.

1

Your Nose Knows - Allergic Rhinitis

This chapter discusses how to diagnose allergic rhinitis as well as effects on quality of life. A blocked nose may give a grouchy feeling the whole day. You don't need hospitalisation but you may not be able to work or study with adequate attention and energy. There are patients who have such severe year-round rhinitis and consequent distress due to it. They describe it being as a death sentence when those who do not suffer from it think of it as a simple symptom. Such is the magnitude of the disease.

Introduction

Allergic rhinitis has a typical clinical presentation. We need to know this in detail as it is the most common allergic disorder. Allergic rhinitis is a long-standing inflammation of the nose induced by the IgE antibodies after the mucous membranes, the outermost linings of the nose passage, has been repeatedly exposed to allergens. Non-allergic rhinitis is the diagnosis if there are no specific IgE antibodies.

Presentation

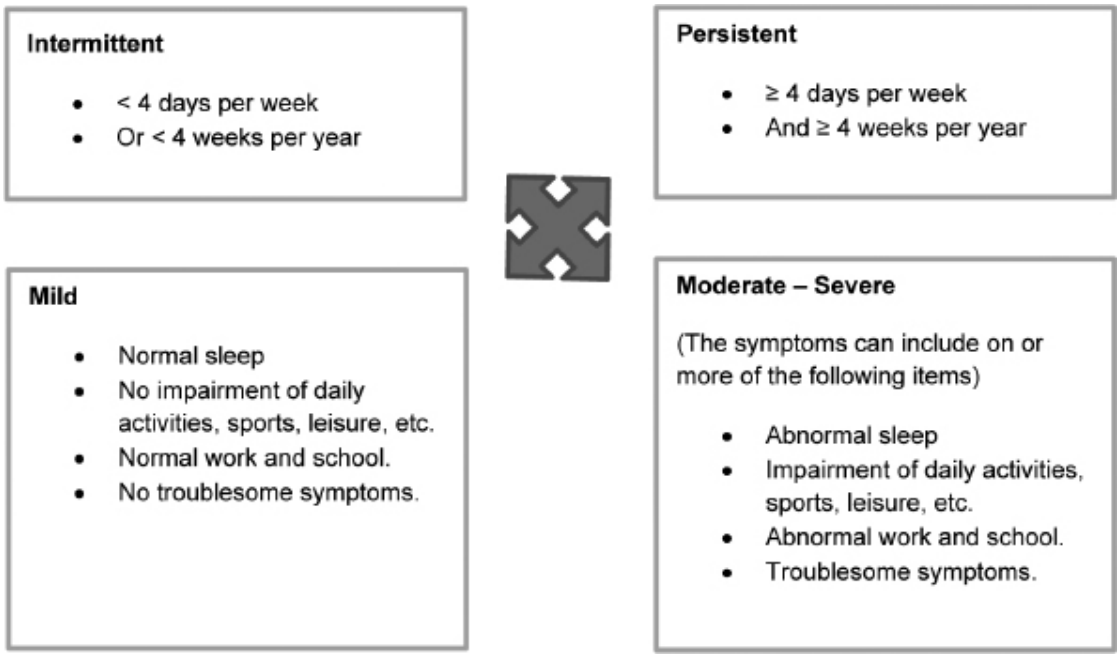
There are many conditions in which these symptoms are present, but the diagnosis of allergic rhinitis should be considered if two or more of the below symptoms are present for more than an hour for most of the days.

Four Key Symptoms of Allergic Rhinitis

- Sneezing
- Itching
- Runny nose
- Congestion i.e. nose block/obstruction

Diagnosis

Classification of Allergic Rhinitis



*Number '4' is the key for the understanding of this classification strategy.

Based on the above illustration, the diagnosis of Allergic Rhinitis would be one of the following in the order of severity based on the four factors affecting Quality of Life (QOL) or the duration of the symptoms. It is very important to classify the disease as the treatment strategy depends on the stage of the disease.

1. Mild Intermittent Rhinitis
2. Mild Persistent Rhinitis
3. Moderate - Severe Intermittent rhinitis
4. Moderate - Severe Persistent rhinitis

Symptoms

Sneezing and runny nose is typical. Many patients don't complain of itching or congestion. It has to be elicited through cross-questioning.

Sneeze is the most constant and presenting feature of allergic rhinitis. We all sneeze often in life. All sneezing is not a disease and does not need intervention. When the sneezing becomes unbearable, it is a sign that the normal response has exceeded its given mandate to protect the body. It is at this moment the patient should seek help.

Sneezing due to house dust mites happens typically in the morning. Usually in such a case, there would be a train of sneeze. But then it would stop suddenly, and the patient would be better through the day. However, some people with dust mite allergy may have their symptoms aggravated in the daytime due to the heavy exposure to mite in a well-carpeted office. On the other hand, pollens are the cause of sneezing in late afternoon and evening. These symptoms are related to the environmental exposure. The dangerous aspect of sneezing is that the speed of airflow during sneezing is 1250km per hour and thus, it can cause damage to the delicate vessels within the nose which can lead to bleeding. Even worse is that you just cannot keep your eyes open while sneezing. Sneezing could be dangerous especially in certain scenarios such as when driving a car. However, allergic rhinitis is much more than a simple sneeze and should not be taken in a trivial way because of the co-morbid disorders it causes.

Co-morbid Disorders

Pharyngitis	Constant pain or irritation in the throat. Often attributed wrongly to tonsils. It is due to the constant drip from the nasal passage.
Sinusitis	Co-existent with rhinitis.
Asthma	Present in 35% of AR patients and 80% of patients with asthma have an allergy. (Refer section 2, chapter 'Ease the Wheeze - Asthma' for more details)
Eczema	Concomitant presence of eczema or atopic dermatitis is very common. (Refer to section

	4, chapter ‘Eczema – Atopic Dermatitis’ for more details)
Otitis media or middle ear infection	Due to very close anatomical and physiological proximity since both the nose and ears are sitting cheek by jowl.
Lymphoid hypertrophy	Swelling of the entire lymphatic system which drains the nose and throat resulting in obstructive sleep apnoea. The adenoid is one such organ. (Refer to section 2, chapter ‘Snorers and Mouth Breathers’ for more details)
Speech impairment	Refer to the case in the chapter ‘Snorers and Mouth Breathers’.
Failure to thrive	Due to sleep disturbances and impaired oxygenation of the body cells. It is a soft sign of allergies.
Conjunctivitis	There is a constant itching and redness of the eyes. (Refer to section 4, chapter ‘Vernal Keratoconjunctivitis’ for more details)
Quality of Life (QOL)	Refer to QOL in section 1, chapter ‘The Burden of the Disease’ for more details.

Patients who don’t complain of a blocked nose may complain of post-nasal drip, causing throat itch or an itching in the ears due to the blockage of the Eustachian tube. A simple blocked nose may give a grouchy feeling the whole day. You don’t need hospitalisation, but you just can’t work to your full capacity and even feel lousy.

Sinusitis patients would usually have a headache or a heaviness of the head especially on awakening in the morning. They would not feel fresh in the morning unlike those without sinusitis. This may progress into the afternoon.

Apart from the characteristic features of allergic rhinitis such as a runny, blocked, itchy nose and/or sneezing, there may be a whole range of symptoms as shown in below table.

Range of Symptoms in Allergic Rhinitis	
Cough	Presents usually on lying down at night.
Sore throat	Due to recurrent secondary infections.
Hyper nasality	Peculiar tone wherein the words seem to be coming from the nose.
Behavioural problem	Sometimes this may be the only presentation of allergic rhinitis.

Signs

I have noticed patients squeezing or pushing their nostrils including the tip of the nose and the side of a nostril with the first finger or the palm and being completely oblivious of it even though this act can cause furrowing between the soft and the hard part of the nose.

Long-standing rhinitis can cause darkening and bogginess under the eyes. The lower eyelid becomes swollen because of venous stasis or an impairment of the blood flow in the local blood vessels. There may also be creases in the lower eyelid referred to as Muller's muscle spasm. These are seen as boggy eyes and are a hallmark of a long-standing nasal problem.

In children, allergic rhinitis is associated with swelling of the adenoids. The adenoids are pear-shaped glands in the nasal passage just above the soft palate. An obstruction in the adenoids causes snoring. In long-standing cases, there would be a typical face called 'adenoid facies'. The adenoid facies makes the child's face look elongated with a dull look. We will discuss more about the adenoids in the chapter of 'Snorers and Mouth Breathers'.

Although, a characteristic finding is pale boggy mucosa due to the swelling in the inferior turbinate's, sometimes on examination of the nose, there may not be any findings. If the nose inside is red and hot, it is unlikely to be allergic rhinitis unless there is also an underlying secondary infection. Sometimes especially in adolescents, a polyp may also be seen. The polyp is a protruding mass pale to bluish in colour. In children, one should avoid inserting any instrument for visualisation. A mere pinching up of the nose tip and visualisation under bright light will suffice. When there is an involvement of the sinuses which is common, there will be pain on percussion on the maxillary sinuses.

Other Diseases

Allergic rhinitis needs to be differentiated from a common cold. This is done on the basis of duration, other members of the family affected simultaneously, and on the appearance of nasal mucosa. The following table shows the various factors that differentiates common cold from allergic rhinitis.

Common Cold	**Allergic Rhinitis**
Cold lasts for a week	Cold lasts more than ten days
Equivocal response to antihistamines	Good response to antihistamines
Usually has a mild fever	No fever
Other systems may be involved	Have allergic signs
Nasal mucosa is red with thick mucus	Nasal mucosa pale boggy with thin mucus
Many people in the family have the same acute symptoms	Not many people have the same acute symptoms in family

Management of Allergic Rhinitis

The management of allergic rhinitis consists of four major pillars:

1. Education - (Refer to the 'Counselling' chapter).
2. Pharmacotherapy - (Refer to the 'Drug and Devices' chapter).
3. Avoidance - (Refer to section 6, chapter 'Environmental and Pollen Control'). It is important that the allergen causing allergic rhinitis is identified by a skin prick test (Refer to the 'Allergy Testing - Skin Prick Test' chapter) or by a blood test (Refer to the 'Laboratory Diagnosis of Allergic Diseases' chapter).
4. Immunotherapy - (Refer to the 'Immunotherapy' chapter).

Case Study

Satish, an 11-year-old boy was referred because of uncontrolled sneezing, particularly in the evening. He had no pets, but a few lovebirds. His sneezing had made his parents extremely concerned. On examination, it was found out that he had swelling of the inferior nasal turbinate. Skin prick test for allergies was strongly positive for house dust mites. The diagnosis was allergic rhinitis.

He had a history of headaches two years ago. He was seen by a neurologist who gave a diagnosis of migraine as his mother also had migraine. A CT scan showed evidence of sinusitis. Cases of allergic rhinitis can be misdiagnosed as other conditions. (Refer to the case study in the section 6, chapter 'Environmental and Pollen Control' to know about the outcome of Satish.)

Key Pointers:

- Allergic rhinitis manifestations are protean and therefore, the diagnosis needs to be borne at the back of the mind.
- The nose is part of the unified airway system and thus its affection can affect any component of the airway system.
- The symptoms may not be severe enough to cause hospitalisation but persistent enough to severely impair the quality of life.
- It is necessary that for appropriate management, we should identify the allergen and follow the four pillars of management.

Frequently Asked Questions (FAQs) on Allergic Rhinitis

Can swimming cure chronic sinusitis?

Swimming is an excellent breathing exercise and helps in the ventilation of the lungs and the sinuses. However, it is very important that the quality of the water in the swimming pool should be free of any irritants. These irritants include chlorine or any other chemicals which may be added to water to make it sterile. In addition, the water should also be free of bacteria, fungi, and viruses.

How can one get rid of allergic from perfume?

Perfumes do not cause classical allergy. A person is allergic to a living molecule i.e. proteins such as dust mites, pollen, fungi, dander, and food substances. Perfume is a chemical and thus causes symptoms as an irritant in a person with an underlying nasal structural defect or an underlying allergy.

Do you take allergy medicine for non-allergic rhinitis?

Allergy medication such as intranasal steroids and anticholinergics such as ipratropium bromide can be used in non-allergic rhinitis also. However, the effectiveness of these drugs in non-allergic rhinitis is not the same as in allergic rhinitis.

Is it safe to take Montair LC for a long time for allergic rhinitis?

There is no need to take the combination continuously. The LC or levocetirizine is required for a short duration of time up to 6 weeks. The Montair will be needed for a longer duration and is very safe for adults. In children, it may cause behavioural problems on a very long-term use.

Can allergic rhinitis be cured completely by surgery?

Allergic rhinitis is caused due to hypersensitivity of the immune system through an inbuilt genetic makeup. This cannot be cured by surgery. However, complications of

allergic rhinitis, such as polyps, turbinate, and septal hypertrophies can be corrected by surgery. Only Immunotherapy can completely cure allergic rhinitis

2

Ease the Wheeze - Asthma

This chapter explains what asthma is, its symptoms, and when to suspect the diagnosis. There is a detailed explanation about the types of wheezing and which patients with wheezing will develop asthma. We also talk about general treatment guidelines without details of drug therapy, time to seek help, and how the patient could adhere to treatment and manage the disease at home. This is followed by the asthma FAQs.

Introduction

Asthma is a chronic inflammatory disease of airways. In many, it is triggered by colds and coughs, but in some, it has an allergic aetiology. This inflammation in asthma causes airways to narrow and swell and produce extra mucus. This can make breathing difficult and trigger coughing, wheezing, tightening of the chest, and shortness of breath. Although asthma is a condition that is not reversible, it can be kept under strict control for a normal quality of life.

Predisposing Factors to Increased Lung Resistance and BHR

- Exposure to indoor allergens
- Obesity due to changes in diet
- Prolonged shallow breathing

- Children watching screen without interaction with the program

The modern lifestyle with increased indoor entertainment and subsequent changes in lifestyle has led to an increased lung resistance and bronchial hyperresponsiveness. These are due to the various factors shown above.

In our study, we made the following conclusion:*

> Apart from allergic sensitisation, lifestyle factors are key causative factors the in transformation from intermittent to persistent symptoms in allergic-asthmatic patients, establishing that persistent asthma is a chronic inflammatory disorder like diabetes and ischemic heart disease in genetically predisposed individuals needing multidisciplinary measures to prevent and treat persistent asthma apart from allergen avoidance and pharmacotherapy.

The following were our recommendations:

- After an exponential increase in asthma in last 3-4 decades which can be explained by modern lifestyle changes (apart from allergic sensitisation), the management of asthma should also focus on lifestyle modifications in addition to pharmacotherapy and allergens avoidance.
- We should live as near to nature as possible.

Issues with the Diagnosis of Asthma

Asthma is often called chronic bronchitis, hyperactive airway disease, or wheezy chest. There is a great fear of the word amongst both the patients and the doctors who are somewhat scared of losing the patient once the ‘sentencing’ has been done. This fear is more for paediatric patients. It is this stigma which has interfered with the proper and scientific management of the disease.

Asthma is a condition though not reversible can be kept under strict control without any exacerbations or

hospitalisation if the protocols as per GINA (Global Initiative for Asthma) are strictly adhered to. The GINA guidelines are mentioned at the end of the book. This, unfortunately, is not happening since the acceptance of the disease among the populace is poor. If one doesn't accept the diagnosis and face reality, one just doesn't get the correct treatment. As a result, we find most patients of asthma seeking an alternative system of treatment including quackery of which there's no dearth of in our country. Why some people get asthma and others don't isn't clear, but it's probably due to a combination of environmental and genetic (inherited) factors.

Diagnosis

Asthma is difficult to diagnose in infants and young children. Many children wheeze from infancy onwards and most of these children are prescribed the same medications used in asthma and very often as nebulisation of the drug. Every wheeze is not due to asthma and it is not necessary that all asthma patients would be having a cough or would be wheezing.

There are three different types of wheezing observable characteristics of an individual resulting from the interaction of its gene with the environment based on wheezing symptoms during the first 3 years of life and again at age 6 years. Based on this we can predict the risk factors for the development of asthma in these patients:

1. **Never/transient early wheezing resolved by age 6 years:**

   It is the most common type and is characterised by recurrent episodes of wheezing in the first twelve months of life. Risk factors for transient early wheezing are infants with school-aged wheezing sibling, day care attendance, house dust, endotoxins and cockroach allergens, male sex, and bottle feeding. There is less chance of developing chronic asthma.

2. **Persistent wheezing before age 3 years and at age 6 years:**

   This represents 20% of the wheeze children less than 3 years of age. Risk factors for persistent atopic wheezing include male gender, family history of asthma, eczema, eosinophilia at 9 months, and a history of wheezing secondary to infections. There is a high chance of developing chronic asthma later in childhood and adolescence, but the frequency of the wheezing episodes decreases by early teens.

3. **Late onset wheezing:**

   In this case, there is no wheezing in the first 3 years of life but begins at age 6. This may or may not develop chronic asthma.

Asthma Predictive Index

This is a collection of clinical and laboratory findings which may help in predicting asthma in a child. It has a high negative predictive value (NPV) and low positive predictive value (PPV). This means that if the index is negative then there is a very high chance that the child will not have asthma, but if it is positive, then it is not necessary that the child will have asthma. Since 2012, this index has fallen out of vogue.

Major Criteria	**Minor Criteria**
Parental asthma	Allergic rhinitis
Eczema	Food allergy
Inhalant allergen sensitisation	Peripheral blood eosinophil more than 4%
	Wheeze without cold

The presence of one major or two minor criteria is suggestive of asthma in a child with repeated wheezing. Asthma can be diagnosed after the age of 2 years and almost 80% of asthma patients are diagnosed before the onset of 6 years.

Presentation

For some people, asthma is a minor nuisance while being a major problem for others. It interferes with their daily activities and may lead to a life-threatening acute asthma attack.

The symptoms of asthma can be controlled but the disease can't be cured. The symptoms of asthma vary from person to person. You may have infrequent asthma attacks while others may have symptoms only under circumstances such as on exercising or may have symptoms all the time.

Signs and Symptoms of Asthma

- Shortness of breath
- Chest tightness or pain
- Difficulty in sleeping due to coughing, shortness of breath or wheezing
- Wheezing or whistling sound on exhaling*
- Coughing or wheezing attacks **

Signs that your asthma is probably worsening include:

- Asthma signs and symptoms become more frequent and bothersome.
- Increasing difficulty in breathing as measured with a peak flow meter, a device used to check how well your lungs are working.
- The frequent use of a quick-relief inhaler like salbutamol.

Asthma signs and symptoms worsen in any or all of the following situations mentioned below.

Asthma Triggers

The signs and symptoms of asthma can get triggered on exposure to various irritants and substances that trigger allergies (allergens). Asthma triggers vary from one person to another person and can include:

Airborne substances	Mould spores, pollen, dust mites, pet dander, or particles of cockroach waste
Respiratory infections	Common cold
Physical activity*	Exercise-induced asthma
Cold air	A blast of air in winter through a narrowed opening
Air pollutants and irritants	Smoke and particulate matter from a construction site
Medications Aspirin, ibuprofen, naproxen, and beta-blockers	
Strong emotions and stress	Commonly seen during the final examinations
Sulphates and Preservatives**	Processed potato, beer, wine, shrimp, and dried fruit
Gastro-oesophageal reflux disease (GERD)	Condition in which stomach acids come up into the throat

*However, it is to be emphasised that regular exercise improves the symptoms of asthma.

**Used in some types of foods and beverages.

Asthma Risk Factors

A number of factors are postulated to increase the possibilities of asthma. These include:

- Presence of another allergic condition such as atopic dermatitis or allergic rhinitis
- Blood relative (a parent or sibling) with asthma
- Exposure to occupational triggers-fertilisers in farming and chemicals in hairdressing/manufacturing
- Overweight
- Smoking
- Exposure to second-hand smoke
- Indoor and outdoor pollution

Red Flag Signs

These are the indicators that suggest the asthma is worsening and the patient is in need of urgent medical attention requiring hospitalisation. In such scenarios, people should stop trying any further treatment at home but rush to the nearest health facility.

- Chest pain or/and palpitations
- Sudden presentation with symptoms persisting
- Visible signs such as inability to complete sentence in a breath, talk in words
- Hunched forward and agitated
- Accessory muscles in use
- Cyanosis, confusion
- Noisy breathing like stridor, audible wheeze, and uncontrolled cough

The details regarding the treatment of asthma are discussed in section 6, chapters ‘Environmental and Pollen Control’, ‘Drugs and Devices’, ‘Immunotherapy’, and ‘Counselling’.

Prevention

We can only design a step-by-step plan for living with your condition and preventing asthma attacks.

- Adhere to an asthma action plan: Asthma needs regular monitoring and treatment since it is an ongoing condition. You will feel more in control of your life in general after taking control of your treatment.
- Get vaccinated for influenza and pneumonia: Staying up to date with vaccinations can prevent triggering asthma flare-ups by flu and pneumonia.
- Identify and avoid asthma triggers: Numerous outdoor allergens and irritants ranging from mould and pollen to cold air and air pollution can trigger asthma attacks. It is important to find out the triggers and take steps to avoid those triggers.
- Monitor your breathing: Before you notice any signs or symptoms, there will be a decrease in the lung function. Therefore, you should regularly measure and record your peak airflow with a home peak flow meter. You should also learn to recognise warning signs of a possible impending attack, such as uncontrolled coughing, wheezing, or shortness of breath.
- Identify and treat attacks early: A stitch in time saves nine. The earlier you act, the less likely is the possibility of a severe attack. You will also need less medication. Take your medication as instructed and immediately stop any activity that may have triggered the attack whenever you are alerted of an oncoming attack by a decrease in your peak flow measurements. Try for medical help as directed in your action plan when your symptoms don’t improve.
- Take your medication as prescribed: If your asthma seems to be improving, don’t change anything without first discussing with your doctor. It’s always best to bring your medications and devices with you on each visit. The doctor can double-check that you’re using your devices correctly and taking the right dose.

- Pay attention to increasing quick-relief inhaler use: If you find yourself relying on your quick-relief inhaler (SABA – Short Acting Beta Agonist) such as salbutamol very often, your asthma isn't under control.
- The latest recommendation allows a LABA such as formeterol to be used as a quick-relief inhaler.

Case Study

Sonali, a five-year-old female, presented with a history of repeated wheezing since the second year of her life. Each episode of wheezing was accompanied by a cold and a low-grade fever. Antibiotics, montelukast, an antihistamine and nebulised saline or bronchodilator like salbutamol provided some relief. This combination has always given her relief. The cough typically occurred when she laid down and at night. There's no family history of similar complaints. The father smokes but insists that he doesn't do that in the presence of the family members.

There is snoring and mouth breathing. There are no teeth grinding. The overall examination is normal. A nasopharynx lateral radiograph shows adenoids of moderate size. The patient was concerned as to whether this was asthma and whether it will go away.

The history suggests viral-induced wheeze, which may well go on to develop into asthma. It fits into a case of late onset wheeze mentioned above. The intermittent nature of the symptoms is against an allergic cause and indeed the allergy tests to house dust mite and pollen were negative. Because of the frequent symptoms, regular montelukast might be considered and a salbutamol inhaler for acute symptoms might be prescribed. Antibiotics are not indicated for virus infections. The father should be advised to stop smoking.

Key Pointers:

- Asthma diagnosis is a taboo for many patients. It is essential that the patient is educated about the disease and given proper counselling.
- Appropriate control cannot be brought about unless the enlisted measures are undertaken diligently.
- The patients ought to learn how to monitor the disease at home, identify the red flag signs, and seek treatment when necessary.

Frequently Asked Questions (FAQs) on Asthma

Is it possible to cure asthma permanently?

Asthma, just like diabetes, has no cure, but both can be managed so well that the individual can live an almost normal life. Unlike diabetes, asthma can be dormant for a very long time if good medical attention and adherence to treatment are followed along with environmental control. The person with asthma can go on symptomless for weeks to months and may not need medication frequently unlike diabetes which has to be managed on a daily basis and monitored closely forever. An allergic asthma can sometimes be helped by dust mite or pollen immunotherapy.

Does the fish-based asthma cure developed in India work?

The answer is no. There are no documented or proven studies that can confidently prove curing of asthma with fish medicine or otherwise.

What foods should I eat and avoid, having asthma?

In most cases, you can eat everything and don't need to restrict your diet. You should preferably avoid colourants, additives, and preservatives in food.

What are the tests to confirm asthma?

The diagnosis of asthma is essentially clinical. Symptoms like cough, wheeze, and breathlessness which are recurrent and reversible. However, there are tests to support the diagnosis of asthma like pulmonary function test or spirometry and the latest is inhaled nitrous oxide test. (Refer to section 6, chapter 'Laboratory Diagnosis of Allergic Diseases')

Can allergies cause chest pain?

Allergic asthma commonly presents as chest tightness and difficulty breathing which might be perceived as pain. It is usually bilateral and non-radiating.

Is there a cure for asthma at the initial stage?

Asthma cannot be ‘cured’ per se in any stage—initial or late. But it can be better controlled in initial stages as when compared to late stages.

Can too much albuterol cause increased asthma?

Too much salbutamol/albuterol is definitely bad but not in terms of causing increased symptoms of asthma but by various other systemic side effects like increased heart rate and palpitations. Regular use of salbutamol indicates that the asthma is poorly controlled and that you need to see your doctor.

What can a person with asthma do to alleviate his/her symptoms, other than using an inhaler?

80% of asthma has an underlying allergic cause. Skin prick tests and other allergy tests for house dust mite or pollen help to determine what is triggering the asthma. After identification of the allergen, active care in avoiding contact with allergen through environmental control can give satisfactory results.

Who offers the best treatment for asthma?

The best treatment for asthma can be offered by a chest physician (pulmonologist) and if the asthma is due to allergic causes or there is the presence of co-morbid disorders, then the best physician to approach is an allergist.

Can you outgrow asthma?

For a better understanding, asthma can be compared to a volcano. They can be active, dormant, or extinct. Unlike volcanoes, asthma can be either active or dormant but never extinct. Your symptoms may gradually go down with age to an extent where you go symptomless for months to years, but you can never truly really be cured of asthma.

Can people with asthma dance, join a gym, play sports, or exercise? And can any form of physical activity dangerous to them?

People living with asthma can do absolutely anything, provided their asthma is well under control. There are well-known sports personalities like David Beckham who have asthma.

Why are antihistamines not used in asthma?

In asthma, which is predominantly a disease of the lower airway, histamine is not a part of the inflammatory cascade (refer to the chapter 'The Body's Defence System'). There are no histamine receptors in the lung airways. The antihistamines work well for concurrent allergic rhinitis. The major substances that play a role in asthma are leukotrienes, bradykinin, and interleukins. Antihistamines work well for concomitant allergic rhinitis.

My child is too scared to leave the house because smokers give her really bad asthma attacks, but they're everywhere. How can I help her?

In many countries, smoking is prohibited in most public places like educational institutes, public transports, parks, and malls; the places children are more likely to be at. In case your child encounters smokers in above listed places, don't hesitate to contact the concerned authority or call the local helpline. In India, the toll-free number is 1800–110–456.

How does lavender oil help asthma?

There are no published studies that claim the efficiency of lavender oil in soothing or curing asthma. However, close contact with lavender flowers to a person allergic to pollen may aggravate the symptoms leading to an asthma attack.

How can asthma cause hyperinflated lungs?

In asthma, the amount of air inspired is not entirely expired because of a ball valve mechanism in the airway of lungs which leads to air trapping. A gradual buildup of trapped air makes the lungs look hyperinflated.

How can I get rid of allergic asthma?

80% of asthma is due to an underlying allergic cause and hence, it is sometimes useful to know the allergen triggering the asthmatic attack and avoiding it actively. This can be done effectively through environmental control. There are several options in medical therapy like a combination of bronchodilators (salbutamol, salmeterol) and low dose corticosteroid puffs, mast cell stabilisers like montelukast, when used on a daily basis, can reduce symptoms and avoid precipitation of asthmatic attacks. Newer modality of therapy called systemic immunotherapy (SIT) which includes sublingual immunotherapy or subcutaneous immunotherapy have promising results and have proven their long-term effect in reducing symptoms, but most people still need to take their asthma medication.

How are allergies (eczema) and asthma related?

Asthma and atopic dermatitis (eczema) are different manifestations of atopy.

Do toddlers who have eczema and food allergies have a high chance of developing asthma?

Most children who develop eczema and food allergies early on in life are more prone to develop asthma in later years. This is called ‘Allergy March’ which is nothing but a natural course of atopy.

How can pigeons cause asthma?

The dust of dried droppings (faeces) of pigeons is known to irritate nasal mucosa which leads to a hypersensitive state in the nasal and lung mucosal linings. In addition, the protein molecule in the pigeon dander can cause the allergen cascade.

Does using the sauna help with asthma?

There are no direct benefits since it has no effect on bronchial airways. But yes, there may be indirect benefits. It can be recommended in children with bronchial asthma since there may be an improvement in resistance against infections as well as in psychosocial behaviour.

Is saltwater pool better for asthma?

Studies have shown that a 4-week therapy at the dead sea has resulted in increased lung function, improved efficacy of inhaled bronchodilators, and a decrease in number and severity of attacks of asthma. The improvement in asthma at the Dead Sea may be due to absorption of magnesium and other salts through the skin and via lungs and due to involvement in anti-inflammatory and vasodilator processes. Extrapolating this study, we can suggest that creating similar conditions in a pool can improve asthma symptoms.

Can you be born with asthma?

Yes. A particular gene which is newly discovered called the ADAM 33 (a disintegrin and metalloproteinase 33) gene at birth confers development of asthma and airway

hyperresponsiveness. In addition, many other genes have been discovered.

Is it bad to take asthma drugs when you don't have asthma?

It's not advisable to take asthma drugs by a person who does not have asthma. It is not beneficial but certainly, no side effects are caused due to one time or short-term use of the drugs.

What does the red asthma inhaler represent?

Asthma medication is of two types i.e. controller and relievers. All reliever medication such as salbutamol, albuterol, and levosalbutamol come in blue colour. The controller medication comes in purple, green, and red. Budesonide is a steroid which acts as a controller and it comes in red colour only.

Why do we cough while lying in bed?

Under normal conditions, cough serves an important protective role in the airways and lungs. But in some conditions, it may become excessive, non-productive, troublesome, and potentially harmful to the airway.

Anatomy

The cough reflex has sensory component mainly via the vagus nerve and motor components via the muscles of respiration. Pulmonary irritant receptors (cough receptors) in the epithelium (lining) of the respiratory tract are so sensitive to both mechanical and chemical stimuli that slight amounts of foreign matter or other causes of irritation initiate the cough reflex.

Physiology

Laryngeal and tracheobronchial receptors respond to both mechanical and chemical stimuli. Chemical receptors sensitive to acid, heat, and allergens and physical receptors sensitive to smoke, light touch (post-nasal drip), and wind stimulate the cough reflex.

Cough, which is aggravated on lying down, is commonly due to two causes:

1. Post-nasal drip: Continuous post-nasal drip acts as a physical irritant to the larynx and pharynx, more so on lying down, which activates the cough reflex arc leading to cough. Thus, any condition which leads to post-nasal drip aggravates the cough. For, example, allergic rhinitis and any upper respiratory tract infection like the common cold, sinusitis, etc.
2. Asthma: Due to increased levels of leukotrienes (which aid in coughing) and low levels of cortisol (which combat the coughing mechanism) at night results in increased cough intensity especially after midnight.

*Reference: PurushotamD, Ahmed M.A. Lifestyle factors as main causative factors apart from allergen sensitisation in the development of persistent nature of asthma from an intermittent one. ALLERGY' September 2013 and JEMDS Journal June 2016 and at EAACI Milan 2013.

*Wheezing is a common sign of asthma in children.

**Worsened by a respiratory virus, such as a cold or the flu. The cough is characteristically more after midnight. The nocturnal cough is due to greater night-time activation of inflammatory cells and mediators like leukotrienes, lower levels of epinephrine, increased vagal tone, and differences in the glucocorticoid and beta receptors level.

3

Snorers and Mouth Breathers

This chapter looks at children with snoring and mouth breathing issue. It brings about a paradigm shift in the approach and management of children with snoring, mouth breathing, and teeth grinding.

Introduction

The prevalence of mouth breathing, snoring, and difficult breathing has increased in the age group of one to eleven years. This is having an impact on the growth of the child, his behaviour, and concentration. As a consequence, it affects their quality of life.

Approach

The first thing to ascertain is whether the child is having difficulty breathing or is it just a habit. On sealing the lips, the child can breathe for at least two minutes through the nose than it is more a habit and needs only counselling.

Another thing to note is that the tongue should be normally resting at the roof of the mouth. If it is resting at any other place i.e. on the teeth, the bottom of the mouth, or in between the teeth, it will cause problems. Also, if they have or had a thumb or finger sucking habit then it will lead to Orofacial and Myofunctional Disorders (OMDs) causing abnormal positioning of teeth and a facial deformity. When the thumb is in the mouth, especially for an extended period of time, the oral and facial muscles will develop around this habit. When the thumb is in the mouth, the lips are not able to form a seal, and a tongue thrust swallowing pattern develops as well. Just because a child stops sucking his or her thumb does not mean the mouth breathing symptoms will go away.

The same thing that occurs with airway issues often occurs with sucking habits; the habit is stopped, but the mouth breathing remains.

The child would need a myofunctional therapist and probably an orthodontic treatment after the thumb or finger sucking habit has been eliminated. This will bring about an improvement in sleeping along with proper eating, speaking, and breathing.

Complications

Under normal condition, the breathing takes place by the nose and therefore mouth breathing or snoring should not be overlooked and a proper evaluation should be done because it can progress and lead to sleep disorder as mentioned earlier and a poor school performance. And subsequently, it can lead to adverse effects on both the heart and lungs.

Anatomy

The adenoids are at the centre stage of the respiratory air passages. It is around this point that the connections from the ears, sinuses, nose, and lung passage converge on an isthmus. It is exactly at this isthmus that the adenoids are located.

Physiology

During the deep stages of sleep, there is complete relaxation and a collapse of all the muscles around the airway. The airway is normally a tight space and it can become further tighter in the presence of enlarged tonsils and adenoids both in children and infants. Now if this airway becomes obstructed, the brain has to come out of a deep state of sleep to a lighter stage of sleep to grind and clench the teeth in order to push the jaw forward to allow for breathing.

Soft Clinical Signs

Grinding and clenching are the body’s way of reopening a collapsed airway during sleep to start breathing again. And as a result, there is a disturbance of the sleep pattern in such individuals.

Grinding and clenching is the new red flag for catching sleep apnoea early.

Children who have been deprived of a deep stage of sleep because of obstruction in the airways by tonsils or adenoids are very hyperactive. This is due to the excessive adrenaline released in order to overcome the daytime sleepiness occurring due to improper sleep at night. These children do not achieve their full academic potential since both their brains and bodies aren't at their best in a damaged, deep sleep-deprived state. They are often diagnosed with ADHD (Attention Deficit Hyperactive Disorder) and with other behavioural issues. They also have lowered immune system, poor health, and can sometimes be overweight too.

Causes of Airway Obstruction

The most common cause of this is due to the adenoids located in nasal pharynx which is an area just above the soft palate. It can be seen neither from the mouth nor from the nose directly. We simply do an X-ray to see for any enlargement. The location of the adenoids in a limited space along with edema or swelling in response to an insult leads to matching greater airway obstruction.

The insult could be mostly due to infection or allergen. Children do suffer from repeated viral and bacterial infection which would lead to enlargement of the adenoids. As age advances and the infections abate, the adenoids would gradually shrink. The adenoids enlarge normally in childhood due to physiological reasons and shrink subsequently.

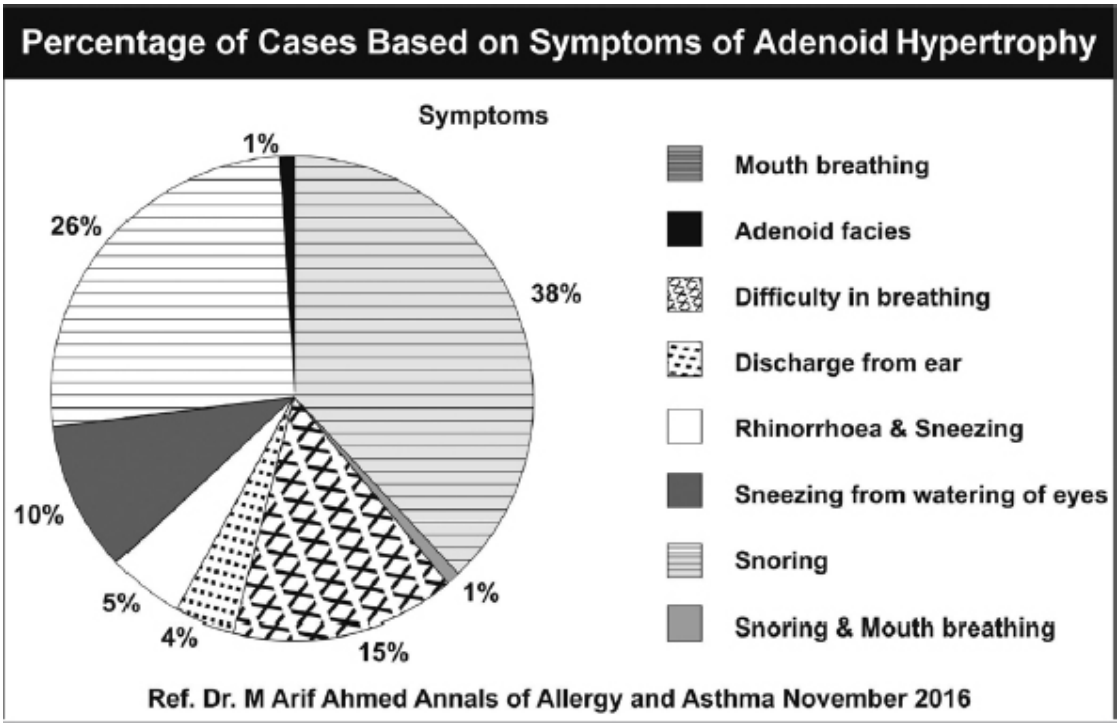
However, allergens too have a higher action in the adenoids due to the anatomical proximity to the nose and the sharing of the same lymphatic drainage. In various study models, it has been shown that there is a definite pathological and physiological relationship between adenoids enlargement and allergy. Both infection and allergies contribute to adenoid enlargement and also inflammation. As a result, this also worsens middle ear disease causing otitis media with effusion.

The adenoids are likely to be sensitive to the *house* dust mite (HDM) especially if the patient is having concurrent allergic rhinitis or inflammation of the nose. It has been shown that allergy control in these patients brings about a reduction in the incidence of adenoid surgery.

Various studies across the globe have shown that children with a family history of allergy and clinical allergy have early onset of symptoms in presence of adenoid enlargement. There has been a higher incidence of positive allergic testing in children with mouth breathing. House dust mite was the most common allergen identified in children with adenoid enlargement. Almost 50% of children having moderate to severe rhinitis were not satisfied with the treatment.

Our Study

From the 'Evaluation of dust mite allergy in children with adenoid Hypertrophy' presented at ACAAI in San Francisco and published in annals of allergy November 2016, we made the following observation:



(Adapted from Evaluation of Dust Mite Allergy in Children with Adenoid Hypertrophy. Arif Ahmed Annals of Allergy and Asthma November 2016**.)**

Sensitivity to dust mites is a risk factor for adenoid enlargement. If there is a family history of allergy and presence of clinical allergy and a male child, there would be a higher incidence of HDM allergy. Also, there is a direct correlation between dust mite allergy and size of adenoid enlargement. As the enlargement

increased from mild to moderate to severe, there was a corresponding increase in the incidence of HDM positivity.

Hence, the recommendation was that there should be a complete ENT as well as allergy assessment of the child with adenoid enlargement. They should be evaluated comprehensively since there is a definite treatment which would lead to a reduction in morbidity and much suffering. *The mainstay of this treatment besides allergen avoidance is intranasal steroid spray for at least 6 weeks.* This would lead to a reduction in the size of the adenoids thus saving the patient from surgery. It is referred to as medical adenoidectomy.

Case Study

Zaid, a two-and-a-half-year male child, was a non-resident Indian from Australia who was brought to a clinic because of a constant cold. 'The nose is always blocked,' his mom exclaimed. His speech was delayed as he could only say 3 to 4 words when he should be speaking in sentences. He snored and occasionally mouth breathing. An X-ray of his nose and pharynx showed moderate swelling of the adenoids. Tympanometry showed fluid in both the middle ears.

The child was given a two-week course of intranasal steroids along with a Montelukast tablet. After two weeks, tympanometry was normal, and adenoids had shrunk. Also, the child became more interactive and his restlessness came down. Blood tests for dust mites were strongly positive.

A complete hearing test was normal. The lack of interaction was due to a combination of decreased hearing because of middle ear fluid secondary to dust mite triggered allergic rhinitis but also due to the lack of verbal stimulation. It is commonly observed amongst expatriates in foreign lands. There is a lack of stimulation for a child alone with a mother confined at home and negligible contact with neighbours and a minimal social circle. The interaction improved in India when the child started interacting with the whole of the extended family.

The above case is an example wherein the only complaint was a constant cold and nothing else. However, an open mind and a keen observation showed that the child had both speech impairment and

behavioural disturbance due to a co-morbid disorder of allergic rhinitis - adenoids.

Key Pointers:

- Snoring and mouth breathing need to be evaluated.
- Teeth grinding and clenching in sleep needs a relook. They are the body's way of reopening collapsed airway during sleep to start breathing again. It's the new red flag sign for catching sleep apnoea early.
- Behavioural abnormalities in children may be due to a pathological cause in the airways.
- Adenoids secondary to allergies is an important cause and intranasal steroids will prevent surgery.

Section 3

MULTISYSTEM ALLERGIES

Food allergy is not limited to a single organ. One may presume it to be limited to the gastrointestinal tract but in reality, it affects almost every organ of the body especially due to its penchant to cause anaphylaxis. Although anaphylaxis is uncommon, food allergy also commonly involves the skin and nose and lungs along with the gastrointestinal system.

1

FOOD ALLERGY

Food allergy is now a major concern, especially in the West. This is due to the risk of anaphylaxis and also the wide prevalence. The chapter clarifies the different terminologies associated with food allergy. The details of diagnosis of IgE mediated food allergy is followed by various strategies for dealing with the food allergy such as food allergy diary, oral challenge test, elimination test, and nutrition counselling. There is a detailed discussion on cow's milk allergy; non-IgE mediated allergy or food intolerance. Day-to-day problems related to food allergies have been dealt in the FAQ section.

Introduction

Food allergy is a term used by many patients and clinicians to describe a variety of adverse reactions to foods. However, not all symptoms after ingestion of a specific food are due to an allergic or immunologic mechanism. In fact, the majority of symptoms attributed to food allergy are not true allergic reactions. It is important that one should be clear with the different definitions and terminologies associated with food allergy.

Definitions and Terminologies

Adverse food reactions: General term encompassing all untoward reactions to foods.

- Food allergy (True food allergy): It involves an abnormal response of the immune system to one or more specific food or food components. When we talk of food allergy in a true sense, we refer to this type of reactions. This chapter mainly deals with this type of reactions to food.

- Food intolerance: Lactose intolerance and favism are some examples. Lactose intolerance occurs because of an inherited deficiency of the enzyme ß-galactosidase in the intestinal mucosa. It can be present transiently in infants and toddlers especially after a severe diarrhoea. Favism results from an inherited deficiency in the enzyme glucose-6phosphate dehydrogenase in the erythrocytes, which causes a heightened sensitivity to several naturally occurring oxidant compounds found in fava beans.

Difference between Food Allergy and Food Intolerance

Is it a food intolerance or food allergy? This is the common question asked in clinical practice. It needs to be explained that food intolerance is not the same as a food allergy.

Here's how you can tell the difference:

Food Allergy	**Food Intolerance**
Reaction of your immune system: • Your immune system mistakenly treats proteins found in food as a threat. Can rarely be life-threatening.	**Immune system may not be involved:** • There is no allergic reaction. • Never life-threatening.
Symptoms: • Starts rapidly after eating just a small amount of the food. • Typical allergy symptoms such as a rash, wheezing, and itching.	**Symptoms:** • Starts slowly, often many hours after eating a reasonable amount of the 'problem' food. • Typical symptoms.*
Foods: • Common food allergies in adults are to fish, shellfish, and nuts, and in children to milk, eggs, and peanuts.	**Foods:** • Can be caused by any food.**

*Some people have trouble digesting wheat and experience bloating, wind, diarrhoea, and vomiting and stomach pain after eating bread.

**The culprit may be a food additive, chemical or contaminant such as: Monosodium glutamate (MSG), Caffeine, Alcohol, Artificial sweetener, Histamine (corn, mushrooms, pickled and cured foods, and alcoholic drinks), Toxins (viruses, bacteria, or parasites that have contaminated food), Artificial food (colours, preservatives, or flavour enhancers).

Below are reactions due to food colourants:

Food Colourant	Reaction
Tartrazine	Urticaria
Sunset Yellow	Urticaria, angioedema, Gl illness
Annatto, Carmine	Urticaria, angioedema
Sulphites in drugs and food	Rarely Anaphylaxis
Benzoates, Nitrates	Urticaria, angioedema

Flavour Enhancers: These are papain, lactose, gelatin, inulin, wheat starch, and lecithin.

(Adverse effect case reports have been reported to the above.)

Food Sensitivity

It is often unclear why a person is sensitive to certain foods. For instance, if your symptoms come on after having dairy products, it’s possible that you may be lactose intolerant. This means your body can›t absorb lactose, a sugar found in milk, yoghurts and soft cheese.

1. Food Aversion:
   Food aversion is the alteration of eating behaviour for psychological reasons. It may manifest as psychological

food intolerance, where there is an adverse physical reaction associated with the ingestion of a particular food.

2. Psychological Food Intolerance:
   This response may be associated with symptoms that may be similar to those associated with true food intolerance. Such reactions are psychosomatic and do not occur when the food or food ingredient is administered in disguised form. Anecdotally, in some cases, the bodily reaction can even be reproduced by the mere suggestion that a particular food may have been consumed. Development of an aversion to specific foods is recognised to occur occasionally following vomiting associated with medical treatments, where the food has been eaten at about the same time. It can be overcome with counselling. A skin prick test is the best way to disprove the allergic food.
3. Food Poisoning:
   Food poisoning is a result of consuming food that was not fully cooked or is otherwise contaminated with preformed bacterial toxins which would cause the symptoms. These symptoms can develop rapidly within 30 minutes or slowly progressively worsen over days to weeks. Usually, food poisoning is not serious and lasts 24 to 48 hours.

   Some of the symptoms of food poisoning include:

   - Feeling sick (nausea)
   - Diarrhoea
   - Being sick (vomiting)
   - Stomach cramps
   - High temperature of 38 degrees Celsius or above
   - Feeling generally unwell such as feeling tired or having aches and chills

4. Food Idiosyncrasy:
   Idiosyncratic reactions are in an individual who exhibits adverse reaction to a particular food to which the general population is not sensitive to. They propagate through an unknown mechanism and are poorly understood. In fact, the cause-and-effect relationship implicating the food or food ingredient as the cause of the illness is often quite weak. Example: sulphite induced asthma.

Prevalence

The precise prevalence of food allergy is unknown, but surveys have shown that the prevalence of food allergy based upon public perception runs as high as 20%, whereas the true prevalence is around 2-8%. The prevalence of food allergy is more common in early childhood days (6-8%) compared to adults (1-2%).

The prevalence of food allergies in Indian children living in India is unknown but presumed to be lower than children of Indian descent who are born and brought up in the West. In general, 6–8% of children who are born and brought up in the West are known to have food allergies. This vast difference of prevalence occurs as allergy depends upon epigenetic which is the change of expression of a certain gene despite having the same genetic code.

The food allergen that has been most extensively studied is peanut allergy. Hence, it is necessary to understand the reasons behind the increase in peanut allergy to understand increase in food allergy.

In the United States, the number of children with peanut allergy has more than tripled between 1997 and 2008.This allergy tends to be lifelong and only about 20% of children are fortunate enough to outgrow it.

Pre-existing Factors and Changes for Increase in Peanut Allergy

1. Delayed oral consumption of peanut proteins. Comparison of Israel and London.
2. American Academy of Paediatrics policy regarding avoiding peanut products in infancy. There has been a regular waxing and waning in the timing of peanut introduction. (Refer to LEAP study results in section 7, chapter ‘Traditional Indian Practices’)
3. Preparation of peanut products:
    - Roasted vs boiled
    - Emulsified peanut products in the United States Roasted peanuts are more allergenic than boiled peanuts

Role of the Environment

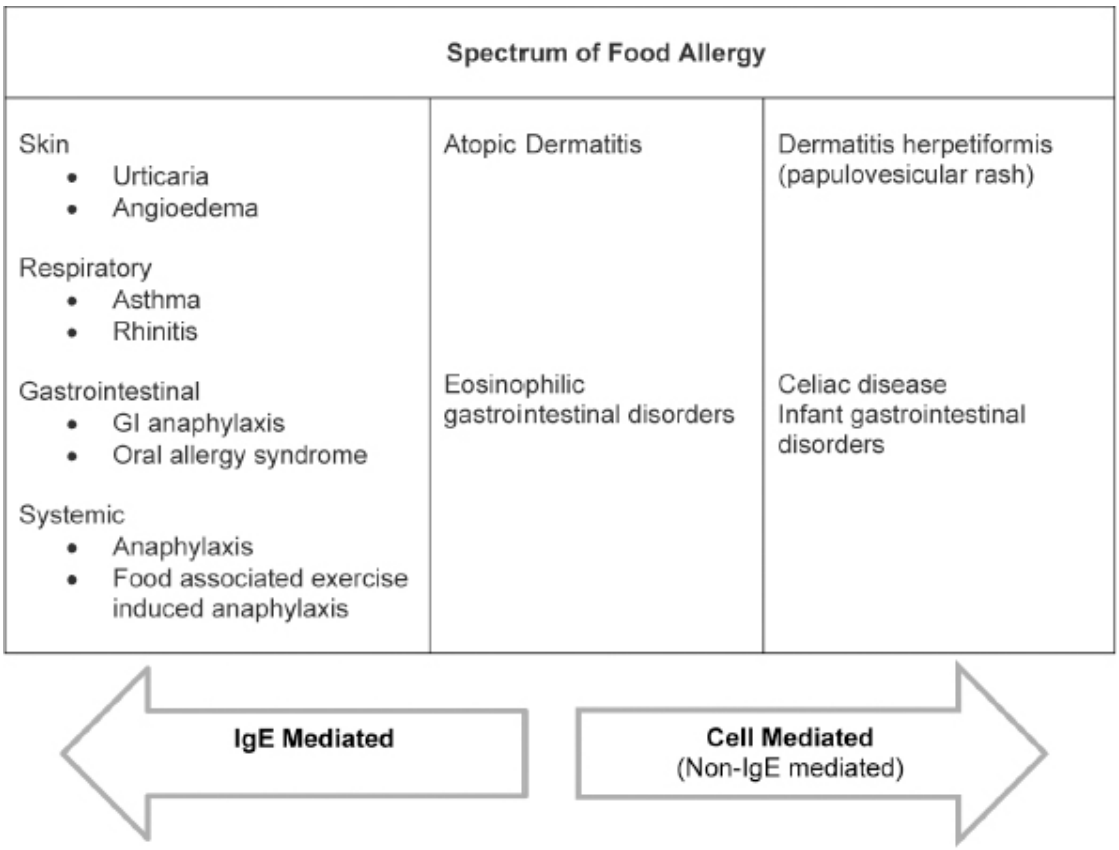
Indian children born and brought up in the Western world have the same incidence of food allergies as their white counterparts. The westernised standards of living consist of a very hygienically maintained environment, food habits consisting of consuming packed and processed food containing additives, preservatives and/or colouring agents, change in dietary choices, and in infancy due to lack of adequate breastfeeding along with the use of nontraditional food during weaning.

In Indians living in India, thanks to our cultural and food habits, we are protected from developing these allergies. However, if there is a change in the food habits right from birth and increased westernisation in our day to day living, very soon food allergies will become endemic in India.

Types of Food Allergies

Food allergies may be divided into 2 types:

1. IgE mediated reactions. These are immediate type of reactions, having symptoms within 20 minutes of food ingestion and maximum up to 2 hours (milk, eggs, nuts).
2. Non-IgE mediated (eosinophilic esophagitis [EOE], eosinophilic gastritis or food protein-induced enteropathy syndrome [FPIES]).



IgE-mediated

IgE-mediated means that IgE antibodies are a cause of the allergic reaction to a particular food substance. This is a true allergy, characteristic of which is fixed temporal association of symptoms with food ingestion, i.e. symptoms will appear within 20 minutes to 2 hours. Symptom consists of mild rash on the skin called hives/urticaria to fatal anaphylaxis reactions.

Food allergy may have both IgE and Non-IgE mediated reactions at the same time. A good example is cow's milk protein allergy which can be both ways. This can be the situation particularly in children with severe eczema.

IgE mediated food allergy is further subdivided into two categories:

1. IgE mediated Allergy due to class 1 food allergen: These are comparatively heat-stable and enzyme-resistant class 1 food allergens that induce allergic sensitisation via the digestive tract, typically being responsible for systemic allergic reactions. These are relatively serious reaction. Example, peanut allergy.

2. IgE mediated Allergy due to class 2 food allergen: Class 2 food allergens are more heat-labile and susceptible to digestion and therefore do not cause gastrointestinal sensitisation, but instead provoke allergic reactions in already sensitised patients to cross-reactive aeroallergens through the respiratory route. Typically, pollen-food syndromes are produced by class 2 food allergens. In contrast to class 1 food allergy which mainly affects young children, Class 2 food allergy is observed especially in adults as a consequence of sensitisation to cross-reactive aeroallergens.

Non-immunoglobulin E (IgE) Mediated Food Allergies

It will present as more sub-acute and/or chronic symptoms that are typically isolated to the gastrointestinal tract. They do not affect the respiratory system, nor do they cause urticaria. Affected patients are commonly present with a characteristic constellation of clinical features that are consistent with well-described disorders. The reactions are limited to the gastrointestinal tract and are non-specific such as vomiting, bloating, and diarrhoea. Most importantly, these may appear hours to days after the ingestion of the food unlike IgE mediated which occurs sometimes even in minutes. Example oral allergy syndrome.

The mechanism of non-IgE-mediated food allergy is not well defined and not well understood. The immune system is presumed to be involved and IgE antibodies are not associated with this condition. Hence, the term ‘non-IgE-mediated’ food allergy. Since the symptoms are usually delayed to the extent of 24 to 48 hours after the ingestion of the particular allergenic food as compared to IgE mediated food allergy, it is more difficult to make the association between offending food and the symptoms.

The most common causative foods for non-IgE-mediated food allergies are cow’s milk and soy proteins in infants and wheat in older children. Unlike IgE mediated food allergy, non-IgE food allergies are very rarely immediately life-threatening because they do not result in anaphylaxis.

The exclusive non-IgE-mediated food allergy disorders include:

- Food protein-induced enter colitis syndrome (FPIES; entire gastrointestinal tract)

- Food protein-induced enteropathy (small bowel)
- Food protein-induced proctitis and proctocolitis (rectum and colon)
- Food-induced pulmonary hemosiderosis (Heiner syndrome)
- Eosinophilic Esophagitis (EOE) is a group of conditions in the digestive tract in which infiltration of eosinophils is diagnostic

Food Protein-Induced Enter Colitis Syndrome (FPIES)

FPIES is an uncommon type of non-IgE-mediated food allergy. This condition is usually seen in infants below one year and consists of profuse vomiting 1-3 hours after ingestion of the food soon after it has been introduced into the infant's diet. The infant can become pale and floppy after severe vomiting and can also develop diarrhoea. Common triggers are cow's milk and soy milk in 50% of cases but can also occur with a large variety of other foods such as grains (in particular rice), meats, and other foods less commonly associated with allergies. This condition is frequently misdiagnosed as a severe gastroenteritis or bacterial infection or as an acute surgical condition in the abdomen. There are often several reactions before the diagnosis is established. At times, they may be dehydrated requiring intravenous fluids. Typically, they come with watery diarrhoea not responding to the entire battery of antibiotics thrown at the child. All the routine testing and cultures are negative. Even a skin prick test to any suspected food allergens is negative. The parents would be doctor shopping. In spite of the patients being on the incriminating agent albeit, in lower amounts, the diarrhoea is self-limiting. Almost all children will outgrow from this condition by school age. (Refer to the case at the end of the chapter)

Proctocolitis

It is a condition that predominantly occurs in infants. Usually the baby is well and thriving and presents with bloody diarrhoea. Symptoms usually resolve after removal of cow's milk and soy from the diet of the infant and mother, if the latter is still breastfeeding. This condition can occur in fully breastfed babies since proteins from cow's milk can pass through the mother's milk and cause symptoms in her baby.

How to Diagnose Food Allergy

In IgE mediated reaction:

1. Clinical history	For possible identification of causative allergens.
2. Allergen-specific IgE demonstration	Allergen skin prick test (SPT) or in vitro blood test (specific IgE immunoassay).
3. Challenge	Determines whether exposure to the causative allergen orally will result in symptoms.

Diagnoses of Non-IgE Mediated Food Allergy

Unlike IgE mediated food allergy, there are no blood or skin tests which have proved useful in general medical practice. Therefore, the diagnoses must be suspected on the history and maybe confirmed by observing that the symptoms improve when the suspected food is removed from the diet and returns when the food is reintroduced into the diet. This process can take a number of weeks or months to complete properly and is termed the eliminate-rechallenge test. The rechallenge aspect of the test is very important to confirm the link between the offending food and symptoms since symptoms can resolve by chance.

Sometimes the elimination-rechallenge sequence does not give a conclusive result and needs be done a second time. Most clinicians recommend that the food be removed for two weeks. If symptoms resolve, then the food is gradually reintroduced to assess whether symptoms recur. Only one food type at a time is removed. If more than one type of food is removed, we recommend that a dietician trained in allergy elimination diets is involved in the care of the patient.

Diagnostic Tools for Food Allergy

The impact of food allergies on the human body can be as innocuous as just causing a mild rash or fatalistic to causing an anaphylactic shock. It can be very subtle and thus difficult to

diagnose because of hidden food allergens such as additives, preservatives, and colouring agents.

1. Blood test for specific IgE. (Refer to section 6, chapter 'Laboratory Testing')

2. Skin Prick Test. (Refer to section 6, chapter 'Skin Prick Test')

3. Food Allergy Diary:

   Parents of a child who presents to the clinic with symptoms suggestive of food allergies are advised to maintain a food diary which will help in tracing the food substance which triggered the allergy.

   It is a very common practice amongst patients to attribute their symptoms of skin rashes or respiratory or gastrointestinal symptoms to food. If it is a true allergy, the symptoms would occur within a maximum of 2 hours from the time of ingestion and more often within 30 minutes. The patients are more often not clear as to which particular food would be causing the problem. In order to make it easy, they should stop eating all outside prepared food, all packaged food, and any food containing additives, preservatives, and colouring agents.

   The food cooked should be simple and contain the usual ingredients which the patient has an element of doubt about being allergic. Whenever they get the symptoms following ingestion, the particular food and its contents should be jotted. Such a diary maintained over a period of one month will help in narrowing down the particular food item. All the food which was in common at the time of reaction would be subjected to an allergy test by skin prick or by blood testing. When any of these come positive, they'll subsequently be subjected to an oral challenge test.

   Oral Challenge Test:

   The patient is made to ingest the food to which he has a doubt or has come positive on a blood or skin prick test. It may be open where both doctor and patient are aware of the food taken. In single-blind, only the doctor is aware and in double-blind, both are unaware. Double-blind food

challenge is the gold standard in the diagnosis of food allergy.

The patient is admitted in a hospital. On an empty stomach, he is given an incremental amount of the allergic food every 15 minutes till a fixed maximum amount is reached.

This test can be done with caution at home only for certain foods. The foods which have not shown a strong positive reaction on a skin prick test can be tested at home. The onset of the signs and symptoms of food allergy at any time of the test warrants the immediate cessation of the procedure and administration of anti-allergic medication and observation of the patient.

4. Role of IgG tests in the diagnosis of food allergies**:** They are not useful in diagnosing allergies and need not be used.

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MODALITIES OF PREVENTION AND TREATMENT OF FOOD ALLERGIES

Avoidance

Strict avoidance is the basis of control.

Hidden Allergens in Food Allergy

Hidden allergens in foods represent a major health problem for sensitised persons. A substance is a hidden allergen when it is unrecognised or not declared on the product label. This omission is not always intentional. There are also many ways for allergens to be hidden in food, for example through misleading labels, allergenic foods that can contaminate other safe foods, carelessness, food that is listed by an uncommon term, and ingredient switching, among others. Hidden allergens can induce a wide variety of hypersensitivity reactions. For example, patients with milk allergy should avoid any food with the following ingredients on the label—casein, ghee, custard, curd, lactalbumin, lactoferrin, and whey.

Allergic Food Ingredients in Non-Food Substances

There are certain foods substances present in non-food substances and allergic patients should avoid these at best. The following are some examples.

Egg Proteins	Some vaccines, finger paints, and shampoo
Casein	Anti-stick agents
Lactose	Dry powder inhalers
Soy Lecithin	Asthma inhalers
Chicken protein	Yellow fever vaccine
Milk & nut ingredients	Cosmetics

Food Labelling

In Western countries, where food allergy is more common, food regulatory authority warrants all food manufacturers to list the most common ingredients that trigger food allergies in simple terms that adults and older children can understand. In the United States, the Food and Drug Administration (FDA) requires food manufacturers to list the eight most common ingredients that trigger food allergies. Most other countries have similar rules.

The eight foods included in food allergy labelling account for an estimated 90% of allergic reactions. These eight foods are:

- Milk
- Eggs
- Peanuts
- Tree nuts (almonds, cashews, walnuts, etc.)
- Fish (bass, cod, flounder, etc.)

Precautions When Eating Out

Ethnic restaurants that employ cooks and servers with higher turnover and who are not well trained in the dangers of allergies can cross-contaminate foods by sharing spoons and utensils, or by not

strictly avoiding ingredients not clearly listed in the menu for patrons. This is dangerous. And this is the norm almost in all lower-cost affordable restaurants across the board or many, if not most, ethnic restaurants that use masalas and pastes with mixed ingredients bought from other vendors.

Immunotherapy in Food Allergies

It is in a developing stage and presently restricted to research. Its use in clinical practice is controversial. There are some successful reports for milk, egg, and peanuts.

Anti-IgE in Food Allergies

There are few trials which show anti-IgE treatment raises the threshold for the amount of food that triggers a reaction, but routine clinical use is not justified because of the cost.

Does One Outgrow Food Allergies?

- Children with milk, egg and soy allergies are most likely to outgrow their allergies.
- The likelihood of outgrowing shellfish, tree nut, and peanut allergies is significantly lower.
- Black children were less likely to outgrow their allergy than white children.
- Other factors that contributed to outgrowing an allergy included having a history of only mild to moderate reactions, being allergic to only one food, and having eczema as the only symptom. Conversely, children with severe symptoms (trouble breathing, swelling, and anaphylaxis) and multiple food allergies are less likely to achieve tolerance.

Nutritional Counselling in Food Allergy Patients

Although the need for nutritional and dietary intervention is a common thread in food allergy management, the type of food allergic disorder and the identified food allergen will influence the approach to dietary intervention. A comprehensive nutrition assessment with appropriate intervention is warranted in all children with food allergies to meet nutrient needs and optimise

growth. However, dietary elimination in food allergy may also have undesirable consequences. Frequently, an elimination diet is absolutely necessary to prevent potentially life-threatening food allergic reactions. Allergen elimination can also ease chronic symptoms, such as atopic dermatitis, when a food is proven to trigger symptoms. However, removing a food with proven sensitivity to treat chronic symptoms may increase the risk of an acute reaction upon reintroduction or accidental ingestion after long-term avoidance, so it is not without risk.

Additionally, it is not recommended to avoid foods in an attempt to control chronic symptoms such as atopic dermatitis and EoE (eosinophillic oesophagitis) when the allergy to the specific food has not been demonstrated. Ultimately, allergen elimination goals are to prevent acute and chronic food allergic reactions in the least restrictive, but also the safest environment to supply a balanced diet that promotes health and growth and development in children.

Accidental Ingestion Emergency Action Plan

1. Educate the patient and family about how to properly read food labels and identify common words used for indicating the presence of the food allergen of concern.
2. Be aware of the potential for exposures by routes other than ingestion, such as skin contact or inhalation. This concern is particularly problematic for foods while they are being cooked because proteins are dispersed in the steam (example frying fish, boiling milk, etc.).
3. Encourage avoidance of high-risk situations (example buffets, picnics, etc.) where accidental or inadvertent ingestion of food allergens can occur. Instruct patients to discuss their food allergies with restaurant and food establishment personnel.
4. Despite following stringent avoidance measures for clinically relevant food allergens, accidental or inadvertent ingestions may occur. Therefore, patients must be instructed on actions to take in the event of a reaction. These are mentioned below:

    - A concise written plan for the treatment of allergic reactions resulting from accidental exposure to a patient’s food allergen should be developed.

- Have copies of this plan available at appropriate places like in school, day care, or workplace. An example of an anaphylaxis action plan can be accessed from www.foodallergy.org.
- Ensure that the patient has an emergency contact number available like a local emergency department number that can be used in the event of a major food-induced allergic reaction. Anticipatory guidance measures cannot be overemphasised.

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Cow's Milk allergy

Introduction

Cow's Milk Protein Allergy (CMPA) is the designated term for any allergy to cow's milk.

Prevalence

5–15% of normal infants show symptoms suggestive of reaction to cow's milk protein.

16–42% of infants with gastro-oesophageal reflux (GER) have CMPA.

Remission rate of CMPA expected:

- 45–50% of infants at 1 year
- 60–75% at 2 years
- 85–90% at 3 years

Presentation

Most infants with cow's milk protein allergy (CMPA) develop symptoms before 1-month age, often within 1 week after the introduction of CMPA based formula.

CMPA can induce the following types:

Type	Time	Presentation

Acute IgE-medicated reactions	< 2 hours	Rash or urticaria, wheeze, vomitting
Delayed reactions non-IgE-medicated	> 2 hours	Mild-moderate eczema, reflux
Severe CMPA hypersensitivity	-	Anaphylaxis, severe eczema, or faltering growth
Subtle Presentation	-	Behavioural changes like hyperactivity Gastrointestinal symptoms like diarrhoea or constipation

Managing CMPA

Patients with an established cow milk allergy must minimise their risk of accidental ingestion of milk, although most tolerate biscuit and cake containing baked milk, in which case they can continue to eat these baked dairy products. The patient with a history of severe reaction must be taught emergency action plan in case of milk ingestion. As for CMPA infants, breast milk remains the ideal choice.

If CMPA symptoms persist in the breastfed infant, a maternal exclusion diet, i.e. milk-free diet, is indicated for a minimum trial of 2 weeks. The mother will need a calcium supplement of 1000mg/day if she follows a milk-free diet herself whilst breastfeeding.

A referral should be made to a paediatric dietician when suspicion of CMPA is raised and all infants on a cow's milk-free diet should be referred to a paediatric dietician.

This action plan consists of a written document outlining steps to be taken in case of an allergic reaction including when to use adrenalin. In a case of a mild reaction, oral antihistamines must be used. The patient and caregiver should regularly review the emergency action plan and should receive training on the proper administration of adrenaline.

If the patient cannot afford hydrolysed formulas, what you can recommend is exclusive breastfeeding for the infant and the mother should be strictly on a cow milk protein free diet. Calcium supplements should also be given to mother.

Soya Milk

Isolated soy protein-based formulas may be used to provide nutrition for normal growth and development in term infants. They are a suitable alternative for infants over 6 months old. They are also used for infants with galactosemia and hereditary lactase deficiency, which is rare, and in situations where a vegetarian diet is preferred.

Soya formula is not recommended for infants less than 6 months old because of a concern about their phytooestrogen content.10 to 35% of children with CMPA are also sensitive to soya.

What Are the Methods Other Than Avoidance?

Oral immunotherapy with cow milk is an option increasingly used in many allergy centres.

Case Study

Case 1

A nine-month-old girl was admitted with recurrent wheezing. The baby was bottle feeding and not thriving well. The treatment with bronchodilator and steroids was not making much of an impact. Since the wheezing was persisting and there were no significant findings on examination and no evidence of reflux, we went ahead for the blood test for milk allergy which was positive in keeping with an allergy to cow's milk protein. The symptoms improved after changing to soya milk formula.

Case 2

Baby Harshita was formula fed since birth. On day 15 of her life, she had an episode of a few, small, loose watery stools. Over a period of 3 months, she had persistent motions requiring

intravenous fluids. They settled not with antibiotics but only with a protein-based formula. The motions recurred on the introduction of milk in any form and any type including soy based. The patient was finally diagnosed as food protein-induced enter colitis syndrome (FPIES) since the blood test for milk allergy was negative and the patient responded on stopping milk in all forms.

The above study divulges the complexities and the difficulties in the diagnosis of non-infective diarrhoea.

Specific IgE to cow milk: negative

Diagnosis: Food protein-induced enter colitis syndrome (FPIES)

Case 3

In another case, a 10-year girl had itching of the lips and throat whenever she ate fresh apples. She didn't have any other symptoms except for an occasional itching of eyes, runny nose, and daytime sneezing in the last summer. The above is a typical case of Oral Allergy Syndrome (OAS) wherein the pollen would cause the eye and nasal symptoms and it would cross-react with the allergen in the apple to cause food allergies. The same apple when cooked wouldn't cause any symptoms because the allergens would be destroyed on heating.

Key Pointers:

- Food allergy and food intolerance have to be differentiated.
- Food allergy is type 1 hypersensitivity reaction and happens immediately after exposure and not dose dependent.
- Food intolerance will have mainly GI symptoms and dose dependent symptoms.
- In developing countries like ours, food intolerance is more common than food allergy.
- Diagnosis should be established by detailed clinical history, diagnostic test (SPT or immunoassay for specific IgE), and supervised food challenge.
- Strict avoidance of culprit food may be advised, although for children with cow's milk and egg allergy, many children can tolerate baked foods, in which case they should be promoted as they may help children to outgrow their food allergies.
- In case of accidental ingestion, Emergency Action Plan should be taught.

Frequently Asked Questions (FAQs) on Food Allergy

Why do some food allergies and sensitivities (i.e. gluten and MSG) seem to appear out of nowhere at specific times in history?

Individuals who develop food allergies and sensitivities always carry the genetic predisposition to develop those allergies from birth, just that the person might not be in a favourable environmental condition for phenotypic (physical or outward) expression of those genes. Once the allergy genes find suitable conditions favouring their expression like a sudden change of food habits or living environment, they show a rapid manifestation of allergies.

Does my child need an adrenaline injector for non-IgE-mediated food allergy?

Adrenaline is used in severe reactions of IgE mediated food allergy (i.e. anaphylaxis) but is not used to treat non-IgE-mediated food allergies. In general, non-IgE mediated food allergies are not life-threatening.

Whenever my child takes banana, his wheeze worsens? His SPT and specific IgE to banana are negative. How do you explain?

Bananas have an enzyme diamine oxidase which prevents the degradation of the histamine present in banana. The histamine in the banana acts as a local irritant.

When the patient takes fresh fish, there are no allergic symptoms, but if he takes dry fish, he develops symptoms. How do you explain?

Most people will be able to tolerate fish in fresh form. But sometimes, the method of processing or cooking fish like dry roasting can alter the protein content inducing histamine release causing irritation in the throat upon consumption of the same.

There is also scombroid poisoning to be considered. This is an allergy-like reaction that occurs after eating fish that have

been improperly stored after capture. Bacteria in and on the fish breaks down proteins into histamine. Affected fish often have a metallic or peppery taste. The symptoms usually commence within 30 minutes of eating and include flushing, itch, hives (urticaria), nausea, vomiting, stomach cramps, dizziness, palpitations, and headache. Treatment usually involves taking antihistamines, although, in a hospital setting, adrenaline may also be given.

A friend has a lot of food allergies. Is there a medical remedy?

The first and foremost thing to do is to evaluate your friend and find out the specific food products he/she may be allergic to and which they can tolerate. The cheapest way to do it is by maintaining a food diary and writing down the suspected food products which may be causing allergic symptoms like rashes, disturbed bowel habits, etc., within 2 hours of consumption of the suspected food item. This can be later confirmed at the allergist's office through a skin prick test followed by a food challenge test.

The best and most effective remedy is absolute avoidance of the confirmed food to which the person is allergic. The newer medical therapy called Specific Immunotherapy is effective in alleviating allergic symptoms in around 50–60% people who take them. The immunotherapy is limited to egg, milk, and peanuts only.

Can you reverse a food allergy?

Many children with cow's milk, egg, wheat, and soya allergy will outgrow their food allergies in childhood. Peanut, tree nut, fish, and shellfish allergy usually persist. Refer to the above answer for more details.

Is homeopathic treatment good for food allergies?

There are no documented published studies that can confidently prove that homeopathy helps with food allergies.

Why are peanut allergies so uncommon or rare in India, especially compared to the US?

Food allergies in general, are very rare in India as when compared to the Western world. Allergies are due to genetic and environmental causes. A massive variation of lifestyle and environment between India and the West is responsible for this variable expression of allergy. To elaborate, children of Indian descent born and raised in India are less prone to develop food allergies than children of Indian descent raised in the West.

Why do I keep developing new food allergies as I get older?

To understand this, it is important for you to know the concept of Atopic March. Atopic march is simply the natural course atopy follows through a person's lifetime. A person with atopy is prone to develop eczema in infancy, asthma in childhood, followed by allergic rhinitis in adulthood. When these allergies are untreated, they lead to the development of other types of allergies like food allergy. Therefore, it is vital to treat atopy as and when it presents.

How do I manage children food allergies in India?

Parents of a child who presents to the clinic with suggestive symptoms of food allergies are advised to maintain food diaries which help in tracing the food substance which triggered the allergy. To support this, a skin prick test followed by an oral challenge test (Gold standard) for suspicious food substances are done to confirm the diagnosis. The ultimate and standard treatment remains active avoidance of food substance identified.

Do toddlers who have eczema and food allergies have a high chance of developing asthma?

Most children who develop eczema and food allergies early on in life are more prone to develop asthma in later years. This is called 'Allergy March' which is nothing but a natural course of atopy.

I have a peanut allergy. Is there a certain cure or will it last forever?

Peanut allergy, like any other allergy, has no permanent cure. However, the next best thing one can do is to avoid the allergen (substance causing allergy). In your case, peanuts must be avoided by all means to prevent exacerbation of allergic episodes. It is important to know that most people grow out of allergies on their own. The newest therapeutic modality is oral or sublingual immunotherapy for a permanent cure.

Can I have food sensitivity without any symptoms?

Food sensitivity can be present without any clinical manifestations. Over a period of time, on serial exposure to a specific antigen, the body gradually starts building up sensitivity towards it. The only way to find out sensitivity to a particular antigen is by undergoing a skin prick test and sensitivity can be diagnosed based on the size of the wheal and can be treated accordingly. On neglect, the sensitivity keeps on increasing until there is a full-blown clinical manifestation.

Is it possible to be allergic to vitamins (natural, not supplements)?

You can be allergic to any living molecule, such as a protein. A vitamin, like any drug which is a chemical, can very rarely cause allergy by a process called haptenization (Refer to the chapter ‘Drug Allergy’)

Why do Indians not suffer from food allergies like compared to the Western counterparts?

Indian children born and brought up in the Western world have the same incidence of food allergies as their white counterparts. In Indians in India, thanks to our cultural and food habits, we are protected from developing these allergies. However, if there is a change in the food habits right from birth and increased westernisation in our day to day living, very soon we too will face an epidemic of food allergies in India.

How can my allergy to guava be treated?

Allergies to food/food intolerance cannot be completely treated but can be effectively controlled by avoiding the particular food which triggers the allergy. However, some individuals may naturally grow out of it.

Is it possible to overcome a seafood allergy?

Seafood is one of the most common foods which individuals can be allergic to. It is not possible to entirely cure the disease through medications, but it can be controlled significantly by avoiding seafood in its entirety. Unfortunately, even with age and time, people never grow out of it. In case of a known allergy to seafood, the person must avoid it at all cost and always carry an EpiPen with them.

Can one have an egg allergy that makes you itch?

Egg is one of the most common food substances that cause food allergy. It can develop at any given age despite the person previously consuming egg uneventfully. It manifests as diarrhoea, vomiting, generalised itching in the entire body, tightness of chest, and breathlessness, and in the worst case, anaphylaxis and even death.

If a person experiences itching after consumption of egg, the next best step is to refrain from further egg consumption and consult a competent allergist.

Testing for Egg Allergy

This is done by your allergist by performing a skin prick test on you, provided you haven't consumed any anti-histaminic in the past 7 days. Skin prick test is followed by a food challenge test. If these tests are positive, it is strongly suggestive of egg allergy, in which case the patient must adopt absolute refrain from consuming egg (raw or cooked) or any dish that may contain eggs like cakes, pancakes, pies, and custards.

Can eating prawns outside in restaurants contribute to eye redness allergy?

Seafood, among other food substances, is infamous to cause food allergy and contributes to a significant percentage of anaphylactic episodes and deaths related to food allergy.

Redness of eyes could be one of the mild symptoms indicating an underlying developing allergy. Other symptoms that food allergy may present as are diarrhoea, a sudden feeling of breathlessness/tightness of airway, and rashes all over the body. All of these symptoms can be linked to post-eating seafood.

It is in the best interest of the individual to further investigate and confirm the allergy with a skin prick test or a food challenge test. The foremost step to be taken after confirmation is absolute and strict avoidance of food substance in question besides taking medical therapy.

However, it is not necessary that the reaction after eating prawns is due to prawns only. It can be due to the various ingredients the prawn was prepared in. Hence, the patient should be tested for all the ingredients the prawn dish was prepared in. (Refer to the case in section 6, chapter 'Skin Prick Test')

My father recently had a severe allergic attack. He is allergic to a lot of things and has met a lot of doctors, but nothing has helped. Any advice for him?

An allergic attack, I presume, must have been to a food substance. In that case identification and eliminating the allergic substance from the diet is the treatment. If it is due to aeroallergens, we can overcome it with immunotherapy.

How do I know if I have a seafood allergy?

The interesting aspect of seafood allergy is that one may be allergic to one species of fish will not necessarily be allergic to another species. Also, if you eat stale fish, you will get a reaction which may not necessarily be due to allergy but because of the high histamine content of stale fish. Thus, we can conclude that if a person gets symptoms of allergy such as a rash or itching within 2 to 4 hours of intake of fresh seafood, a diagnosis of seafood allergy can be made.

I am allergic to certain foods, such as potato, apple, orange, and some others. Earlier from vaccination, my bacterial and viral infections were prevented. Can my food

allergies ever be cured, perhaps with homeopathic or allopathic or Ayurvedic medicine?

The prerequisite to declare an allergy is to confirm it with a skin prick test followed by a food challenge test. However, when proven positive for the previously mentioned tests, allergy can be confirmed.

The best method to treat allergy from food is to strictly avoid its intake. There are no drugs or vaccinations in allopathic so far to completely cure food allergy from foods in question, i.e. potato, apple, and orange. However, allergies to certain food substances like peanuts, milk, and egg can be cured with immunotherapy.

I'm allergic to eggs, milk, and wheat. What do I do?

Same as the above answer.

I get itching with consumption of brinjal, but the allergy test was negative for brinjal. What should I do?

Certain foods such as brinjal, tree nuts, alcohol, canned foods, cheese, bananas, chickpeas, groundnuts, salty snacks, sweets with preservatives, chocolates, and other cocoa based products have a high content of a chemical called histamine. Hence an excess consumption of these food substances can cause itching without the presence of positive allergy testing for the food for which a test is available.

Can one have an allergy or digestive intolerance to arhar dal (lentil soup), also called *toor dal* or *tuwar dal*?

Lentil allergy is very common amongst South Asians (Indians, Pakistanis, Bangladeshis, and Sri Lankans) living in the UK. In India, it is not as prevalent, although, with a growing change in food habits, such allergies are expected to increase due to a change in the gene-environment.

On my allergy test, I got a 2 (from a scale 1-10) on pecans. Does this mean that I can eat pecans? What type of reactions would I get if I ate some?

Food substances you're allergic to must be completely avoided irrespective of a low score on the scale as some allergies tend to intensify over time if you're continually exposed to the allergen (pecan in this case), hence, it will make the symptoms worse on subsequent exposures.

What's your worst experience with food allergies?

Refer to the Richa case in section 5, chapter 'Anaphylaxis'.

Section 4

Skin and Eye Allergies

Many a time, an itching of the skin and eyes is mistaken as an allergy because of the preponderance of the symptom of itching present in both allergic and non-allergic conditions. It must be emphasised that all that itches is not an allergy but all allergies of skin and eyes do itch.

1

HIVES - URTICARIA

The chapter deals with a problem which causes much distress if it becomes chronic. A case is discussed which gives us an insight about the various treatment options a patient might have to go through. Alternative diagnoses are also discussed because every rash is not an allergy.

Introduction

Urticaria, commonly referred to as hives, is a common and distressing allergic skin lesion seen in allergy practice. It's distressing because of the itching, appearance, and its chronic nature (persistence >6 weeks) and therefore the toll that it has on the quality of life of the patient.

Presentation

Urticaria typically presents with red raised patches of various sizes and shapes. These may be isolated or may coalesce with each other and present itself all over the body. It mimics skin infections especially the fungal infection. As a result, a fungal infection may be mistaken as an allergy. Thus, all skin rashes are not allergies. In fact, the majority will not have any allergic origins at all. Even for urticaria, allergy itself is uncommon as a cause, especially in chronic urticaria. Urticaria may last for years but is usually controlled with oral antihistamines if taken regularly.

Acute Urticaria

This may be acute when it lasts for less than six weeks and chronic if it lasts for more than six weeks duration. The acute type is more common in children and may be due to infection or infestation. Foods are also a common cause of acute but not chronic urticaria. Allergies to food items can be present with acute urticaria in 40% of patients, the hallmark being that it comes within a maximum of one to two hours of ingestion of food and disappears within 24 hours. Although anaphylaxis is uncommon, patients with food-induced urticaria should be told which foods to avoid and what to do if they develop a reaction. Anaphylactic shock will be dealt with in a separate chapter.

In smaller children, a papular urticarial rash is generally seen on the extremities and the exposed parts. When acute urticaria lasts for more than 24 hours and is associated with fever than viral infections, penicillin group of antibiotics induced rashes, urinary tract infections, and worm infestations need to be strongly considered.

Insect bite can cause urticaria. We can identify the insect from the site and the type of bite, and with the knowledge of where the patient was located at the time of the bite. This information is very vital in the treatment of insect bite.

The distress caused by acute urticaria especially to a child can completely breakdown the caretaker. More important than the diagnosis is the need to give relief through intense medications and ameliorating the anxiety through proper counselling. (Refer to section 7, chapter ‘Counselling’)

Chronic Urticaria

Chronic urticaria is more common in adults and is seldom linked to ‘hidden’ food or environmental allergen. It is now called chronic spontaneous urticaria (CSU). Most chronic urticaria patients do not have any underlying cause. Collagen vascular disorders, gastrointestinal problems, and cutaneous vasculitis need to be considered if there is evidence of persistence over 48 hours and bruising. Food as a cause may be present in not more than 10% of the cases of chronic

urticaria. Skin prick tests are often misleading with many false-positive results.

Patients benefit from regular long-term antihistamines. There is no risk or side effects of being on long-term medication. In some patients with urticaria, the rash can flare on exposure to cold, sunlight, physical stimulation, and rarely to even water. This is a form of physical urticaria, also referred to as cholinergic urticaria.

Approach

As part of a detailed history and examination, the patient needs to be investigated for thyroid, autoimmune, renal, and liver disorders and also to rule out a chronic infestation. The urticaria may be the initial presentation of one of these diseases. There are many drugs which may initially not cause any rashes but can be the cause after years of therapy. Chronic spontaneous urticaria (CSU) patients may suffer for years only responding to second-generation antihistamines like fexofenadine, cetirizine, bilastine, or loratadine. The first-generation antihistamine like an avil tablet also works but is not recommended because it will cause unusual drowsiness.

Treatment starts with second-generation antihistamine followed by an increase to four times the antihistamine dose. The immunosuppressant cyclosporine or corticosteroids need not be given unless the patient has an exaggerated reaction. And when all doesn't work, we give anti-IgE injections such as omalizumab. The last is a very effective drug and the best drug if one excludes the cost of the drug which is exorbitant and requires repeated dosing.

Chronic urticaria aetiology can be a diagnostic dilemma and thus, there's much doctor shopping in order to get rid of the disease wherein the patient resorts to an alternative system of medicine including baba or saint's therapy. But all that's required is a patient counselling. It is only a matter of time when the disease goes into self-remission.

Omalizumab – Third-line treatment

A new drug called omalizumab which has an anti-IgE action is often effective when regular high-dose antihistamines (4 times standard dose) fail to control the rash. The drug is very expensive and therefore reserved for the most severe cases with poor quality of life. There are many criteria for starting Omalizumab which includes IgE levels and weight of the patient.

EAACI (European) Recommendation in the Management of Urticaria	
Recommendation	**Level of Recommendation**
Aim for complete symptom control in urticaria as safely as possible.	Strong
Only avoid these food items where sensitisation has a clinical relevance for urticaria.	Strong
Recommend use of pseudo allergen-free* diets in CSU patients with daily or almost daily symptoms only.	Strong
Recommend a trial of up to a fourfold dose of second-generation H1-antihistamines as second line in the algorithm of treatment.	Strong
Trial of omalizumab as add on therapy to modern second-generation H1-antihistamines as third line	Strong

in the algorithm of treatment
of urticaria.

*(Non-allergic-hypersensitivity reaction agents) Naturally occurring food ingredients and in some cases to food additives.

Drugs Used in Urticaria

Refer to section 6, chapter ‘Drug and Devices’.

Counselling

Refer to section 6, chapter ‘Counselling’.

Case Study

A 27-year-old woman was diagnosed with allergic rhinitis due to dust mites. She had chronic spontaneous urticaria and was started on antihistamine tablets, montelukast, and intranasal steroids. Her symptoms were well controlled with medication and environmental control but would recur on any decrease in medication or exposure to dust. She was started on immunotherapy against dust mites. After 5 months of immunotherapy, the urticaria recurred. As there was a need to control the disease before any expected pregnancy, it was decided to start her on anti-IgE therapy i.e. omalizumab. The patient had earlier taken a prolonged course of steroids and subsequently short courses of oral steroids without any satisfactory outcome. She then received 150 mg of omalizumab every 2 weeks for 4 months. The rash completely disappeared after two months of anti-IgE therapy. The patient is now off all medications occasionally requiring antihistamines.

Key Pointers:

- Urticaria can be acute or chronic.
- Acute urticaria can be associated with anaphylaxis and rarely with death.
- Chronic urticaria aetiology can be a diagnostic dilemma and reason for doctor shopping. Food as a cause is present in less than 10% of cases.
- All that itches is not an allergy nor is allergy always the cause of urticaria.
- Long-term medication with antihistamines will not have any deleterious effects. A treatment is there provided the patient is willing to adhere.

2

ECZEMA - ATOPIC DERMATITIS

This chapter makes the subject easy to understand with an illustration giving an insight into the details of management and the problems including various treatment options for the patient. It mentions the trigger factors, the latest development in atopic dermatitis, and ends with a classic case history and analysis.

Introduction

Atopic dermatitis (AD) is commonly referred to as eczema and the two names are interchangeable. AD is common in young children. It begins in infancy and in almost 85% of cases, it will disappear by adolescence. The significance of AD is that it is the first step in the allergy march. Almost 70% to 80% of AD patients develop AR and 50% of AD patients develop asthma.

Presentation

Atopic dermatitis can begin in infancy and usually presents with itchy skin. The precursor of eczema will be a mild rash on face and scalp. AD characteristically spares the perianal region and if present, it is more likely due to secondary infection of Candida species. Itching in AD is not due to the release of histamine and thus antihistamines do not work, although it may show benefit by making the child sleepy. The rash on the face will invite a lot of apprehension from the parents who have a lurking fear of long-term adverse changes

on the face. There would be a lot of pressure on the treating physician to cure it completely. It would be best and prudent to treat with a moisturiser and avoid potent corticosteroids. The steroids will completely remove the lesions albeit temporarily but will affect the texture of the skin with resultant thinning. In infancy, as at most times, counselling of the parents is very essential. (Refer section 6, chapter 'Counselling')

Appearance

The skin lesions consist of papular lesions in the form of simple small swellings, which would be numerous along with dermal excoriations wherein the skin is abraded or denuded. There may also be some fluid-filled tiny swellings called vesicles and much oozing. Thickened skin with accentuated markings (lichenification) and whitish-yellow areas (fibrotic plaques) are characteristic features of chronic atopic dermatitis.

Distribution of Rash

The distribution is very typical and characteristic. The scalp, face, and the extensor surfaces of the extremities are the primary sites in infants. In older children and adults, the flexural surfaces are typically involved. These consist of the forearm and the back of the knees. Physical factors such as dust will worsen the disease. Food allergens too would worsen it.

Triggers

The following are some of the potential triggers for Eczema:

- Viral or bacterial infections.
- Use of upholstered furniture allowing collection of dust.
- Swimming in chlorinated swimming pools.
- Playing in the sand and particularly sandpits.
- Sitting directly on carpets or grass.

- Inhalant allergens—worsening of eczema in spring and summer may also be due to pollen sensitivity.
- Food intolerances to artificial colour and preservative in some people.
- Irritants such as perfumes, soap, chemicals, woollen, or synthetic fabrics.
- Temperature changes (such as heat) or overly heated rooms.
- Stress (this can make it worse, but eczema is not a psychological condition).

These triggers may be relevant for some people. However, it is not routinely recommended that everyone avoids all these triggers.

Diagnosis

Atopic dermatitis has no pathognomonic dermal lesions or any special laboratory markers.

Recent Developments

The new player in eczema is filaggrin. Profilaggrin (keratohyalin F granules) is a precursor for filaggrin which leads to the synthesis of hydrophilic amino acids. These hydrophilic amino acids act as a natural moisturising factor. Filaggrin (FLG) mutation is present in 30% of AD. A mutation in the filaggrin gene would lead to a very dry skin.

Management

The mainstay of the management is good hydration of the skin. The moisturisers which are available in the market may come with additives, colouring agents, or with odours and perfumes. These agents by themselves or in combination may sometimes act as irritants. Hence, it is best to use a paraffin gel which by itself is inert. It can be purchased in bulk and thus can turn out to be cheaper which is important for a chronic

disorder. In order to get the best results, we follow roughly the rule of 3. In this, the following 3 important steps are to be followed:

1. Take a bath or wet the skin at least 3 times a day*
2. Bathe for 3 minutes minimum
3. Apply the gel within 3 minutes of the bath on wet skin

The web-page figure helps explain the rationale behind this regimen. The skin of a patient with AD is rough with micro gaps. These gaps not only allow water to exude out but will also allow irritants to get in easily. Hence, the thick layer of gel on the surface not only traps the water inside but also acts as a shield or *kavach* which will prevent the irritants from getting through. The gel also has a soothing effect. (Refer to AD images on www.allermy.com)

Topical steroids play a key role in the treatment in eczema. They need to be applied only to areas of active eczema to bring about a complete control albeit temporarily. Steroids are available in various strengths. They can be used in a step-up or a step-down approach to tailor to the individual's need. I personally use the step-down approach. This is starting with the steroid cream of the highest strength for at least a week and as soon as the patient shows response, we bring it down rapidly to the least strength. The earlier we wean off the steroids the better it would be because of the possibility of systemic absorption of steroids through the abraded skin and resultant adverse effects.

As far as possible, steroids more potent than 1% hydrocortisone ointment should be avoided on the face. The skin of the face is delicate and thus susceptible to damages such as thickening, striae, and telangiectasia. There are rare patients who may be on continuous topical steroids. Details of steroids used are given below.

Topical Steroid Strength

Potency	Class	Example Agent
Super High	I	Clobetasol propionate 0.05%
High	II	Fluocinonide 0.05%
Medium	III - V	Triamcinolone acetonide ointment 0.1% Triamcinolone acetonide cream 0.1% Triancinolone acetonide lotion 0.1%
Low	VI - VII	Flucinonide acetonide 0.01% Desonide 0.05% Hydrocortisone 1%

Non-steroid ointments

An alternative group of drugs called immunomodulators were introduced nearly two decades ago, including tacrolimus and pimecrolimus. They have steroid-sparing effects and may bring about a complete remission of the disease. In addition, they do not have any of the side effects that the steroids would have. They are applied preferably after two years of age for at least six months. It should be applied after the acute inflammation has been controlled with steroids.

If the above treatment does not work, then there are more advanced modalities such as ultraviolet rays and immunosuppressive drugs such as cyclosporine. There is much resistance to the use of cyclosporine amongst the patients because of the risk of side effects that it carries. Some patients may require regular applications of dry or wet bandages to occlude the topically applied ointments and thus avoiding any further flare ups.

In 40% of cases, there may be an underlying allergen which would be aggravating the disease. It could be due to a food substance or to an aeroallergen, especially dust mites. Hence, it is very important to do an allergy test to find the allergen and subsequently follow strict avoidance of the particular allergen. It is important to remember the allergen mostly aggravates the disease activity and its avoidance does not necessarily ameliorate the disease.

Clothing in AD

The main aim should be to maintain an even skin temperature as much as possible, avoiding the hot-cold-hot-cold cycle. Keep each room at a constant, comfortable (but not too warm) temperature. Layers of bed sheets on the bed are better than one thick duvet, as the layers can then be peeled off one by one. Hot baths (and sitting right beside fire and radiators) should be avoided, as the heat can trigger scratching. Try wearing several layers of cotton clothing rather than one heavy layer of warm clothing so you are better able to adjust your body temperature to suit you.

If the weather is cold then hats, scarves, and gloves may be needed but avoid those made from wool since it would further increase the itching. The clothes should be subjected to extra rinsing in the washing machine to get rid of the detergents. Detergents should be used economically.

Treatment of Complications

Recurrent staphylococcal pustulosis is a significant problem. Not all cases of secondary skin infection need to be treated with a systemic antibiotic. Some patients with localised crusty, infected eczema may need only a steroid plus antibiotic cream or steroid plus antiseptic cream. If the infection is extensive, oral antibiotics will be needed.

Psychological Impact: AD is a chronic disorder causing itching, scratching and affecting the sleep. The sleep deprivation compounded with the suffering has an impact on

the psychosocial aspects of the patient's life and this need to be addressed. In addition, there are time-consuming drug applications with all its financial implications.

Follow up

Since AD is a chronic waxing, waning disease, it is essential that patients are well supported by clinicians and if possible, peer-support groups. We have taken the initiative to form such a group. The members share their numbers with each other and whenever they do have an aggravation of the disease and it is managed, they share their experience with each other, thereby supporting each other. It's very often that they receive more information rather promptly from each other. Since the disease has an underlying psychological basis too, sharing does help a lot in the management of the disease. The lesions may disappear by adolescence in 85% of the cases. In others, it may last for years.

Case Study

Ayesha, a 12-year girl was referred at 9 years of age. After birth, she was breastfed. At 5 months of age, she developed a rash on the cheeks along with a pustular type eruption on the scalp or head. It would improve with moisturisers and sometimes would require steroids for complete remission. At around 11 months of age, when she was put on formula feeds, she developed swelling of her extremities and flare of her eczema. She was diagnosed with milk allergy and promptly, milk was stopped. Over the years, her eczema would wax and wane but wouldn't disappear completely.

Around 4years of age, she started wheezing which required nebulisers. As the wheezing decreased at around 8 years, she developed the nasal symptoms along with severe itching and redness of the eyes. At this time, her eczema also got exaggerated. It must be mentioned that like all patients, she was also tried on alternative medicine such as homeopathy and Ayurveda. The homeopathy only worsened the disease beyond tolerance and the argument that the lull comes after the storm

couldn’t convince her to continue the homeopathic medicine. The Ayurveda medicine was given up because of the lack of information about the contents. This indeed many times scares patients, especially in paediatrics. When she came to me 3 years back, she was literally a red child with ooze in many areas, her nose was completely blocked with greenish discharge, and her eyes could hardly be opened due to the redness and burning sensation.

She was immediately put on an intense and liberal coating of non-medicated and perfume-free moisturiser along with the steroid to affected areas for short-term and immunomodulator on long-term. Allergy tests are generally not indicated in children with AD as this disease is T-cell mediated and are commonly falsely positive. However, as the patient also had a clinical history of immediate hypersensitivity to cow’s milk, skin prick testing was performed and was positive, confirming the clinical suspicion. We had the blood test to identify the aeroallergen and the food allergens. She was strongly positive to dust mites along with some pollen. The food allergies were egg, seafood, and tree nuts (Results in section 6, chapter ‘Laboratory Testing’). We advocated total elimination of these along with strong aeroallergen control which involved an environmentally friendly transformation of the house. It had a dramatic effect on her overall health.

Today she is much better but totally dependent on the moisturiser. Ayesha has followed the typical pattern of the atopic march with atopic dermatitis, milk allergy followed by wheezing replaced by rhinoconjunctivitis. She tried all the alternative medicines but still faced constant suffering. She required a lot of steroids too but later when we found the incriminating allergens and brought about strict environmental control, we could get her off almost all medications except for the moisturiser for her extremely dry skin.

Key Pointers:

- Atopic dermatitis is common in young children. It begins in infancy and in almost 85% of cases, it disappears by adolescence.
- Atopic dermatitis has no pathognomonic dermal lesions or any special laboratory markers. Severe itching is a hallmark.
- The patient's misconception that the therapy is curative needs to be clarified and the importance of the exacerbating factors needs to be emphasised.
- Skin hydration is an essential component of therapy.
- Short-term course of corticosteroids is effective in all components of AD. Topical immunomodulators can be safely used as third-line treatment.
- Antihistamines will not control the itch in AD.

*Bathe or shower in lukewarm water only.

Note: It's not always necessary that all the 3 steps be followed strictly. There may be a lag and not necessarily every case of AD will require a bath 3 times a day.

3

Red Eye - Vernal Keratoconjunctivitis (VKC)

VKC is a commonly seen eye disorder seen by the ophthalmologist. The chapter briefly describes the presentation and its progression. Treatment is given in a tabulated format.

Introduction

Vernal keratoconjunctivitis (VKC) is a common recurrent bilateral allergic eye disorder of cell-mediated immunity. It primarily affects boys and its onset is generally from about the age of 5 years onwards. VKC is rare in temperate regions but relatively common in warm dry climates such as the Mediterranean, sub-Saharan Africa, and the Middle East. VKC frequently occurs on a seasonal basis with a peak incidence over late spring and summer.

Presentation

Symptoms consist of intense itching of the eyes, which may be associated with watering, photophobia, foreign body sensation, burning, and thick sticky whitish discharge.

Early disease is characterised by redness of the conjunctiva, which is followed by the development of large nodule like masses called ‘papillae’ on the tarsal conjunctiva which can be seen on everting the upper eyelid. In fact, the presence of papillae on the tarsal conjunctiva is a very specific sign for

ocular allergy. The diagnosis of the condition is mainly clinical due to its typical signs, without the need for any local or systemic investigations. The only investigation needed would be an allergy skin prick test for aeroallergens. The clinical signs and symptoms among those with and without positive skin tests are the same.

Progress

VKC typically has numerous papillae <1 mm in size, with a flat-topped polygonal appearance reminiscent of cobblestones and hence, the name given is 'cobblestone papillae of VKC'. Progression to giant papillae (>1 mm) can occur as adjacent smaller lesions fuse together when dividing septa rupture. Similar nodules can be seen adjacent to the limbus known as Horner–Trantas spots. The disease can manifest as predominantly papillary involving or predominantly limbal involving, the former being the more common one. Corneal involvement ranging from mild keratopathy to severe ulceration (shield ulcers) is more frequently seen in the papillary disease, due to constant rubbing of the rough papillary conjunctiva against the cornea with every blink. If left untreated, it can impair the vision secondary to glaucoma and corneal scarring.

Investigations

Skin prick test will help to identify the aeroallergen. (Refer to section 6, chapter 'Allergy Testing - Skin Prick Test')

Treatment

The management of VKC does not differ substantially from that of an allergic conjunctivitis, although the former is generally less responsive and requires more intensive and prolonged treatment.

General Measures

Allergen avoidance	Most times difficult to pinpoint the the exact source of allergy.
Lid hygiene	Should be used for associated staphylococcal blepharitis.
Moisturing cream	E45 can be applied to dry fissured skin.
Bandage contact lens wear	To aid healing of persistent epithelial defects.

Local Treatment

Mast cell stabilisers (sodium cromoglycate)	Reduce the frequency of acute exacerbations and need for steroids and so forms the basis of many regimens but are seldom effective in isolation. Several days to weeks of treatment is needed for response and long-term therapy may be needed.
Topical antihistamine (olopatadine, bepotastine)	When used in isolation are about as effective as mast cell stabilisers. They are suitable for acute exacerbations but generally not for continuous long-term use.
Non-steroidal anti-inflammatory (ketorolac, diclofenac)	May improve comfort by blocking non-histamine mediators. Combining one of these with a mast cell stabiliser is an effective regimen in some patients.
Topical steroids (fluorometholone 0.1%, rimexolone 1%,	Used for severe exacerbations of conjunctivitis and significant keratopathy as reducing conjunctiva activity genrally leads to corneal

prednisolone 0.5%, lotepredonol etabonate 0.2% or 0.5%).	improvement. Usually prescribed in short intensive courses, aiming for very prompt tapering. Although the risk of elevation of intraocular pressure is low, monitoring is advisable if long term treatment is necessary. Stronger preparations prednisolone 1% can be used but carry a higher risk of steroid-induced glaucoma. Antibiotics may be used in conjunction with steroids in severe keratopathy to prevent or treat bacterial infection.
Immune modulators like cyclosporine (0.05-2% between two and six times daily)	Used if steroids are ineffective, inadequate, or poorly tolerated, or as a steroid-sparing agent in patients with severe disease. The effects typically take some weeks to be exerted and relapses may occur if treatment is stopped suddently. Irritation and blurred vision are common. Tacrolimus 0.03% ointment can be effective in refractory cases but can cause severe irritation in the eyes, so should only be used if no other option is available.
Supratarsal steroid injection	Severe palpebral disease or for non-compliant patients. Injection is given into conjunctive surface.

Systemic Treatment

Oral antihistamine	Help with itching, promote sleep, and reduce nocturnal eye rubbing.
Antibiotics like doxycycline	May be given to reduce blepharities aggravated inflammation.
Oral steroids or	Not recommended for VKC cases.

immunomodulatory	
Surgical options are needed rarely	Scrape out material from the surface of the cornea (superficial keratectony) or in later stages reconstruction of the entire ocular surface.
Immunotherapy	Has shown benefit in studies across the world.

Key Pointers:

- Vernal keratoconjunctivitis (VKC) is a bilateral, chronic, and severe inflammatory ocular disease mainly occurring in children.
- Presence of papillae on the tarsal conjunctiva is a very specific sign for ocular allergy.
- If left untreated, it can impair the vision secondary to glaucoma and corneal scarring.
- A skin prick test is advisable to identify the probable allergens.
- VKC requires an intense and long-term treatment.
- Topical steroids need close supervision from an ophthalmologist to monitor for cataracts and glaucoma.

Section 5

Acute and Life-Threatening Allergies

Allergies basically affect the quality of life. They do not cause death or hospitalisations but rather cause a continuous and long-term suffering of the mind and body. Many affected individuals learn or adapt to live with it with much suffering. However, the problems of anaphylaxis and drug allergy are life-threatening which calls for serious attention. Many a time, anaphylaxis may not be diagnosed in cases of sudden death. Hence, the importance of this section.

1

ANAPHYLAXIS

Anaphylaxis is the most life-threatening problem of allergy. We discuss common allergen triggers, manifestations, diagnosis, and treatment. The key features for readers are the measures and practical points to deal with the aftermath of an episode, after doctors have managed an acute emergency.

Introduction

Anaphylaxis is a potentially life-threatening allergic reaction with a significant risk of relapse on allergen exposure. Death after anaphylaxis is rare, even when adrenaline is not used. In most cases of fatal anaphylaxis, fatality is not only related to allergen exposure in an allergic individual, but to co-factors contributing to the severity of the reaction, particularly asthma.

Approach

After an allergic reaction and the control of its manifestations, it is essential to find out the cause for such a reaction. This is not an easy task and entails a Sherlock Holmes type of approach, especially in food allergy. Very often an allergen may be incriminated when probably it may have been only an innocent bystander.

The true incidence of anaphylaxis is not known as it is under-reported, and many patients go undiagnosed. When there are young individuals coming with sudden death

especially after food, there should be a suspicion of anaphylaxis and blood for a serum mast cell tryptase should be taken. In at least 20% cases of anaphylaxis, there may have been no rash. In addition, if there is a circulatory collapse, the visibility of the rash may be compromised. Hence, the very concept of diagnosing an anaphylactic shock on the basis of a rash is flawed.

Common Allergens

In children, foods such as peanut, tree nuts, seafood, egg, and milk are a cause of anaphylaxis and in adults, it is more likely to be medicines (antibiotics) or bee/wasp stings. Although, any allergenic food may lead to it, the most commonly encountered are due to allergies to insects like ants, wasp, and bees.

Manifestation

A previous exposure to these agents might not be symptomatic but is said to cause sensitisation (i.e. priming of the immune system to mount a full-blown response on subsequent exposure to the same or similar allergen). On exposure to the allergen by way of ingestion, injection, and rarely even by inhalation of the fumes during cooking of the allergenic food substance, the patient develops the symptoms of anaphylaxis.

The most common manifestations are rash, feeling of tightness in the neck, swelling, and breathlessness occurring within a few minutes of the exposure. It may progress further to abdominal pain, vomiting, headache, flushing, and drowsiness. As the episode worsens, it leads to circulatory compromise with hypotension and respiratory distress. Death from anaphylaxis is rare occurring in about one in a million.

Your Body During Anaphylaxis

Nature has gifted us with a natural mechanism to overcome anaphylaxis. The body itself mounts a compensatory response to the allergen by secreting adrenaline (fight or flight

hormone). The body stores of adrenaline may not be enough to counter the attack and hence the administration of adrenaline externally is warranted. Most patients suffering from anaphylaxis will survive with or without adrenaline. The body itself produces adrenaline to overcome the attack and in more than 50% of the cases, the endogenous adrenaline is sufficient. Poorly controlled asthma is a major risk factor for anaphylaxis and all at-risk patients should have their asthma well controlled and reviewed.

Diagnosis

The diagnosis of anaphylaxis is strictly clinical but in cases of injected allergen, one can do a blood mast cell tryptase level provided the blood was collected within 6 hours of the attack. Due to the risks and fatalities associated with the above allergies, it is imperative that one should consult an allergist at the earliest opportunity to identify the allergen, preferably, through a skin prick test and start the suitable treatment.

The NIAID (National Institute of Allergy and Infectious Diseases) in Washington has laid down guidelines for the diagnosis of anaphylaxis (Table below). These are only guidelines to make a diagnosis but what is most important is having a degree of suspicion about anaphylaxis. There are many co-factors which can aggravate or compound the whole situation. Poorly controlled asthma or allergic rhinitis, exercise, alcohol, and some drugs such as non-steroidal anti-inflammatory, angiotensin-converting enzyme inhibitors are co-factors which can predispose to more severe allergic reactions.

Diagnostic Clinical Criteria for Anaphylaxis

Anaphylaxis is highly likely when any one of the following three criteria is fulfilled:

1. Acute onset of an illness (minutes to several hours) with the involvement of the skin, mucosal tissue, or

both (example generalised urticaria, itching or flushing, swollen lips-tongue-uvula).

AND at least one of the following:

a. Respiratory compromise (Example dyspnoea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia).
b. Reduced blood pressure or associated symptoms of end-organ dysfunction (Example hypotonia, collapse, syncope, incontinence).

2. Two or more of the following that occurs rapidly after exposure to a likely allergen for that patient (minutes to several hours).

a. Involvement of the skin-mucosal tissue (Example generalised urticaria, itch-flush, swollen lips-tongue-uvula).
b. Respiratory compromise (Example dyspnoea, wheeze-bronchospasm, stridor, reduced PEFR, hypoxemia).
c. Reduced blood pressure or associated symptoms (Example hypotonic, collapse, syncope, incontinence).
d. Persistent gastrointestinal symptoms (Example crampy abdominal pain, vomiting).

3. Reduced blood pressure after exposure to a known allergen for that patient (minutes to several hours).

a. Infants and children: low systolic blood pressure (age-specific) or greater than 30% decrease in systolic blood pressure.
b. Adults: systolic blood pressure of less than 90 mm Hg or greater than 30% decrease from that person's baseline.

However, after a severe allergic reaction without a known cause, all patients should be subjected to allergen testing to

identify the trigger. A serum mast cell tryptase, if the sample is collected preferably within 2-3 hours of a reaction following a parenteral injection of the allergen, supports the diagnosis of anaphylaxis especially in patients with atypical symptoms. These tests are not universally available and are not specific for anaphylaxis. Mast cell tryptase level is often within normal limits in patients with anaphylaxis triggered by food and in those who are normotensive (Refer to the case in section 6, chapter 'Laboratory Testing'). In practice, the diagnosis of anaphylaxis is strictly clinical.

Progress

There are 3 different ways in which the anaphylaxis reaction would progress:

Type	Onset	Progress
Uniphasic	Immediately after exposure	Resolves with or without treatment within the first minutes to hours and then does not recur during that episode
Biphasic	Can occur 8 hours after the first reaction and may extend up to 72 hours	Recurrence of symptoms develops after apparent resolution of the initial reaction. Incidence 1% to 20% of anaphylaxis
Protracted		Reaction without treatment may last for hours or days after the attack

Treatment

First-line treatment for anaphylaxis is intra-muscular adrenaline (American epinephrine) (Epipen). If given subcutaneous, the response will be slow and if intravenous, it

will lead to a surge in blood pressure or cardiac arrhythmias. Adrenaline should be given in the lateral thigh. It can be repeated every 5 to 15 minutes to a maximum of three doses. It should ideally be given by a prefilled syringe (EpiPen) or freshly loaded from an ampoule.

Other treatment modalities given during an attack such as oxygen, fluids, steroids, antihistamine, and ranitidine are merely supportive. However, ABC of resuscitation has to be followed in case required. This consists of the airway, breathing, and circulation. Once the patient improves, he should be observed for 8 to 24 hours for the possibility of a second or diurnal attack.

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Measures to Be Taken after an Episode of Anaphylaxis

This consists of avoidance of the allergen and desensitisation for life-saving drugs. Venom immunotherapy for insects and sublingual immunotherapy for foods such as milk, eggs, and peanuts are viable and promising options that can possibly render a permanent cure. The patient should realise that it is a potentially fatal condition which can be prevented by early diagnosis and prompt treatment.

Adrenaline comes as a prefilled syringe and available as an Epipen. This cost more than 100 US dollars (approx. 7000-8000 Indian rupees) for each one. And more important than the cost is that it has a very short shelf life of 18 months. This is available in very select stores in the metro cities of India, but for those in need can have it imported through the major medical stores of metros having an import license. The alternative to the adrenaline/epinephrine is the adrenaline ampoules which cost no more than 10 INR. This has to be broken and loaded at the time of the attack. Hence, it may take at least five minutes. It is essential that the parents should learn the technique of breaking the ampoule and loading the syringe as fast as possible. This approach may look crude vis-à-vis the EpiPen but it is very essential to remember that at the

time of attack having the adrenaline/epinephrine is of utmost importance. It is feasible economically to have many adrenaline/epinephrine ampoules, hence the patients need to ensure that there is in adrenaline ampoule with them and kept at all the places they spend time working or in any other recreational activity. It isn't necessary that the doctor they visit in the emergency will be having adrenaline with him. They should ensure that it is kept away from light and check the short expiry date repeatedly.

In case of a wrongly diagnosed anaphylaxis, the patient will not come to any harm if given an adrenaline shot intramuscular. If at all a problem would arise, it would be when given intravenously. Hence it is strictly advocated that the intravenous dose should be given by the physician and that too in a hospital setting for a patient in circulatory failure. There have been debates as to how many adrenaline/epinephrine a patient should carry, but what is very essential that the patient should have an Epipen or at least the adrenaline ampoule at the time of the attack. The recovery of such a fatal attack is dramatic with the adrenaline shot.

EpiPen: Method of Use

The EpiPen is a device containing prefilled adrenaline/epinephrine syringe. The Epipen is carried like a pen. At the onset of the attack, just remove the cap, hold the body of the pen firmly with the right hand, and immediately jab it into the right thigh. The area of the thigh is the outer and upper position. After the initial injection, arrangements should be made to take the patient to the hospital.

The Indian modified version of the EpiPen is a 2cc syringe filled with the requisite volume of adrenaline and kept in a spectacle carrying box. This protects it from light and can be safely used for a maximum period of three months.

Case Study

Rucha, a 13-year-old girl had peanut allergy and asthma since two-and-a-half years of age. Her SPT was positive for peanuts and an EpiPen (adrenaline injection) was prescribed. She was lost to follow up and managed by her GP. In August 2011, she ate ‘chicken tikka masala’ in a cafe. On return from a holiday, she ordered a takeaway. She reassured her mother that she has eaten that dish earlier with no reaction. On eating the delivered food, she felt a tingling sensation, swollen lips and shortness of breath within 15 minutes. She didn’t have EpiPen with her and so, salbutamol inhaler and antihistamine were given by mum, who also called an ambulance.

On arrival, the paramedics gave adrenaline 0.5mg IM (left deltoid). Ambulance crew felt Rucha had a severe allergic reaction and so they administered salbutamol neb, IV chlorpheniramine, and then repeat adrenaline 0.5mg IM (left Deltoid) was given and IV fluids started. She showed marked clinical improvement and became fully conscious. She was able to talk in sentences and thus, the ambulance took her to a tertiary care centre.

Rucha was admitted in the Accident and Emergency department. She was fully conscious with swollen lips and tongue and her SpO2 was 98% on 10L/min oxygen and all vitals were normal. Hydrocortisone 200 mg IV, salbutamol, and ipratropium nebulisation, and adrenaline 0.5mg IM was given. She showed further improvement clinically and was referred to the paediatric team for admission.

ECG and chest X-ray were normal. Her SpO2 was 100 % on 10L/min of oxygen with normal vitals, when she suddenly had shortness of breath. She felt warm, was irritable, and her lips and tongue started swelling again with throat pain and she couldn’t breathe. Adrenaline 0.5mg IM given immediately. The crash team was called in. There was a further deterioration SpO2 80-85% on 10L/min O2 after which Rucha collapsed with a big vomit. Resuscitation was initiated and she was intubated by the consultant anaesthetist.

She showed some improvement initially and her SpO2> 92%. But over the next 10-15 minutes, she was deteriorating further. In spite of all the best internationally recommended

measures, CPR was unsuccessful. A postmortem examination showed lips and tongue swelling, prominent laryngeal edema, mucous plugging of small airways with prominent edema, and eosinophilic infiltration. The tikka masala recipe contained mixed nuts which is 90% peanuts and 10% almond.

Key Pointers:

- The diagnosis of anaphylaxis is strictly clinical.
- The treatment of diagnosed or suspected anaphylaxis is strictly intramuscular adrenaline. All other treatment is secondary and supportive.
- After a severe allergic reaction without a known cause, all patients should be subjected to allergen testing to identify the trigger.
- It is very necessary with patients having food allergies to take all precautions and have a much disciplined lifestyle.
- Adrenaline must always be carried in some form or the other.

2

Drug Allergy

Drug allergy is of much concern and is a common problem. In addition, there are no proper validated blood test. We discuss the various tests available such as skin prick test, blood test, provocation test, and their limitations followed by desensitisation.

Introduction

We have reiterated through the chapter that allergies are always to living or animate entities which place drugs in a peculiar position since they are a chemical substance. Drugs through a unique mechanism cause allergy.

Mechanism of Drug Allergy

Drugs such as penicillin can, under physiological conditions, directly bind covalently with macromolecules on cell surfaces and in plasma to form multivalent hapten-carrier complexes. When direct haptenisation results in a sufficient density of drug epitomes, a drug-specific immune response can occur. In case of penicillin, it binds to the lysine residues in proteins (Middleton's Allergy-Principles and Practice).

Types of Adverse Effects

Type A Side Effect	**Type B Side Effect**
It is predictable.	Not predictable.
Along expected lines	Not dose dependent and unexpected.

and and strictly dose dependent.	
Symptoms include diarrhoea after amoxicillin or gastrointestinal bleeding as in NSAID like aspirin.	These are the ones which can turn out to be serious enough to cause death.
Occurrence is as high as 80% of all side reactions of all drugs included.	Usually are uncommon.

Prevalence: the true incidence of drug allergy in the community and among children and adults is unknown.

Drugs Commonly Linked to Allergies

Almost any drug can cause an allergic reaction, but some drugs are more often associated with allergies. These include:

Antiobiotics	Especially pencillin
Pain relievers	Aspirin, ibuprofen, and naproxen sodium
Chemotherapy	Drugs used in cancer
Rheumatologic disease	Biologics
Anti-diabetics	Insulin

Risk Factors

Although anyone can have an allergic reaction to a drug, certain factors can increase the risk. These include:

- Increased exposure to a drug as high doses or repetitive and/or prolonged use.

- Concomitant illnesses predisposing to allergic drug reactions, such as HIV or the Epstein-Barr virus infection.

Classification Based on Time of Onset

Immediate Reaction	**Delayed Reaction**
Begin within 1-2 hours of drug exposure.	Often takes more than 6 hours to weeks.
Symptoms: Rapidly appearing angioedema and generalised body swelling more around eyes and genitals with itching/pruritis. Gastro-intestinal symptom like vomiting, diarrhoea, and abdominal cramps.	Symptoms: Mainly skin is involved. Severe cases may also involve mouth and eyes (mucous membranes) as well as liver, lungs and heart.
Mediated by Type I (IgE antibody).	Mediated mainly by T cells and sometimes IgE.

Serious drug allergies consist of either immediate or delayed reactions which may be potentially life-threatening. Anaphylaxis is one of the life-threatening reactions that happen following drug ingestion.

Drug Hypersensitivity Reaction (DHR) Workup

There may be a need to work up a hypersensitivity reaction to a drug. It is not necessary that all the hypersensitivity reaction should be worked up since there are many shortcomings in the workup protocol of the patient.

- The workup should be done if there is a history of a DHR and the drug concerned is required and there is no equally

effective, structurally unrelated alternative present to overcome the patient's disease.

- The risk/possible advantages ratio is positive. It means that not testing will increase the risk of adverse reaction of the drug in future. This is because the drug may be so commonly used in practice that it may be difficult to completely avoid the particular drug. This includes patients who commonly use ß-lactam antibiotics i.e. the penicillin group, non-steroidal anti-inflammatory drugs like aspirin and local anaesthetics.
- When drugs are required depending on an individual's medical needs. Example insulin.
- History of a severe DHR for other drugs. In such a situation, the best way to protect the patient is to look for the culprit.

DHR: When Not to Evaluate

- Cases with no drug allergy causality:

  No definitive or temporal relationship of an adverse reaction and the intake of the drug can be established.

- Non-compatible symptoms:

  The symptoms which occurred on the intake of the drug are not similar to the symptoms which are commonly associated with the intake of the drug.

- Non-compatible chronology:

  An adverse reaction to a drug takes place within a specified time. Some drugs will cause a reaction within an hour while other drugs would cause after 24 to 48 hours after exposure to the drug. It is unlikely that the particular drug is involved if the reaction for that particular drug doesn't take place within the specified time.

- Drug taken subsequently without any reaction:

  The patient may take the particular drug again incidentally after the adverse episode and there may have been no adverse reaction following it. In such a situation, there is no need for the test.

- Reaction without having taken the drug:

The patient may be getting a similar adverse reaction even when the drug is not taken. Here too there is no need for any testing.

- Alternative diagnosis:

  If the adverse reaction following the intake of the drug can be explained by an alternative diagnosis such as herpes or a viral eruption or by chronic urticaria, then there is no need for drug testing.

- In drug provocation, every time the reaction was too severe:

  The drug caused a reaction which was severe, uncontrolled, and life-threatening. In such a situation, there's a possibility of serious consequences following the testing and therefore there should be no drug testing done.

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Guidelines for Preparation for the Doctor Appointment for a Patient with Suspected Drug Allergy:

Take all your previous prescription papers and drugs if present along with you.

Questionnaire for Drug Allergies

The patient should have the below mentioned information ready before entering the physician chamber.

- All the symptoms that were experienced. It should be in details even if they seem unimportant to you.
- The time of onset of symptoms from the time of consumption of the drug. It has to be as specific as possible.
- The duration of the symptoms.
- Any new drug taken, when it was taken, and for how long it was taken.
- Whether any over-the-counter or prescription drugs were also taken.
- Any herbal medications, vitamins, or other nutritional supplements were given.
- The timing of medications, any increase in medications, or stoppage of the medications is to be informed.

- Treatment taken for the symptoms, and its effect.
- Past drug reactions.
- Similar symptoms without taking the drug.
- Do you have asthma, nasal allergies, food allergy, or other allergies?
- Family history of drug allergies.
- Always take pictures of any condition, such as a rash/swelling to show your doctor.

Clinical Tools for a Definitive Diagnosis			
Clinical	Skin Prick Test	Biology	DPT
Causality Assessment (chronology, danger signs, etc.)	Demonstrates the allergic mechanism. Avoid DPT with the culprit drug.	Histamine for drug induced tryptase. Basophil Activation (BAT) Lymphocyte transformation test.	Confirms the drug responsible. Elicit DHR or exclude DHR.

History

A very detailed history has to be undertaken to make a diagnosis. Only patients with a prior history of allergic drug reactions should be screened.

Skin test cannot be done for all the drugs. The list for which it cannot be done is mentioned. In case a skin test is difficult, then a blood test can be done followed by a drug provocation test. The latter is the best screening test for sensitisation. A patient with a positive skin test may avoid provocation test whereas, a negative skin test does not rule out drug allergy.

Drugs for which the value of skin test has not been adequately demonstrated:

- Antihypertensive drugs.
- Biological other than anti-TNF preparations and omalizumab.
- Hormones, corticosteroids, and insulin.
- Non-beta-lactam antibiotics.
- Non-platinum chemotherapeutics.
- NSAIDs other than pyrazolones for immediate reactions opioids.
- Sera, immunoglobulins, and vaccines.

There are numerous laboratories which are doing blood tests for drug allergies. However, none of these blood tests have been validated. The patient can get it done but they need not rely on it completely.

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Drug Provocation

The drug provocation test (DPTs) is to be done preferably in a hospital where the means and trained personnel for resuscitation are available by the bedside.

The drug provocation test consists of challenging the patient with incremental doses of the drug. It is done when the diagnosis of a drug allergy is uncertain and your doctor judges that an allergy is unlikely.

In a drug challenge, the patient is given two to five doses of the drug, starting with the smallest dose and increased to the expected dose. If the therapeutic dose is reached with no reaction, then we can conclude that you aren't allergic to the drug. In such a scenario, the drug can be taken as prescribed.

When to Do Drug Provocation

This should be done when:

- History suggests that the allergy is unlikely, and the patient has been avoiding the drug. Example, a reaction to a local anaesthetic has occurred.
- There is a vague history in childhood of a penicillin reaction.
- To confirm or exclude allergy especially when other tests are negative, inconclusive, or not available.
- Confirm or to exclude allergy in simultaneous exposures to multiple drugs.
- Find a safe alternative to a highly suspected or to a proven allergen.

Precautions and Contraindications of Performing DPTs

- It should never be done or even tried if non-controllable and/or severe life-threatening DHRs have occurred following the drug intake.
- If a severe skin reaction such as Steven Johnson Syndrome, TEN, DRESS (drug rash with eosinophilia and systemic symptoms), vasculitis, AGEP, any internal organ involvement, or if any haematological reactions have occurred.
- If there is a history of anaphylaxis present, then it may be tested after a risk/benefit analysis has been done.

DPTs Not Indicated

- The offending drug unlikely to be needed and structurally unrelated alternatives are existent.
- In the presence of a severe concurrent illness or pregnancy (unless the drug is essential for the concurrent illness or required during pregnancy or delivery).

Drug Desensitisation

It is a process to make a drug reasonably safe for the patient.

Indications for Desensitisation

- No reasonable and effective alternatives are present to the concerned drug and it is a matter of life. (Meropenem used for

multidrug resistant sepsis)

- Not contraindicated.
- Patient still considered allergic to the drug and there is a need for the drug. An example of it is insulin in diabetics.

Method

Drug desensitisation is necessary when the drug has caused an allergic reaction and you need to take the drug. In a drug challenge, the patient is given a very small dose and gradually the dose is increased every 15 to 30 minutes over several hours or days. You can continue the treatment if the desired dose is reached with no reaction.

Desensitisation should be done at specialised centres with the availability of safe and alternative medication in case of any adverse reaction. If the drug is not given continually, the procedure needs to be repeated with each course of the drug as the effect is only temporary.

Prevention

In the presence of a drug allergy, the best prevention is to avoid the incriminating drug. The following steps need to be taken for protection:

Inform healthcare workers: Drug allergy is clearly identified in the medical records and is duly informed to other healthcare providers, such as a dentist or any medical specialist.	Wear a bracelet: The medical alert bracelet identifies your drug allergy. This information ensures prompt treatment in an emergency.

Case Study

A 24-year-old female was reported to the emergency ward in a critical condition with a history of periorbital edema, edema of the skin, itching, pruritus, vomiting, and difficulty breathing 20 minutes after ingestion of a pantoprazole 40 mg tablet.

Case Review

Any drug can cause a reaction. Pantoprazole was identified as the incriminating agent since it causes an immediate drug reaction. Moreover, there was no exposure to any other allergens such as food or aeroallergens especially dust mites.

Key Pointers:

- Many patients are labelled as having drug allergy incorrectly.
- Drug allergy can present as an immediate or delayed reaction.
- Allergy tests are not much useful for the diagnosis of most drug allergies.
- The drug provocation test is the only definitive test and should usually be done in a hospital setting.
- Drug desensitisation is the only method to overcome allergy, but the effects are temporary and need to be repeated prior to each new course of the medicine.

Section 6

DETECTION AND TREATMENT

The treatment of all allergic diseases essentially consists of the four pillars which are education, environmental control, pharmacotherapy followed by immunotherapy. The most important factor is to get the diagnoses correct, so that patients are not falsely labelled with an allergy that does not exist, which is a common situation in over half of the patients.

Allergen identification is essential before starting the treatment. This can be well identified by a good history. The education of the patient includes knowledge regarding the disease, the characteristics of the allergens, and usage of drugs along with a proper and empathic counselling of the patient.

Effective Management of Allergic Diseases

Practising evidence based medicine			
Patient Education	**Parmacotherapy**	**Allergen avoidance**	**Immunotherapy**
Always indicated	Effective Easily administered	Indicated when possible	Effective Alters the natural course of the disease

1

Laboratory Diagnosis of Allergic Diseases

Patients and more importantly, even doctors are confused and have poor knowledge of various laboratory tests. The laboratory is more abused than used. We try to clarify each test and its importance in addition to the latest methods to diagnose the allergen notwithstanding that the diagnosis of allergy and the type is primarily and often entirely clinical. We explain how the laboratory can help whether one can outgrow the disease and how to overcome or manage food allergies.

Introduction

The Spectrum of Allergic Disorders consists of the following:

- Allergic Rhinitis
- Asthma
- Eczema
- Urticaria
- Food Allergies
- Eye Allergies
- Drug Allergy
- Anaphylaxis

Diagnosis of all the above allergic disorders is—*Clinical*.

The clinical aspect is emphasised since a well-taken history of the patient would easily help to diagnose allergic diseases. The test is more to affirm or refute the clinical diagnosis and has a secondary role in making the diagnosis of an allergic disorder. Testing may support the clinical diagnosis but should not be used as a screening test. Allergy tests can sometimes be omitted if a well taken Sherlock style history is done by a knowledgeable clinician with input from the family.

How Allergy Testing Is Done?

The determination of the allergen starts with a meticulous history followed by either skin testing or a blood test for the specific IgE. An estimate of the total IgE is not a good predictor of allergies in children. Positive allergy test results indicate sensitisation or atopy, but they are not equivalent to clinical allergy, meaning a child can have a positive allergen test indicating he is atopic to that allergen but that doesn't confirm it is responsible for his symptoms. In simple terms, a child with positive allergy tests may have no clinical illness when exposed to the allergen. Thereby highlighting the importance of *meticulous history taking* to narrow down suspected allergen list and then carry out specific allergen test rather than ordering a battery of test, which is a futile attempt if history taking is not proper. Positive allergy testing has no correlation with the severity of allergic state.

Total serum IgE can be raised in one-third of the population and therefore is not a measure of clinical allergy. IgE can be particularly high in a number of other conditions, particularly in:

- Atopic dermatitis
- Parasitic infections
- Neoplastic diseases
- Immunodeficiency diseases

I find many patients coming to the clinic with a preconditioned diagnosis of allergy, because either their referring doctor has told them about the abnormal levels or

simply the patient has noticed an elevated level and he is naturally unduly concerned. Thus, the total nonspecific IgE levels are a headache to the doctor, in trying to convince the patients who are just misled by the values. A specific IgE for an allergen level has a greater value in the diagnosis.

Awareness of food allergy has increased over the past several decades. The laws mandating labelling and prevention campaigns have all contributed to a growing awareness of food allergy. This increased awareness will not only lead more people to attribute many symptoms to food allergy without seeking confirmation, but it is also likely to lead to the increased use of IgE testing, with inevitable false-positive results.

Factors Causing an Increased Awareness of Food Allergy

- Increased use of IgE testing with inevitable false-positive results
- Laws mandating labelling and prevention campaigns
- Comprehensive screening and challenge

Total IgE or specific IgE are usually not helpful for monitoring disease activity as levels may remain high, even after the patient has become tolerant to the allergen.

Supporting the Diagnosis of Respiratory Allergic Disorders

Breath nitric oxide level:

This is a test which analyses the presence of nitric acid in each breath which is blown through a device measuring the nitric oxide in each breath. There is an increase in the levels of nitric acid corresponding to an increase in inflammation secondary to asthma.

Support the Diagnosis of Anaphylaxis

Serum mast cell tryptase will be elevated only if the route of entry of the allergen is by the parenteral route i.e. as an injected drug or an insect bite. The sample should be collected within 2-3 hours of the incidence. An ingested allergen causing anaphylaxis will not necessarily elevate the mast cell tryptase levels. It is advisable to repeat the levels 12 hours after the initial sample to demonstrate the declining trend of the values. The following case study below highlights the importance of the mast cell tryptase test.

Case Study

Samira, a nine-year-old girl, became pale and bradycardic (low heart rate) when given intravenous (IV) ceftriaxone, a cousin of the penicillin group. The patient had been given the same injection for the last two days at a tertiary hospital without any event. It was a real state of anxiety in our outpatient clinic, but she recovered immediately with bag-mask and oxygen.

The parents became very agitated and distressed and blamed us and the drug for the incidence. Although the patient was very stable and now smiling, we decided to admit the child for observation. The girl developed a similar episode in the hospital when a cannula was being inserted intravenously in the hospital. Although we were confident of the diagnosis being an attack of vasovagal syncope but still, we went ahead and did the serum mast cell tryptase test which cost $150. The tryptase test was normal. It not only removed the doubt from the parents' mind but also helped them decide the need for the same medication in future.

Other Tests Available to Identify the Allergens

- Skin Prick Test (SPT) and Intradermal Test
- Patch Test
- Nasal allergen challenge
- Oral Food Challenge Test
- Drug Provocation Test

Factors Helping in Deciding a Test

In allergies, these can be divided as:

1. ***Patient related:***

   The skin condition in eczema and urticaria is sometimes not conducive for SPT allergy testing, especially if the disease is extensive or skin is very greasy. Very young children, sometimes in spite of the best counselling, would not allow for the skin testing. In order to do the skin prick test, the patient should be off antihistamines such as hydroxyzine or chlorpheniramine (avil) for at least 5 days and off second-generation antihistamines such as cetirizine and similar ones for at least 7 days. If the patient cannot be without antihistamines, then there is no option other than doing a blood test. Unlike a blood test, skin prick tests are often cheaper, more reliable, and provide an immediate result.

2. ***Physician related:***

   If the physician is rather uncomfortable in doing the skin prick test or if he is not familiar with the test, then the blood test would be recommended.

3. ***Both:***

   Sometimes, both the patient as well as the physician may not be prepared for doing the skin prick test. Under such circumstances, the blood allergy test would be the most viable option.

4. ***Neither:***

   There are instances when the patient would want a skin allergy test and the physician is willing to do the test but still blood test would be an ideal option. This is when a component analysis of the allergenic food is required.

Role of Laboratory in Individual Diseases

- VKC:
    - To find aeroallergen.
    - Studies have shown that the aeroallergens may not be positive in all VKC and the symptoms are the same with both positive and negative test.
- Anaphylaxis:
    - After a severe allergic reaction without a known cause-to identify a trigger.
- Food Allergy:
    - Persisting or intermittent symptoms without any other known reason, especially with concurrent atopic symptoms.
    - Persons experiencing allergic symptoms (itch, angioedema, urticaria, wheezing, and Gastroesophageal responses) in association with food exposure.
    - Persons who have limited their diet based on perceived adverse reactions to foods/additive.
    - 20% of individuals in the population believe they have adverse reactions to foods.
    - Not all these reactions are food allergies, as they are not immune-mediated.
- Urticaria (indication for lab testing):
    - Acute
        - The reaction has occurred within an hour of ingestion and last <24 hours.
        - In all severe cases and where there is a suspicion of allergy.
    - Chronic

        - There is a high chance of false-positive results leading to unnecessary avoidance of food substances. Chronic idiopathic urticaria uncommonly needs investigation and can usually just be managed with antihistamines.

- Eczema/Atopic Dermatitis:
    - Although total IgE is high in AD, the disease is not an IgE mediated disease and allergy tests should be avoided unless there is an additional history of immediate hypersensitivity. House dust mite (HDM) tests are almost always positive.

- Allergic Rhinitis and Asthma:
    - All the blood test would evaluate for the presence of allergens which are protein molecules. The perfumes, diesel, deodorant, mosquito repellents, and other such substances cannot be tested by any method of blood or skin prick evaluation. If any laboratory is assessing for these, the results should be dumped for these substances are chemicals and they cause symptoms in the patients only by their irritant effects.

- Triggers for Allergic Rhinitis
    - Aerobiological (tested by skin or by blood testing)

      The Irritants which can cause symptoms similar to allergy in patients having an underlying allergic disease to the above aerobiological or to any individual having an underlying defect in the upper airway system especially the nose.

        - Dust mite 60%
        - Cockroach 17.5%
        - Fungi/Pollens 7.5%
        - Pets 5%

- Irritants (cannot be tested by skin or blood test)

  Any laboratory which tests for any of the below irritants is misleading the patients and their reports should be discarded. This is to reiterate the fact that we are allergic to a living substance and not to chemicals.

    - Cigarette smoke
    - Mosquito Coil
    - Other smokes
    - Formaldehyde, Benzene
    - Volatile organic compounds and perfumes, deodorants, etc.

Role of Serum Based In-Vitro Specific IgE Testing in Allergy Diagnosis

The blood test for a specific type of allergen will be helpful in the following way:

1. Identification and quantification of an allergen-specific IgE which can be a food or aeroallergen.
2. Predictive of immunotherapy respondents: The level of the blood result does not generally predict the possible severity of an allergic reaction, except for some specialist component tests. Patients on immunotherapy may show no change in levels of allergen despite improvement in symptoms.
3. Predictor of tolerance to food allergens in children: This is one very important aspect of the testing. Allergenic food consists of various sub-components.

The different molecular components of peanut, an important food, have been listed below.

Allergen	**Frequency of Reactivity (%)**
Ara h 1	>90

Ara h 2	>90
Ara h 3	44
Ara h 4	44
Ara h 5	16
Ara h 6	38
Ara h 7	44
Ara h 8	85

If we know the component of the peanut allergens in the patient's blood, we can safely determine the outcome based on the reactivity of that particular component. As an example, the presence of Arah1 in the blood is dangerous because of high reactivity while Arah5 presence is safe because of low reactivity in peanut positive patients.

Some components are highly allergenic and heat stable. Heating and cooking have no impact on these components. There are other components which are labile and not so allergenic. These components can be destroyed by heating or by cooking. The presence of these labile components is a predictor of the development of tolerance with time and thus, a good omen.

Methods of Testing for Specific IgE

1. Radioallergosorbent Test (RAST)

   Allergens are living substance. Radioactively labelled anti-IgE is added, which attaches to the specific IgE bound to the allergen. The amount of specific IgE can be estimated from the amount of bound radioactivity.

   Since at least 2010, health organisations in the US have recommended that the RAST be abandoned as a diagnostic test for allergy in favour of more sensitive fluorescence enzyme-labelled assays (FEIA). The

latter method is the most reliable technique to date. It is costly, but no doubt helps in proving or disproving the presence of an allergy.

2. Fluorescent-enzyme immunoassay (FEIA)

   The latest and best laboratory method to identify aeroallergens is the fluorescent-enzyme immunoassay (FEIA) method. This has been branded as immunoCAP method by a Swedish company. Although this has not been validated for most of the food allergens, its reliability is the same as the skin prick test for nuts, egg, milk, seafood, and most cereals. The fluorescent-enzyme immunoassay (FEIA) helps to identify the aeroallergens as well as the food allergens that the patient may have an allergy to. This is a reliable method with a sensitivity of some allergens being almost the same as that by a skin prick test. However, it is costly and needs a much detailed history before it is done.

   Phadiatop is a method for allergy screening by FEIA method only. I do not do this test since I would rely more on a good patient history. It only gives us an idea whether the patient is atopic or not i.e. whether the patient has a tendency to develop an allergy or not. If positive, there is a high possibility of an allergic disorder. However, if I take a good history of the patient, there's much information obtained from the patient to confidently make a diagnosis of an allergy.

   A good clinical examination requires much time, knowledge, and experience to make an assertion. Hence, busy non-allergy general practitioners may use the phadiatop test as a screening test for the diagnosis/prognosis of allergies but not as a replacement.

3. Advance Test

   In recent times, there are newer tests such as the basophil activation test (BAT). The basophil activation tests have a role in the diagnosis and follow-up of food

and drug allergies. However, it is not easily available for clinical practice and is currently used only in research settings.

4. Food Component Analysis

The food items consist of different components that can broadly be classified as stable or as labile allergens. The stable allergens are generally associated with or can be considered as a predictor of severe systemic reactions, whereas labile allergens are associated with mild to moderate reactions and cooking food destroys this allergen and the food is often tolerated. The presence of positivity to the labile allergen is an indicator that in future, the patient will outgrow the allergy to the particular food. A positive stable allergen is an indicator that the patient will less likely outgrow the allergy.

Hence, when the patient is positive to a particular allergen like peanut or wheat, we need to find whether they are positive for stable or labile allergen components of that food or for both. This can be done by a special test called component resolved diagnosis (CRD). This is a blood test by FEIA method which specifically lists the different components of the food item such as peanut and gives their levels in the blood. Based on these values and on our knowledge of which are stable and which are labile, we can confidently advise the patients about whether they will get anaphylaxis or whether they can safely eat it in the cooked form but most importantly, also concur whether they can outgrow the allergy to that food with time or not. This testing will soon be available in India.

Ms Ayesha's serum (FEIA) test results (Case study presented in chapter 'Eczema – Atopic Dermatitis'):

- Almond 6.89 kUA/L
- Cashew Nut 39.50 kUA/L

- Peanut 69.90 kUA/L
- Pecan 41.20 kUA/L
- Pistachio 35.20 kUA/L
- Walnut 29.50 kUA/L
- Rice 6.62 kUA/L
- Shrimp 18.20 kUA/L
- Soybean 6.31 kUA/L
- Wheat 45.10 kUA/L
- Gluten 47.70 kUA/L
- Chicken 41.20 kUA/L
- Egg White 39.70 kUA/L
- Fish 4.28 kUA/L
- D. Farinae > 100 kUA/L
- D. Pteronyssinus > 100 kUA/L
- Cockroach 80.30 kUA/L
- Bermuda Grass 91.90 kUA/L
- Sorghum Vulghare 38.50 kUA/L
- Cladosporium 15.90 kUA/L
- Aspergillus Fumigatus 7.4 kUA/L
- Total IgE > 30000 kUA/L (n=<64)
- Phadiatop 81.5 kUA/L

Case Analysis

Approach to a patient with specific food allergens by FEIA method:

In Ayesha's laboratory results, we can see that although the levels of wheat were the highest, the patient could always safely eat wheat in the cooked form. This is likely due to the labile component being positive. The total IgE is very high (>30,000). In such a case, many allergens would invariably come high without the presence of concomitant clinical allergy.

Key Pointers:

- Clinical diagnosis especially a good history is the essence in allergies.
- Laboratories are only for supportive and confirmatory test for the clinical diagnosis.
- Specific allergens should be identified by the FEIA method but unfortunately, it is costly.
- Component resolved diagnosis is the future in the management of allergies.

2

Allergy Testing - Skin Prick Test

Skin prick testing is the method of identifying the incriminating agent. This chapter describes the method, precautions, limitation, and its use in different conditions. There are many apprehensions about the testing and thus, the need to demystify it.

Introduction

Allergen testing is an important prerequisite for specific allergy treatment. It supports in the identification of infants at increased risk for the development of allergic diseases at a later stage. It lays an effective precedent for specific allergy treatment including specific allergen avoidance measures, relevant pharmacotherapy, and specific allergy vaccination.

The children to be tested include those with:

- Recurrent possible allergic symptoms.
- Need for continuous prophylactic treatment.
- Testing for a specific allergen, irrespective of age.

The extent of allergy tests will depend on:

- Age of the child.
- Positive family history of allergic diseases.
- The character of the symptoms.
- Seasonal and diurnal variation.

Allergen Testing Steps

1. Detailed case history.
2. Test to determine IgE sensitisation.
    - Skin prick test (SPT) and/or
    - Allergen-specific IgE in serum

There are newer tests which are primarily used in research or in institutes only. Food allergy can be diagnosed by a SPT but an oral challenge test is the gold standard.

How Allergy Skin Testing is Done?

Skin testing is done by the widely practised skin prick test (SPT) using a lancet or by the intradermal test using an insulin syringe. The SPT has a high sensitivity, low specificity, greater selection of antigen, and is less expensive with minimal equipment. It is also safer and less painful than the intradermal test and unlike with intradermal test, anaphylaxis with SPT is rare.

Steps involved in a skin prick test:*

1. Clean the forearm with spirit or propanol liquid.
2. A drop of different allergens is placed in different circles drawn on the forearm or on the back in young infants.
3. Lancet of steel or sharp plastic is used to prick the epidermis. There should be no bleeding, lest it may lead to false-positive results.
4. Wait for at least 20 minutes.
5. Wheal formation of more than 3 mm with negative saline control and more than 3 mm histamine control would be suggestive of allergy.

Convincing the Child for a Skin Prick Test

Working with children is one of the most difficult things to do. This is very obvious and natural considering the age of the child and the fears they might have. There are many ways to convince them. Among these are:

- Show videos of children of a very small age undergoing a test without any fuss especially being done by you.
- Try doing at least two tests on the parents or other attendees.

While conducting these tests, you will have to incorporate a lot of diversionary tactics such as playing their favourite movie on a cell phone, talking about their school or home, or making them recite their favourite poem or any religious mantra which they may have learnt.

World over, there's no reported patient who has had an anaphylactic reaction following a skin prick test. There are a few patients, especially young girls, who would collapse after the procedure and have vomiting too. In such cases, the staff shouldn't panic and take utmost care of the attendees and the child. All that is needed is lying down position and a glass of water for the patient.

Its clinical relevance is in the diagnosis of food allergy, asthma, and allergic rhinitis directing the different treatment options accordingly. It has a special relevance in children. For example, a child with positive skin prick test having wheeze and cough without fever and progressive symptoms is more likely to be a persistent wheezer.

The allergic child who needs allergy skin prick testing may present any of the following types of allergies:

- **Food Allergy**

  The skin prick test is a useful procedure for evaluating clinical reactivity, but it is important to understand that:

  - Clinical relevance is only possible in the presence of a consistent association with a history of symptoms on exposure to the concerned allergen.

- Negative predictive value (>95%), with a negative skin test exclude IgE-mediated food allergy. If negative, we can certainly exclude food allergy and the patient can freely eat the concerned food substance.
- Positive predictive value is less than 50%. In such a case, a clinical correlation has to be done and if present, then a food challenge should preferably be done.
- History suggestive of food allergy and a positive SPT is supportive.
- Larger SPT wheals correlate with a positive food challenge: If the SPT wheals is >8mm for milk, peanut, and egg, then it has a 95% clinical reactivity.
- Normal subjects may show a reaction to foods consumed on a regular basis. South Indians regularly eat rice only. So, it would be normal for them to be positive on a SPT albeit ≤ 3mm.
- Positive SPT in non-allergic patients predisposes to future allergic disease. If there is no clinical reactivity and challenge is negative, it means the individual is sensitised and should preferably avoid it.
- SPT will be negative in cases of food intolerance and non-IgE mediated food allergy.

Using the prick-to-prick method, testing of any food substance that can be pricked with the lancet can be tested. We prick the food and then the skin. It is safe, sterile, and more reliable than using the food extracts with reagents as extracts of foods can lose much of their reactivity, unlike the raw food. With a prick to prick test, we have the liberty of the availability of a wide variety of allergens for testing, unlike the blood test where the available tests are very limited.

- **Anaphylaxis**

  After anaphylaxis, if the cause is not known, the patient will need to be tested after complete recovery.

- **Urticaria**

  Indication for skin prick testing:

  - Acute

    The reaction has occurred within an hour of ingestion and last < 24 hours. In all severe cases and a suspicion of allergy.

  - Chronic

    Not recommended due to a high chance of false-positive results leading to unnecessary avoidance of food substances.

- **Eczema/Atopic Dermatitis**

  In atopic dermatitis, T-cells play a role in 80% of cases. It is an IgE mediated disease. Skin prick test can be done to identify the aeroallergens and food allergens which are aggravating atopic dermatitis.

- **Allergic Rhinitis and Asthma**

  The skin prick test would evaluate for the presence of aeroallergens which are protein molecules. The perfumes, diesel, deodorant, mosquito repellents, and other such substances cannot be tested by any method of blood or skin prick evaluation.

Triggers for Allergic Rhinitis

- Aerobiological (tested by skin or by blood testing)
  - Dust mite 60%
  - Cockroach 17.5%
  - Fungi/Pollens 7.5%
  - Pets 5%

  When testing for pollens, one should test only for those pollens prevalent in the local area of patients' residence. These locally prevalent pollens can be googled. There are books on pollen maps of India that provide more specific

information. *An Atlas of Allergenically Significant Plants of India* written by Dr A. B. Singh is especially an informative source.

The irritants which can cause symptoms similar to allergy in patients having an underlying allergic disease to the above aerobiological or to any individual having an underlying defect in the upper airway system especially the nose. Irritants cannot be tested by skin or blood test.

- Vernal keratoconjunctivitis (VKC)

  Although skin test will help in identifying the allergen, not all VKC patients will have positive allergy skin tests. The clinical signs and symptoms among those with and without positive skin tests are the same.

- Insect Bite Allergy

  Insect Bite allergy is a common and disturbing problem in the West, unlike India, where it is under-reported. A detailed history of the location where the bite took place and time of the year will help identify the insect. The common insects are the honeybee, yellow jacket, and red ants. If we get the insect, an extract of the insect can be prepared, and the solution can be used for skin prick test.

  Skin testing is preferred over in vitro testing for evaluation of venom-specific IgE antibodies and it should be done in all severe systemic reactions of Grade III-IV. This also helps in deciding about venom immunotherapy (VIT).

- Drug Allergy. (Refer to section 5, chapter 'Drug Allergy')

Case Study

Mrs Shubda a 40-year-old officer, complained of having developed symptoms of anaphylaxis requiring hospitalisation and adrenaline. She developed the symptoms immediately after eating prawns. She was adamant that it was prawn allergy and wanted it to be tested.

However, after getting a detailed history, I tested her to prawns along with all the ingredients that were used to prepare the prawn dish. The result was:

- Prawn - negative
- Coriander - positive
- Red chillies - positive
- Green chillies - negative

All of the above were tested, besides other spices. She was advised to take prawn in boiled form and avoid red chillies and coriander.

Key Pointers:

- Allergen testing begins with a meticulous history followed by determination of IgE sensitisation.
- The SPT is very safe and more reliable than a blood test.
- Any food item which can be pricked in its natural form can be tested by the prick to prick method.
- In case of food allergy, a negative test almost rules out food allergy. For a positive food test, a direct challenge is a gold standard.
- In the management of asthma and allergic rhinitis, skin prick test is essential to find the aeroallergen for good environmental control.
- Immunotherapy initiation requires the exact identification of the allergen.

*Note: SPT is safer and less painful than the intradermal test. And unlike with intradermal test, anaphylaxis with SPT is rare. For more details, check the videos and images on www.allermy.com.

3

Environmental and Pollen Control

This chapter deals with environmental control, which is one of the four major pillars of allergy management, highlighting the magnitude of the problem due to pollution. Environmental control brings about a significant control of the disease. Various allergens are enumerated and the different methods to control them are discussed followed by FAQs.

Introduction

Environmental control envisages control of both allergens and pollutants. Pollutants (the components of pollution) can be either foreign substances/energies or naturally occurring contaminants in large quantities.

Pollution matters because:

- In 2015, pollution killed 9 million people in the world.
- Throughout the world, air pollution, tobacco smoking, and occupational exposures are of great concern when it comes as causative factors for respiratory diseases.
- Population studies have also demonstrated structural changes in the nasal epithelium in subjects exposed to high or prolonged ozone levels.
- A longitudinal study in reunified Germany suggested that improvement in air quality might account for a decrease in respiratory disease including rhinosinusitis.

The State of Global Air report brings into one place the most recent information available on levels and trends in air quality and

health for countries around the globe.

- 95% of the world's population lives in areas exceeding WHO guideline for healthy air. China's air pollution exposures have stabilised and even begun to decline slightly; Pakistan, Bangladesh, and India, in contrast, have experienced the steepest increases in air pollution levels since 2010.
- China (26%) and India (25%) together continue to bear most (51%) of the mortality burden attributable to particulate matter – PM (2.5).

11 out of the 12 most polluted cities on the World Health Organisation list were in India based on the WHO Global Ambient Air Quality Database (update 2018).

Relationship of Pollution and Respiratory Diseases

- Global pollution (SO2, NO2, CO, PM, etc.) are differently implicated in population-based surveys:
    - When there are peaks of the above pollutants, it will lead to a marked increase in asthma attacks, increased usage of asthma drugs, and increased hospital admissions.
    - When there is a chronic exposure to the above irritants then there is an increased bronchial hyperresponsiveness and increased incidence of asthma and allergic rhinitis.
- Ozone:

  An increase in the ozone will cause a marked increase in allergic rhinitis (Parker, Health perspective 2009).
- PM or Particulate matter:

  The PM is implicated by both population and experimental studies. PM (2.5) and PM (10) are the different sized particulate matter which are involved in asthma and allergies development.

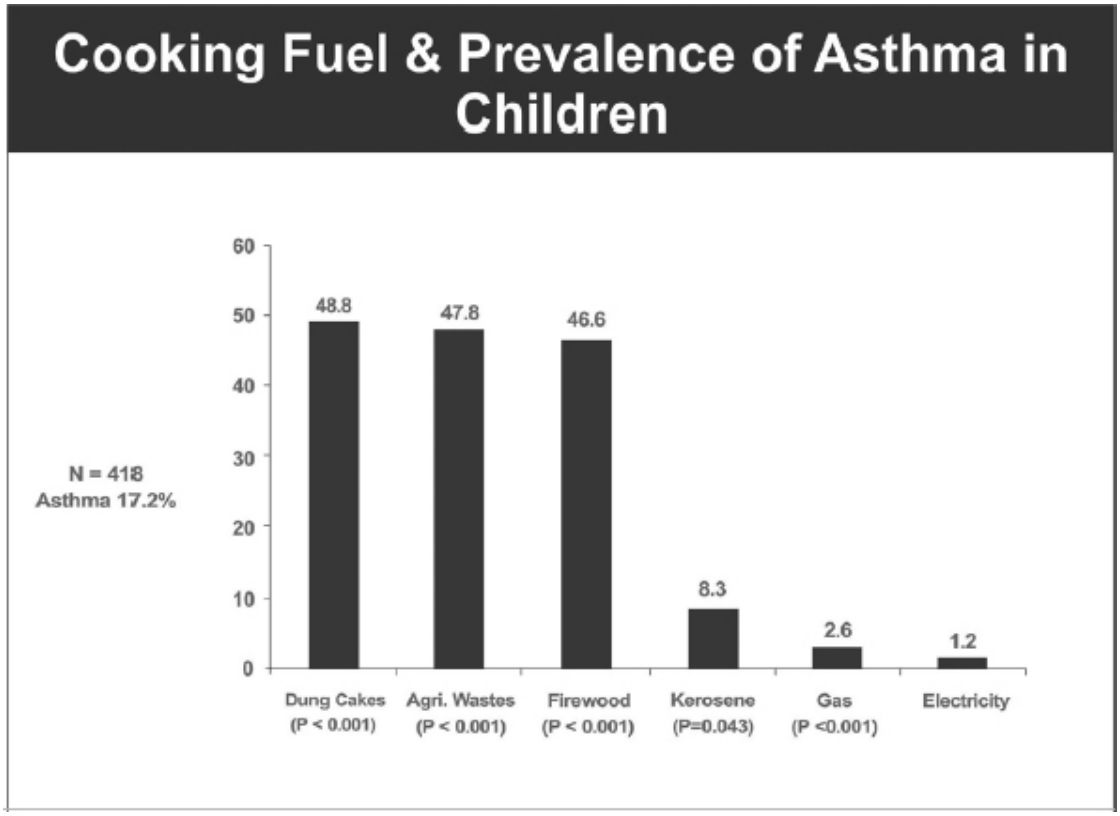

Image credit @ Indian Academy of Paediatrics

The above study shows the prevalence of asthma in children in relation to cooking fuel. The incidence of nonallergic asthma decreases as the amount of organic matter in the environment decreases.

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Relationship between Allergens, Air Pollutants, and Childhood Allergic Diseases

- House dust mites and PM (2.5) play an important role in the risk of asthma and allergic rhinitis.
- Exposure to PM (2.5) and mite allergens have a synergistic effect on the development of asthma. Avoiding co-exposure to allergens and air pollutants is thus important.
- PM (2.5) and PM (10) exposure increases allergen-specific IgE production leading to increased airway inflammation.
- PM (10) and to a lesser degree Ozone (O3) are associated with respiratory deaths in infants and children.
- A meta-analysis of five European birth cohorts examined the association between residential exposure to air pollution and

lung function and found that particulate matter was associated with a decrease in lung function in schoolchildren and it is known that impaired lung development contributes to infant mortality.

- Most of today's patients suffering from allergic rhinitis (AR) are sensitised to more than one trigger and suffer from persistent and moderate/severe symptoms, which severely impair their quality of life (QOL).
- Changes in indoor environment/lifestyle/affluence appear to have led to more time being spent indoors and resulted in perennial exposure to indoor allergens, changes in sensitisation patterns, and polysensitisation to a variety of novel cross-reacting exotic food and pet allergens.
- One recent study of over 3000 Allergic Rhinitis patients consulting general practitioners demonstrated that overall, 93% of the patients had a diagnosis of moderate-to-severe rhinitis and the remaining 7% a diagnosis of mild rhinitis.

How Does Indoor Environment Cause Allergies?

In the USA, housing conditions have changed over the past few decades and have become increasingly 'energy efficient'. This has meant that there is much less chance for air exchange in the indoor air and a greater chance for the build-up because of increased insulation and wall-to-wall carpeting, allergens, and irritant gases. The percentage of new homes with central heating and air-conditioning increased dramatically during the past two decades that would appear to have an impact on indoor air quality. Home dampness and the presence of moulds in the home have been reported to be associated with an increased prevalence of respiratory symptoms, including asthma and wheeze.

The scenario in India is far worse. The traditional homes have a courtyard wherein the families would sit out, dry their clothes, and the kids would play getting a lot of sunshine.

These homes are now being broken down and being replaced by elevated apartments leaving very often inadequate space around for proper ventilation and adequate sunlight to come inside. There is little scope for cross ventilation leading to build up of indoor pollutants. Studies have shown that air is 2.5 times more polluted in closed spaces as compared to open spaces.

Indoor factors contributing to increased allergy:

1. Home dampness and the presence of moulds in the home.
2. Housing conditions have changed over the decades increasingly energy efficient.
3. Less chance for air exchange for the indoor air, leading to build up of allergens and irritant gases.
4. Increased insulation and wall-to-wall carpeting.

Approach

Whenever allergy causes a disease in the unified airway system extending from the nasal cavity to deep in the lungs, patients are concerned with the control or the elimination of the disease. The foremost steps in control of the disease are the identification of the incriminating allergen. It can be identified with a good history or a simple skin prick test which is more reliable than a blood test. Usually, the culprit is an 'aeroallergen' or airborne protein from a living source such as dust mites, pollens, fungus, or animal dander. It is never due to the commonly unsubstantiated beliefs about perfumes, diesel, smoke, or cold items, though they can cause irritation due to direct irritation. Allergy implies immune reactions. Food substances rarely cause respiratory symptoms without the presence of concurrent skin or gastrointestinal symptoms.

Triggers for Allergic Rhinitis

Aerobiologicals	Irritants
Dust Mites - 60% Cockroach - 25% Fungi/Pollens - 7.5% Pets - 5%	Cigarette Smoke 1994 - 6% 1999 - 7.5% 2004 - 7.9% Mosquito Coil - 5% Other Smokes Formaldehyde Volatile Organic Compounds

Identification of Allergens

The above table shows the prevalence of dust mite and other aeroallergens which cause allergy. On the right side are the substances which act as irritants. They will worsen the underlying allergy. Exposure to PM (2.5) and mite allergens bring about a synergistic effect leading to the development of asthma and AR. Thus, avoiding co-exposure to allergens and air pollutants is important.

The most common aeroallergen in more than 50% of cases is the dust mites. The 3 most important types of dust mites found in our study are:

1. Dermatophagoides pteronyssinus
2. Dermatophagoides farinae
3. Bloomia species

Dust Mites Characteristic

The dust mites are microscopic insects. They thrive on human skin scales and on the atmospheric humidity. The biggest enemy of the dust mites is sunlight. Thus, one will never find the mites in the dust of outer or open places. Since dust mites are 80% water by composition, humidity affects the mites very substantially. Their numbers decrease with increase in altitude. This could be due to both the cold and low pressure. Hence, sometimes in a lighter vein, it is suggested to the patient to go away to the Himalayas for that is the place devoid of all mites. They are always present indoors in closed or sequestered spaces. The outdoor dust in the open spaces never contains dust mites and does not cause allergy.

Handling Dust Mites

A simple rule to follow is to live in a very sparingly furnished and easily cleanable space. Adopt an ascetic style. Less clutter, less ostentation, less allergens. Once you live in such low maintenance and clean environment, you cannot return to a dust welcoming, chemical-filled home with too much stuff in it. It also changes our mindset from being consumers to becoming ‘doers’, with more time to learn, work, create, and engage in activities outdoors. In short, it requires at the very least sealing cracks and gaps in false ceilings, smoother walls without any hangings, less curtains and washables are used, smooth chairs and leather or rexine sofas that

can be wiped down with damp cloths, simple furniture without grooves and carving, and no woollen blankets, rugs, and carpets. Any items allowing dust to gather like soft toys should be removed if unable to wash on a regular basis. Daily wet mopping is far superior to vacuum cleaning. All the bedsheets should be smooth and non-textured and should be washed weekly in hot water, sun-dried, dusted, and then to be used. Every night the bed sheets can be dusted.

In my experience, unless it is a really distressing disease making life unbearable, patients do not undertake the above measures seriously. It is a disease present predominately amongst the well off and they are trapped under the pressure to maintain the standard of living that subscribes to certain appearances. It becomes very difficult for them to maintain the strict measures required to eliminate dust from their house. Families which are from a business background and are living in a joint family system are the most entrapped under the pressure of maintaining the particular lifestyle.

However, most five-star hotel rooms follow strict measures to keep dust mites under control and the measures followed in those rooms can be replicated.

Sunlight plays an important role. It is the biggest enemy of dust mites and humidity is the best friend of dust mites. A patient (refer to Satish's case) who had just headaches for years and was being treated as a case of migraine suddenly developed violent and intractable sneezing. A change which coincided with the development of sneezing was that a building had come up behind his bedroom thus blocking the entry of sunlight.

Our ancestors probably knew or had observed this relationship which made them put everything in the sun. In fact, the house construction based on Vaastu advocated the morning sun in the kitchen and evening sunlight in the master bedroom. There were many other recommendations which allowed cross ventilation.

Last, a word about the air conditioner. It is good if they are well maintained and the filter is cleaned monthly but deleterious to the health if not done so.

Dust Mite Free Covers

Among the measures to reduce dust mites is to use dust-mite proof and waterproof covers for bedding, pillows, and quilts. The cost is

variable depending on the micrometre size of the microfibre.

1. Woven	2. Vinyl 3. Laminates	4. Non-woven Microfibre Fabric
Acts as a filter that prevents allergen escape yet allows air and water vapour to pass freely through the fabric	Vinyl & laminates block all allergens but are not permeable to air or water vapour and therefore are uncomfortable	Do not succeed in in decreasing allergen exposure and should not be used for allergen avoidance
Effective and comfortable	Effective and uncomfortable	Not Effective

Reference J. Portnoy et al. Ann Allergy Asthma Immunol 2013;111:465-507

Environmental Detection of Dust mites

There are tests available to detect the quantity of mite allergens in homes within 10 minutes. It is a lateral flow test using gold labelled antibody for mite group 2 allergens. This mite screening test should educate consumers about allergen exposure and encourage compliance with allergen avoidance procedures. This technology has applications for the detection of other common environmental allergens. However, the instruments for the detection are not easily available.

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Pollens Characteristics

The pollens are present strictly outdoors. The source varies widely with the local climate. In the West, tree pollens are between

February and April, grass pollens from May to September, and weed pollens from November to January.

The pollen count increases with an increase in environmental temperature and with a decrease in humidity. A low wind velocity would cause stagnation of the pollens in the atmosphere. An increase in air pollution will increase the potency of the pollens by almost 50 times.

Handling Pollens

A very simple way of dealing is to stay indoors during pollination time with all doors and windows closed. Their peak action is between 11 a.m. and 5 p.m. when they are released into the atmosphere. If during the time of high pollen count, the patient needs to go out or stay in the open, they should cover themselves well and have a bath on returning.

The pets can be a reservoir for pollen infusion and thus limiting their outdoor activities is advisable. Furry pets can be trimmed for easier brushing and bathing. If a pet is not terrified by a quiet, low suction vacuum hose then they can be brushed outside the front door and gently vacuumed while brushing to reduce dander, fur, and pollen on their bodies. Non-shedding dogs with short trimmed hair are easier for allergic people to live with. Their bedding needs to be washed frequently too. Doormats should be either washable or should be cleaned regularly by a non-allergic person. Street shoes should not be taken inside the house but put in shelves with doors inside the main door. Avoid drying clothes outside.

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Fungus Characteristics

Fungal allergens are present both indoors and outside. The spores of fungi will increase with a decrease in temperature, increase in humidity, and during a thunderstorm. The fungi have a propensity for dampness which should be ameliorated at all costs. Hence there should be no wet walls and leakages, collection of water in pots, and the garbage should be disposed properly. A new well-painted house is a simple solution. Try to use low VOC (volatile organic compound) paint for many reasons. It can be more expensive but if you can afford it, it is a very worthwhile expenditure. Also,

eliminate the source of moisture such as cool mist humidifier. Keep indoor plants intermittently in sunlit areas.

Measures to Control Cockroaches

The pest controller is the best remedy to the cockroach. The pesticides are very toxic, and the cockroaches keep coming back. Pest control is limited to only heavy infestations and less toxic physical measures are done regularly and meticulously. Some other measures to combat cockroach infestation include:

- Net screens on windows.
- Fine wire mesh on floor drains at night on sink drains.
- Careful use of mothballs inside nylon net bags*.
- Keep minimum furnishings in the house.
- All food tightly shut in steel or glass containers.
- Garbage bins with tight lids.
- Repellent sprayed carefully on the inner rim of the bin.
- Pest controller of India (PCI) is a solution.

This should not undermine the importance of cleanliness and proper disposal. There are different species of cockroach. If the cockroaches are seen in the daytime or in the bedroom, it's a serious matter. It suggests that their numbers have reached critical levels and thus the need for elimination at the earliest.

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Pets Characteristics and Management

The most difficult aspect in the aeroallergen control is of pet animals. Patients especially children and adolescent would prefer to get rid of the doctor rather than to remove the pet from the house. Hence, we need to have a detail session on pet management with the family. This includes avoiding the pet being allowed into the bedrooms and if possible, the living rooms.

The difficult part of the cat dander is that it is ubiquitous and it's not necessary that there should be a cat at home. The saliva of the cat and dogs contain the allergenic particles. When the animals lick their bodies, the saliva gets deposited and dries up. This dried up microscopic particles get airborne or are deposited on all the

surfaces that the animals come in contact with such as bedding, sofas, and carpets. Even if the cat has been removed from the house, it takes weeks for the particles to be eliminated from the house.

The mere presence of the cat in the neighbourhood is enough. There are many apartments especially in the Western world and in the Middle East wherein they have a central air conditioning system. If there are cats anywhere in the apartment, the cat allergens would travel through the ducts into the apartments.

Allergic households with pets should not have carpets and should not allow pets on sofas and beds. Brushing and wiping the pet down daily should become a household routine.

The droppings (faeces) and feathers are an important cause for allergic rhinitis, asthma, and related non-allergic lung disorders. Hence, it is absolutely necessary that the breeding and feeding of pigeons in and around all areas of habitation should be stopped and strictly discouraged.

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Interplay of Environment and Pharmacotherapy

A strict environmental control is required for significant control of the symptoms. The drugs will be effective in controlling the disease in the presence of good environmental control.

There are many patients who do take their medication regularly but are not able to achieve symptom control. The most common reason would be either poor technique in the use of devices or/and improper or no environmental control of the allergens.

Case Study

An example of good environmental control is patient Satish discussed in section 2, chapter ‘Your Nose Knows - Allergic Rhinitis’. When he was given a full dose of medications consisting of intranasal steroid spray, antihistamines, and montelukast, we noticed only a minimal benefit.

A visit to the house revealed that his bedroom was West-facing and on the fifth floor. In the last two years, a building had come up. This construction not only blocked the sunlight, the biggest killer of

dust mites, but also was responsible for the release of enormous particulate matter into the environment. In addition, the family being an upper-class business family had fully furnished the house with upholstered sofa, heavy curtains, and thick carpets and cut ceilings. A drastic change in the interiors of the house along with a shifting of the bedroom was very helpful in bringing about complete control of the allergic symptoms.

Key Pointers:

- A detailed knowledge of common allergens such as dust mites, pollens, pets, and fungi is important.
- Dust mites and particulate matter have a synergistic effect.
- There is a marked rise in pollution in the developing world.
- The pollutants have a role in the development of the respiratory allergic disease. They further worsen the underlying allergies.
- Environmental control plays a significant role in the control of allergies in presence of pharmacotherapy.

Frequently Asked Questions (FAQs) on Pollens

What is the cheapest option to beat pollen allergy?

The cheapest and most effective way to beat pollen allergy is by practising strict environmental control. A few steps are written below:

- Avoid going outdoors from 11 a.m. and 5 p.m. as this is the time most flowering plants pollinate.
- Avoid drying clothes outside as pollen may get settled on your clothes and trigger a reaction when this pollen is inhaled. If someone has dust as well as pollen allergy, they can try to find an indoor area in the house that gets direct sunlight to dry clothes.
- Refrain from letting pets out from 11 a.m. to 5 p.m.
- In case you've been outdoors during this time, make sure you take a shower immediately after returning.
- Keep doors and windows closed.
- If you're going to be outdoors in high pollen count areas and times, consider wearing a mask to reduce inhaled pollen.

Although these steps may seem cumbersome, a diligent practise of these may be effective in reducing the number of episodes of pollen allergies.

Do you have any good idea to prevent or cure pollen allergy in spring? It's a headache for my eyes and nose every year.

Same as the above answer.

If I expose myself to pollen enough, will my pollen allergy go away?

No! The treatment of any allergy is to avoid coming in contact with the allergen which is pollen in this case. Repeated exposure to the allergen will worsen the allergy and predispose to allergies with other agents.

What is the remedy of under-eye redness and allergy?

Redness in the eye could be due to various causes including allergy of the eyes. The characteristic of an allergic eye is that it causes itching and redness without much discharge. Most commonly this occurs due to pollen coming in contact with eye tissue. The management is the identification of the allergen (substance triggering your allergy), environmental control, and using drugs like antihistaminic. The definitive treatment is immunotherapy. For details on pharmacotherapy, refer to the section 4, chapter 'Red Eye – Vernal Keratoconjunctivitis (VKC)'.

Is there a way to truly cure pollen allergy?

Pollen allergies can be cured in about 70–80% of individuals through immunotherapy or desensitisation therapy. Specific immunotherapy (SIT) (also called allergic vaccination) is the only therapeutic option that modifies the underlying cause of the allergy, and not just the symptoms of allergy.

I have an eye allergy. How can I remove it permanently?

The first step to take is to identify the agent you might be allergic to which could be allergens like fungi, cockroach, pollen, dust mites, etc. Once the agent is identified, immunotherapy targeting specific agents to attain a permanent cure.

Why do we often develop seasonal allergies in adulthood rather than as kids?

Seasonal allergies (pollen allergy) often manifest late because, for the manifestation of an allergy, consecutive seasonal exposures to an allergen are required which lead to a gradual build-up of immune responses until a full-blown allergy develops.

What is thunder fever?

In thunderstorms, the pollen concentration of air increases by multiple folds and the pollen is broken into several smaller units and can penetrate the airways deeper leading to a severe attack of asthma. This is called thunder fever as the

manifestations of the asthma are so severe that it may even rarely lead to death. Several countries issue warnings before the onset of thunderstorms for asthmatics to take certain precautions like:

- Keeping doors and windows of the house shut.
- Avoid leaving home in the morning as most pollen is released during the morning.
- Use of wide sunglasses to avoid contact of pollen with eyes.
- Installation of pollen filters at home and in cars.
- Avoiding the drying of clothes outdoors.

Where can patients look up for daily pollen counts in India?

The daily pollen counts along with the pollution levels in the metros are displayed at major intersections along with the time of measurement.

*Where children cannot get to them and no one in the household is at risk of methemoglobinemia and other natural insect repellents.

4

Drugs and Devices

This drugs and devices chapter describes in detail and in a very simple language the different drugs and devices used in allergies. It gives very practical points of using the devices which are not mentioned in books nor discussed in clinics. We discuss the apprehensions about the drugs and the ways to deal with them. The various routes of administration are discussed followed by a detailed note on the use and abuse of the nebuliser machine.

DRUGS

Corticosteroids

These are the mainstay in the management of chronic allergic diseases—topical steroids for atopic dermatitis, inhaled steroids for asthma, and nasal sprays for allergic rhinitis. Giving the steroids by mouth for more than a few days is usually not recommended because of the potential for serious side effects. Here in this chapter, we will deal with the uses and intricacies of their use.

Oral Steroids

The oral steroids have given steroid medicine notoriety, adverse publicity, and a scare in the community. Oral steroids are not routinely recommended for the treatment of allergic diseases. When given for a short duration, they are very safe and devoid of any side effects or any long-term consequences and this involves a course of a maximum of five days.

Oral steroids are used when there is an acute flare up of the disease. In order to bring about suppression, the drug is given and stopped abruptly without the mandatory tapering which is required when used on a long-term basis. It's very important to take it with food or milk to overcome the problem of gastritis that it may cause. There is an excellent response to steroids by other routes such as nose and inhalation and with newer medicines with a greater safety margin.

Intranasal Steroids

They are the mainstay and most effective in the treatment of allergic rhinitis. The duration of its use may be as short as six weeks and in an extreme case, lifelong. Yes, it can be given lifelong if it is producing a beneficial response in the patient and if the disease control is dependent on it. The safety and efficacy of the drug are dependent on the right technique.

Technique

In order to understand the technique, the patient needs to be educated about the anatomy of the nose and the disease location. In allergies of the nose, the inferior turbinates are predominately affected to the tune of almost 80%. This part lies on the inner part of the metallic nose jewellery worn by ladies. The spray has to be specifically directed at this spot alone and not anywhere else. It is simple physics that the more the distance from the spot the better is the spread of the spray in all directions. If the nozzle of the device is inserted on the spot itself, that point will only get the drug.

Use of Intranasal Steroid Spray Using the Crossed Finger Technique

Left Hand for Right Nostril

Use of Intranasal Steroid Spray Using the Crossed Finger Technique

Right Hand for Left Nostril

Images adapted from:
Otolaryrngology - Head and Neck surgery, Volume 130, Issue 1, January 2004, Techniques of intranasal steroid use.

At all cost, one should avoid the spray getting directed onto the septum or the medial nasal wall. The reason being that the wall has no pathology of the underlying disease, unlike the inferior turbinate which is predominantly affected. On the contrary, long-term direct spraying of the drug onto the nose bone can damage the bone with resultant bleeding without any amelioration of the disease itself. It is also important to not sniff in the medicine after the spray lest it may go to areas where it is least needed and cause avoidable complications. The patient should just gently breathe in and out. Whatever drops come out of the nose are to be wiped away and not try to be pulled inside the nose. The head needs to be in the neutral position and not be tilted to any particular side and all this has to be done in the sitting position only. The opposite hand is to be kept strictly by the side and avoid touching on any of the nostrils.

Once the spray has been opened, it can be safely used until its expiry date is reached. The medicine needs to be shaken before use. If a saline spray is being used, it would be advisable to first cleanse with the saline followed by the drug spray. In children and adolescents especially because of the lack of compliance of the latter, it's best that the spraying is done by the parents themselves. In adults, we use it by the 'crossed finger technique' i.e. the right hand towards the left nostril and left hand towards the right nostril. As a result of this, we avoid the medicine getting sprayed onto the medial wall. The steroids are mometasone and fluticasone which are the most commonly used and there is not much difference between the two in terms of efficacy and side effects if any.

Response of Adenoids

In children, the adenoids shrink in response to the steroids. It should be noted that there is no necessity for the spray to be directed inside onto the adenoids. The adenoids are linked by the lymphatic system to the anterior (front) part of the nose which will bring about the transport of the drug into the required area. At the same time, an improvement in the anterior portion

will bring about an automatic shrinking of the adenoid which is the end point of treatment. (Refer to section 2, chapter 'Snores and Mouth Breathers')

Intra Nasal Steroid Spray

Drug	Age-wise dosing	Indications	Lowest age group
Budesonide Each Spray (64MCG) (64MCG)	6 to <12 years: 1 spray/nostril BD >12 years: 2 sprays/nostril BD	Allergic Rhinitis	>6 years
Fluticasone Propionate Each Spray (50Mcg)	4 to 11 years: 1 spray/nostril OD ≥12 YEARS: 2 sprays/nostril OD	Allergic Rhinitis	>4 years
Fluticasone Furoate Each Spray (110 Mcg)	2 to 11 years: 1 spray/nostril OD ≥12 years: 2 sprays/nostril OD	Allergic Rhinitis	>2 years
Mometasone Furoate Each Spray (50 Mcg)	2 to 11 years: 1 spray/nostril OD ≥12 YEARS:	Allergic Rhinitis and nasal and acute rhinosinusitis	>2 years

	2 sprays/nostril OD		
Cidesonide Each Spray (MCg 50)	>6 years and and above: 2 spray/nostril OD	Allertic Rhinitis	>6 years
Triamcinolone Each Spray (50 Mcg)	>2 years 1 spray/nostril	Allertic Rhinitis	>2 years

Image credit @ Indian Academy of Paediatrics

Inhaled Steroids

Inhalation therapy has revolutionised asthma management. Steroids which are the basic in the treatment of asthma can be given on a long-term basis without any accompanying side effects. It is important to understand why steroids need to be taken on a long-term basis. The walls of the terminal air passages of the lung can become thickened and there may be a collection of secretions in the lumens. This can complicate the disease by causing compression of these air columns. The inhaled steroids just don't allow the swelling and the secretions in the air passages. Hence there will not be any bronchospasm or airways constriction. The dose of the inhaled steroids is one-tenth the dose of oral steroids. Also, it is being deposited directly on the air passages without getting into the body system thus preventing any systemic side effects.

It is not unusual for parents to be concerned about using the inhalers in children especially out of concern that there would be side effects and secondly the apprehension that the child has developed asthma. It takes a lot of counselling and patience to convince otherwise. It is important to remember that not every patient given a steroid or salbutamol (a bronchodilator) inhaler for the respiratory symptoms is having asthma.

We emphasise that as per studies, the latest inhaled steroids are safe without any long-term permanent side effects.

The Technique of Steroid Inhalation Therapy

There are certain precautions that need to be taken when using steroids. The patients should gargle or rinse the mouth and throat immediately after use to prevent the drug from being absorbed into the system and also the development of fungal secondary infections on the throat. The spray should be kept away from the eyes, lest long-term continued deposition directly in the eyes leads to glaucoma. (Refer to MDI in this chapter for more details)

Precautions When Using Inhaled Steroids

In children, their growth should be monitored. There are studies which have shown that there is an impairment of short-term growth but finally the child achieves the full potential of his growth. Thus, we find that long-term growth is not affected. In fact, if inhaled steroids were not to be used, the disease left uncontrolled would impair the growth to a significant extent. The deposition of the drug on the pharyngeal wall or the throat can be significantly diminished by pulling in the drug slowly in a measured way rather than abruptly or with a jerk.

There are concerns that it causes glaucoma or raised pressure within the eyes. We don’t have any studies to show that it causes an increased pressure although there have been anecdotal hearsay reports, none reported by journals on exclusive use of intranasal or inhaled steroids by proper technique. There is a greater possibility of it occurring with nebuliser steroids as the fumes would reach the eyes.

Nebuliser Steroids

They are a preferred form of treatment by the patient. Since the steroid particles in the nebuliser form are quite large especially when compared to the inhaled form, there are higher possibilities of the drug being deposited in the throat bringing

down the actual drug that is delivered into the lung spaces. Moreover, the larger particle size is an impediment to the delivery in the distal air passages. Hence, the inhalers are superior to nebuliser when steroids are concerned. Since steroids don't have any adverse effects on the heart, the chamber liquid need not be oxygen driven when being used.

The problem with nebulisers is that the duration for the delivery of medicine is 10 minutes, whereas with metered-dose inhaler (MDI) plus spacer, it is 10 seconds. Thus, it becomes difficult to give continuously for months. In such a scenario, it is not feasible to use the nebuliser. Another problem with nebulised steroids is that the steroid fumes would go into the eyes if it is given without a mask. Hence nebuliser steroids are not recommended and inhaled steroids using an MDI are preferred.

Montelukast

This is a very commonly used drug for both asthma and respiratory allergies. This is a very safe drug which can be used on a long-term basis. There are some reported cases of behavioural disturbances in children when used continuously for more than a year. Hence it would be advisable to give some small gaps of abstinence during its use. It should be used as a single dose at night since the leukotrienes it inhibits are secreted maximal early morning. It can be taken as a tablet or as a mouth dispersible form. It should never be used as a liquid or as a combination form with an anti-allergic, especially by children. The liquid form is not stable, and the combination form is less efficacious because of the interference of difference in pH between the two different drugs. Moreover, montelukast needs to be taken for a longer duration while the accompanying anti-allergic antihistamine drug is usually required for a shorter duration and patient may unnecessarily be taking an unwarranted medicine.

I have found that a lot of children like to chew montelukast and some parents have a tough time in trying to withhold it from the child. The added advantage of the drug is that it acts on every section of the unified airway system from nose to the lungs including the adenoids. Its effects in other forms of

allergies especially of the skin are debatable. Zafirlukast is another drug which has a similar mechanism of action as montelukast. The dosage of montelukast is very standard.

Dosage	Age
4 mg	6 months to 5 years
5 mg	6 years to 12 years
10 mg	Adolescents to adults

Salbutamol

Asthma bronchodilator drugs are of two types—relievers used in emergency and controllers used on a long-term basis to control the disease. Salbutamol, a reliever medication, is a short acting beta agonist (SABA). This is the most commonly used drug not only in asthma but in all wheezing. Unfortunately, to the lay mind, it has become synonymous with asthma especially the inhaled form using a meter dose inhaler. Wheezing can normally occur in many non-asthmatic conditions and thus the use of inhaler is not always an indication of asthma diagnosis.

Preparation

It is available in oral, nebuliser, inhaled, and injection forms. The oral is as syrup or tablets and may be single or in combination with other drugs. The oral form may cause much systemic side effects such as tremors and palpitations. These can occur with other forms too but is especially more with the oral form.

Delivery

The drug acts by dilating the small to medium air passages in the distal part of the lungs. At the same time, it brings about heart muscle contraction and consequently, increased oxygen consumption. Hence, if the child is given the drug in nebuliser form in case of respiratory distress with accompanying hypoxia

or oxygen deprivation without accompanying oxygen, there would be a serious risk of the heart failing secondary to oxygen deprivation. It is because of this risk that the British Medical Association has banned the use of home nebuliser for asthma. The patients having severe distress need to be given salbutamol by having the drug driven by oxygen through the nebuliser chamber. At home, the best way for it to be taken is by using a meter dose inhaler (MDI) with a spacer.

The nebuliser form of salbutamol is to be diluted with saline and never with distilled water lest it may cause bronchospasm resulting in difficult breathing. Ideally, the drug should be oxygen driven by connecting the chamber to the oxygen tube. The latter is a must in any severe form of wheezing where there may be hypoxia. The drug salbutamol is also used as an injection and given in ICU settings as an infusion to patients of asthma not showing adequate response to the basic drugs. It has replaced aminophylline which was a drug used very commonly in severe cases earlier. In order to bring about better delivery of the drug with lesser side effects, there is levosalbutamol which is an isomeric form of salbutamol. The extent of benefits it has over salbutamol needs to be seen though.

The controller medications used in asthma are salmeterol and formoterol. Both are long acting beta agonist (LABA) drugs. They are now the most popular bronchodilator drugs as a controller in the treatment of asthma in children above 5 years and in adults. Formoterol can be used as a reliever medication too. Salmeterol is preferred drug in exercise induced asthma. Both the drugs are available as inhalers and DPIs.

Ipratropium Bromide

Ipratropium bromide is a relaxant of the smooth muscles present around the airways resulting in easy breathing. It is used in asthma patients as an inhaler as well as a nebuliser. It is used in combination with salbutamol to decrease the dose of salbutamol especially since the latter is associated with much tachycardia.

Antihistamines

Antihistamines are the first-line therapy for mild allergic rhinitis (sneezers). They are very effective against sneezing, itching (nasal), runny nose, and eye symptoms. Their effect is negligible or is minimally effective against nasal congestion (blockers). The H1 antihistamines are not recommended for wheezing and in asthmatic children. This is due to the lack of these receptors in the lung. They are also the first-line therapy in Urticaria. In Urticaria, one can go up to 4 times the therapeutic dose. When using two different types of antihistamines in the same patient, they should not be given together but separately since the efficacy of each one comes down due to competition for the same sites. They have no role in eczema.

The H1 antihistamines are of two types—first and second generation. Only new or second-generation H1 antihistamines are recommended as they are safe in young children.

The first-generation antihistamine although very effective is not recommended due to sedation effects and impaired cognitive function and anticholinergic side effects. The latter function makes it somehow useful and popular too in over-the-counter cough syrups. The anticholinergic function helps to dry up the secretions and thus sometimes give a feel-good effect. The impairment of cognitive function is produced even by the lowest doses of first-generation antihistamines. Some examples of this group are:

- Triprolidine
- Chlorpheniramine
- Diphenhydramine
- Promethazine

The effects of first-generation antihistamines on the central nervous system are similar and additive with those produced by alcohol or other CNS sedatives. Even if the drug is given at bedtime, the dosing does not decrease the functional impairment the next morning. The first-generation antihistamines take a long time to get eliminated from the body. They work best in emergencies such as anaphylaxis and drug allergy.

The second-generation antihistamines are recommended due to favourable efficacy and safety ratio. The long-term use (12-

18 months) with second-generation antihistamines is safe. Some examples are:

- Desloratadine
- Fexofenadine
- Loratadine
- Cetirizine
- Bilastine

It is interesting to note that some of these will cause sedation in some patients while in others, it will not and vice versa. Example, cetirizine will cause sedation in patient X but not fexofenadine. While in patient Y, fexofenadine will cause sedation but not cetirizine. The second generation is less sedating than the first-generation antihistamines. Bilastine is the latest second-generation antihistamine with the least sedating effects.

Oral Second-Generation Antihistamine Doses

Drug	Age-wise dosing	Conditions requiring dose adjustment	Clinically relevant drug-drug interactions
Cetrizine	6 months to <2 years: 6 to 23 months: 2.5 mg OD 12 to 23 months: 2.5 mg OD or BD 2 to 5 years: 2.5 mg OD/BD or 5 mg OD 6 to 11 years: 5 or 10 mg OD >12 years: 5	Renal and hepatic impairment	Unlikely

	mg or 10 mg OD		
Levocetrizine	6 months to 5 years: 1.25 mg OD 6 to 11 years: 2.5 mg OD >12 years: 5 mg OD	Renal and hepatic impairment	Unlikely
Fexofenadine	2 to 12 years: 30 mg BD >12 years: 120 or 180 mg OD	Renal impairment	Unlikely
Loratadine	1 to 2 years: 2.5 mg OD 2 to 12 years: 5 mg or 10 mg OD >12 years: 10 mg OD	Hepatic impairment	Unlikely
Desloratadine	6 to 11 months: 1 mg OD 12 months to 5 years: 1.25 mg OD 6 to 11 years: 2.5 mg OD >12 years 5 mg OD	Renal and hepatic impairment	Unlikely
Bilastine	>12 years 20 mg	Nil	Unlikely

Saline

Saline is a salt solution containing water and sodium chloride salt in various concentrations varying from a minimum of

0.45% to 3%. This simple formula can do wonders on the entire respiratory tract. It can be used as a nebuliser solution or as sprays, douches, or as a liquid. There are various companies which market this simple product. The cost difference is due to the superior delivery system or to the purity of the solution. A particular company which claims its saline is from the seawater off the coast of France has a spray which has been widely appreciated by my patients in spite of the high cost of the spray.

Jal neti or water therapy has been an ancient form of treatment in all the oriental cultures for centuries. In Indian homes, saline salt gargle is a very standard and common treatment for ages. It has now been accepted and is promoted in modern medicine as a mode of treatment. It helps to liquefy the secretions facilitating its clearance and also for irrigation of the upper nasal passages which would further facilitate the actions of the drugs to be used subsequently.

The Role of Antibiotics

It is a very common practice to give an antibiotic along with other anti-allergic medications. Many patients wrongly attribute the recovery in allergic patients to the effects of the antibiotics. As a result, there is pressure from the patients to prescribe an antibiotic. It takes a lot of effort to convince the patients that the antibiotics play no significant role in the management of more than 90% of cases of allergies. In fact, antibiotics have supposedly known to be a predisposition to the development of allergies when used indiscriminately in the first year of life. Antibiotics destroy the good and protective bacterial flora in the intestines which help to overcome allergic diseases.

Lactobacillus GG

There are studies to show the benefits of giving lactobacillus GG daily to infants in the first six months of life. This probably helps to prevent atopic dermatitis in those children who are predisposed to it. It probably helps in the restoration of the good gut flora and thus repudiates the stand of avoiding antibiotics. There have also been studies questioning its benefits but until

the final verdict is clearly out, there is no harm in a trial of this study in those patients willing for it.

Unwarranted and Placebo Drugs

Allergies and allergic diseases are a chronic disorder with waxing and waning of the intensity of the disease. Hence there are many pharmaceutical companies which come out with products which supposedly claim to cure the disease. There are no scientific independent studies to support the use of these products. If any, they are all pharmaceutical supported. The patients would be best advised to refrain from using these medications. Many have come and gone and I myself have personally used them. My patients have definitely shown a response, but I would best describe these benefits as a placebo effect. One of the popular products was bovine colostrums.

***

DEVICES

Nebuliser

A nebuliser is a machine that turns medication into a mist that can be inhaled so that it directly reaches the respiratory tract. Nebuliser unit consists of a pump machine and the nebuliser set. This set consists of a chamber with an enclosed valve and tubing. The drug in a liquid form is placed in the chamber. This chamber is connected to the pump through plastic tubing. As the pump works, the liquid is drawn up a nozzle with resultant vapour formation.

Drugs Administered through Nebuliser

The commonly used drugs are bronchodilators such as salbutamol, steroids, ipratropium bromide, antibiotics such as tobramycin, racemic epinephrine, and mucolytics such as acetylcysteine. Normal saline is used alone by itself or as the medium for the dilution of the drugs. It helps in the breakdown of the secretions. Use of distilled water is contraindicated for it

may worsen the bronchospasm or air tube tightening in the lungs and cause distress. A maximum of 5 ml of normal saline is used for at least 10 minutes. It is essential that for proper hygiene and asepsis, each patient should have his own nebuliser set.

Indication	
Bronchiolitis	Normal saline help toliquefy the secretions.
Croup	Racemic epinephrine diluted in saline decreases the edema (swelling) of the larynx in severe cases.
Cystic fibrosis	Uncommon in India but antibiotics are given fibrosis directly by nebuliser.
Bronchiectasis	Acetylcysteine in saline helps to break down the thick secretions.
Asthma	The use of a nebuliser machine for asthma is controversial.

In acute asthma, the patients are expected to take albuterol/salbutamol, through a Metered Dose Inhaler (MDI) with the help of a spacer. This drug can only be used with the nebuliser set without the pump but driven by oxygen flow in a hospital setting only. The logic is to avoid patients to repeatedly and unnecessarily take the bronchodilator drug, a beta agonist causing myocardial ischemia (decreased blood flow to heart tissue) resulting in deaths. Also, studies have shown that asthma drugs delivered by MDI plus spacer are as effective as by nebuliser without oxygen. Moreover, it is cumbersome to use repeatedly.

There are now handheld nebuliser pumps available, but their effectiveness is questionable, so much so that in the UK home nebuliser for asthma is banned. In the hospital, the bronchodilator drugs are driven through the chamber with the help of oxygen flow at the rate of minimum 2L to 6L per

minute. In India patients routinely using nebuliser machine for salbutamol nebulisation and this practice needs to be discouraged.

Dangers of Nebuliser Therapy

In the past, there have been incidents where patients have continued the use of nebuliser at home resulting in delayed admissions and resultant death. Regular nebuliser bronchodilator therapy (i.e. for more than a few days) should be avoided. The risk of adverse effects is based on the following:

The delivered dose using a nebuliser is high. The dose in a single nebule may be equivalent to either 25 or even 50 puffs of bronchodilator from an inhaler. Beta-agonists have a pro-inflammatory effect when given at high doses. Beta-agonists result in an increase in airway hyper-responsiveness (AHR) when given regularly or at high doses.

In some patients, the increase in AHR is associated with rebound bronchoconstriction at the end of the dosing interval. Therefore, a vicious cycle develops in some patients because with increased inflammation and AHR, symptoms worsen and there is a perception that even more ‘reliever’ is required.

There are other pitfalls. Using a nebuliser may create a false sense of security, especially during an acute episode of asthma. The temporary relief from a high dose of nebuliser bronchodilator may result in a delay in starting steroid therapy or in ringing the ambulance. Also, the ‘rush’ which occurs with nebuliser beta-agonist—often associated with a fast heart rate or tremor—is enjoyable for some people. ‘Reliever’ beta-agonists are modified forms of adrenaline and, because the delivered dose of nebuliser beta-agonist is so high, it affects not only the airways but other organs also. The ‘adrenaline rush’ is therefore real, and psychological dependence may occur.

Hospital inpatients in the wards that are on nebuliser are in a hurry to get discharged. Their stand is that they have a nebuliser at home and would like to continue the same treatment at home. However, the treatment being given in hospitals are mainly oxygen driven, especially in acute exacerbation, and plain nebulisers being obsolete in respiratory care. Hence, the patients

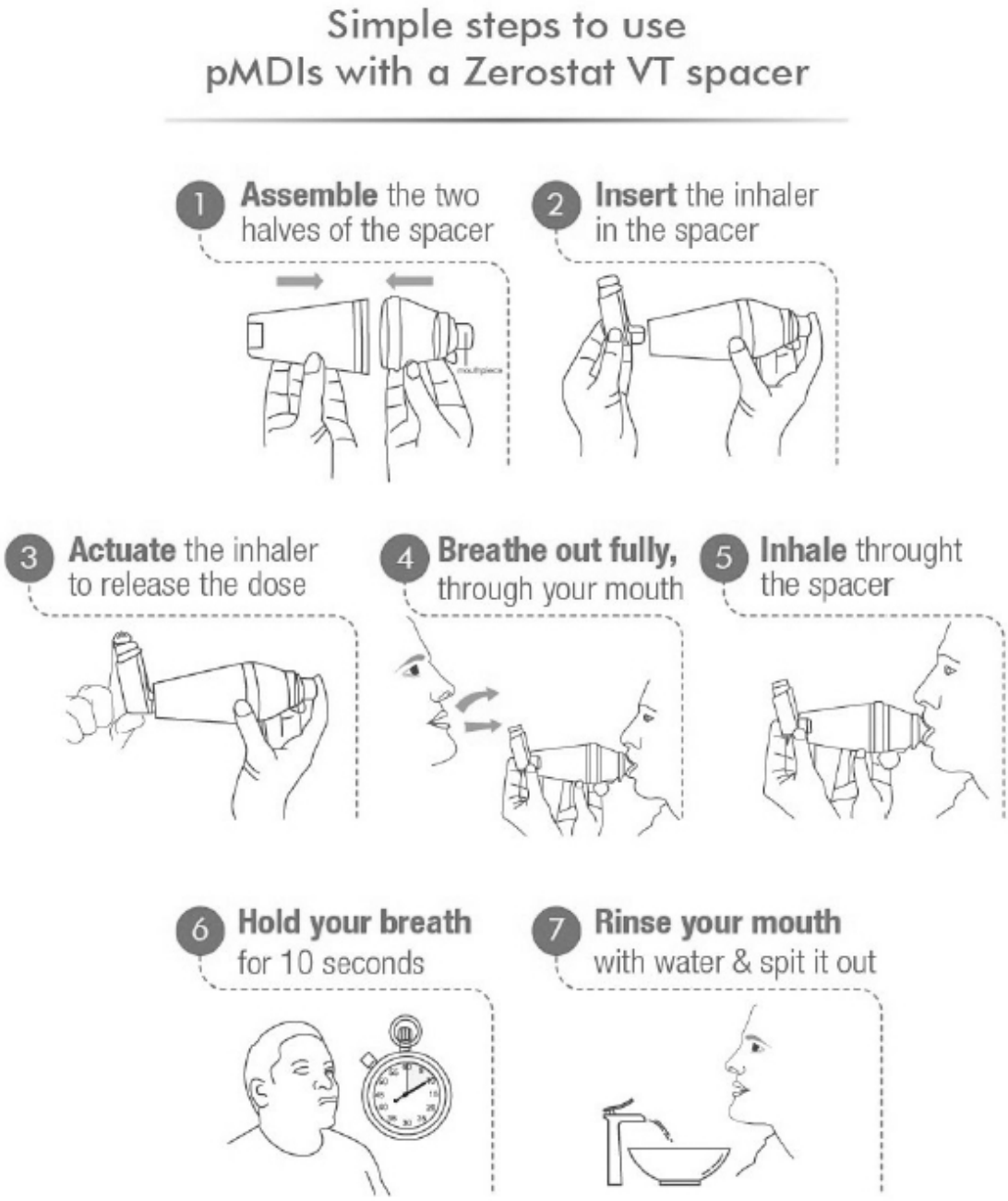
should be explained the rationale behind the decision not to use plain nebulisers and need for oxygen driven therapy. The reverse also holds true. Many patients would avoid going to the hospital if the same hospital instrument can be used at home.

There is a misconception that while crying the patient will take in the drug in a better way. The child is more in the expiratory phase when crying and thus less is the drug intake. So, it is very important to comfort and distract the child and make the nebuliser experience less scary for young children. One can use music or toys and have the child sit in a family member's lap if that is comforting. The mask can be placed on the parents' face and on a doll's face to show that it's okay and that we feel better after breathing in it. Nebuliser machines can be shared between patients but the nebuliser set containing the chamber and oxygen tubing should be strictly patient designated. Masks and mouthpieces cannot be shared. The nebuliser machine comes in all shapes and sizes. The smallest one can be carried in the purse and can be battery operated. Thus, it comes handy in travelling.

A drug can be inhaled through different devices:

Inhalers

MDI or the Metered Dose Inhaler is the most common and widely used inhaler. It is used as follows:



The patient exhales, inserts the mouth of the holder between the lips, and makes a tight seal around it. As the canister or the steel cylinder is pressed, the patient takes the drug in with a deep breath, holds his breath for 10 seconds, and then exhales through the nose. To improve the delivery of the drug, it is best to use with a spacer. The spacer is a cylinder or cone-shaped device which increases the drug delivery and also avoids wastage of drug. There have been various studies which have showed spacer with MDI is superior to MDI alone. Many patients have an issue in carrying the spacer around.

The canister is to be shaken before each use. The holder should be washed once in a fortnight with soap and running water. It should never be wiped but sun-dried.

Dry Powder Inhaler (DPI)

These are of two types. The closed and automated one in which the drug is enclosed in sealed containers but gets delivered with inspiration after the device is activated. The simplest is the DPI using capsules in which the capsule of drugs is inserted into a round inhaler, broken, and then inspired till the capsule is emptied. The delivery of the latter is the least efficient. Many patients prefer this because it's easy to use, has a feeling of the drug being delivered, and is the cheapest of all.

Advances in Inhalers

There are inhalers with drug counter which indicates exactly or to the nearest 10 doses left in the inhaler. This avoids the patients from using an empty canister. The propellant within the canister can continue to give a false impression of the presence of the drug long after it has been emptied. A rough way of confirming is to place the canister in a mug full of water. An empty canister will float horizontally while a new and full canister will be at least two-thirds submerged vertically. The rest you may expect to be in between depending on the amount of drug.

The inhalers should ideally be used with a spacer to bring about the optimum delivery of the drug into the air passages. A spacer may be cumbersome to carry around. To overcome this problem there's a Breath Activated device. This device gets activated with inhalation and even without pressing the canister, the drug enters the lung. However, the patient needs to complete the cycle of inspire hold and then expire. The delivery of the drug is the same as that of an ordinary MDI with a spacer.

Case Study

Who can forget the famous scene in the serial, *House MD*, wherein a middle-aged lady is complaining about her asthma not improving despite using 4 inhalers in as many weeks. She is confident of her technique but when asked to show it, she gets irritated. Nonetheless, she is eventually shown using the inhaler as a perfume being sprayed on her neck.

Key Pointers:

- The patient needs to be taught how to use the drug and the device with a demonstration by the physician.
- At each follow up, the device should be brought and the use of it should be demonstrated by the patient.
- Devices if used wrongly can be ineffective and cause problems.
- A home nebuliser is strongly discouraged.
- Steroids are safe and effective if used correctly in inhalation therapy.

5

IMMUNOTHERAPY

Immunotherapy is the last pillar in the management of allergic diseases and the only disease-modifying therapy. In this chapter, we explain the prerequisite, the different types, safety, efficacy, and method of use of immunotherapy.

Introduction

Allergy like hypertension and diabetes can be a permanent fixture in most patients. However, now there is a new modality of treatment called Immunotherapy. In this, we try to reverse the immunological response which has taken place to cause the allergy in the nose or the lungs. It is a disease-modifying therapy, indicated for allergic rhinitis, allergic asthma, and Hymenoptera insect hypersensitivity. Recently it has been introduced for peanut allergy. The raison d'être of an allergist are allergy skin testing and immunotherapy.

Mechanism of Immunotherapy

Specific Immunotherapy (SIT) involves gradually exposing a patient to small amounts of allergen in order to induce tolerance. It modifies the course of allergic disease in children and adults suffering from rhinitis, conjunctivitis, and asthma. SIT will halt the atopic march. It will prevent the development of asthma in a patient with rhinitis and vice versa. It will also prevent the development of new allergies in the individual suffering from allergies. Specific Immunotherapy is the only real possible disease-modifying treatment for allergic patients.

At the onset, the allergens are identified with the help of a detailed history followed by a skin prick test or an allergen-specific IgE blood test. Once allergens are identified and found to clinically correlate with the history of exposure, the therapy is instituted. The

timing of starting of a drug is very important. The patient should have been relieved of the disease with good environmental control and pharmacotherapy. In case of pollen allergens, pre-seasonal immunotherapy should be initiated (well before the pollen season). In the case of dust mite, it should be avoided in the season when its concentration is likely to be highest. The best time is summer for dust mites.

What Does the Drug Consist Of?

It is a proteinaceous extract of the allergen to which the patient has an allergy to. The allergenic extract is purified, diluted, and then sterilised. The extract could be in an injection form or as an oral form. The oral form can be as a liquid or tablet.

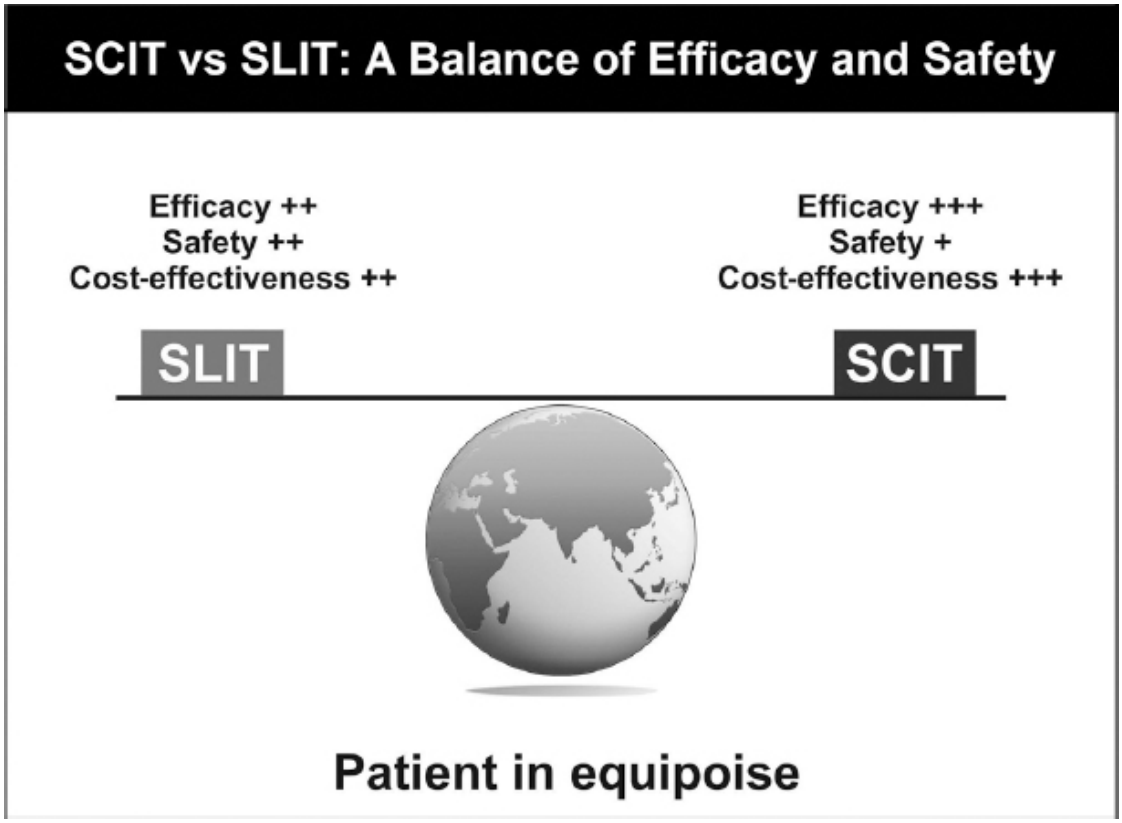
Routes of Administration

The drug can be given as a subcutaneous injection (SCIT) or sublingual (below the tongue) drops (SLIT). There is a possibility of the patient developing an adverse reaction with the possibility of anaphylaxis if the entire maintenance dose of the drug is given initially. Hence, the full maintenance dose of SCIT is diluted almost to 100 times and given in increasing concentration over a period of 5 to 6 months when the full maintenance dose will be given every month. The initial diluted dose is given as a weekly or biweekly injection in increasing doses from the smallest dose to prevent any untoward side effects. These injections are given subcutaneously just the way diabetes patients would self-administer medications.

Patients on SCIT should always carry the ‘anaphylaxis kit’ consisting of a steroid, a first-generation antihistamine, and an ampoule of adrenaline. The vaccine should be stored in the refrigerator outside the freezer compartment with no food items around. When transported, it should be carried in a thermocol box with a coolant. They should take rest for at least half an hour after taking the medication. Cold compress applications need to be applied if any local irritation occurs at the site of injection. If much itching and rashes do occur, an anti-allergic can be administered. Once the optimum or the maintenance dose is reached after a minimum period of six months, the frequency may become monthly to bimonthly for SCIT. On completion of the course of three years, 80% of the patient’s will be free of the disease and of the remaining 20%, the disease will have only a 20% presence. Patients who have

a fear of needles and are concerned of any possible remote side effects of SCIT can go for SLIT.

In the SLIT therapy, drops of the allergens are placed below the tongue and the patient is made to hold it for 1-2 minutes and then swallow or spit it out. The patient needs to avoid taking anything by mouth half an hour before and after the medication. It is a much safer treatment, but studies have shown it to be less effective than SCIT (WHO reports that both are equally efficacious). It is the most widely practised treatment in Europe. Another advantage is that the treatment is domiciliary i.e. at home unlike SCIT wherein doctor visit may be required for the injection. The reported side effects are tingling in the lips and worse swelling of lips and tongue. These are rarely seen and correctable on oral anti-allergic medications.



When to Start Immunotherapy

The criteria to start immunotherapy are very strict and are as follows:

- The patient should have shown a positive test for the particular allergen on a skin prick test and/or allergen-specific IgE.
- On exposure to the particular allergen, the symptoms are aggravated and on complete withdrawal there is an

improvement.

- There is an improvement on pharmacotherapy which can be the intranasal spray or oral drugs.
- The FEV1 an index of lung function test is more than 70% when the patient is under treatment or without inhaler treatment.*
- The patient should have no underlying immunocompromised disease.
- The disease is compromising the quality of life (QOL). It is having an effect on sleep, daily activities, office or schoolwork, and on social interactions.
- It is essential that the patient should be considered reliable to undergo the full course of the therapy.
- The patient could develop adverse effects on long-term pharmacotherapy medications.
- There should be good quality vaccines which are affordable and easily available when needed.

Choosing the Allergens for Immunotherapy

- In cases where the patient is allergic to multiple allergens or is polysensitised, then which are the allergens the patient should have the immunotherapy started against?
- Can Immunotherapy be given against all the allergens?
- Is giving immunotherapy against one allergen as effective as giving against multiple allergens?
- Is giving multiple allergens safe?

Immunotherapy can be given against multiple allergens, but the safety and effectiveness are not the same as giving against a single family of allergens. The different family consists of mites, fungus, pollen, epithelia, animal dander, and similar allergens. Multiple allergen therapy can be given considering allergen compatibility factors. It is much safer to give against 4 to 5 different types of pollens as compared to a vaccine containing pollen and dust mite. Same holds true for giving for multiple dust mites or fungus or animal dander. The increase in the number of different allergens from a different family of allergens increases the risk of adverse effect. There are some allergens which cannot be mixed with other allergens due to incompatibility factor.

An understanding of cross-reactivity of allergens is also important. If a particular pollen is positive and if it cross-reacts with positive pollen on the SPT, it's better to only go for the pollen which is dominant in patients' atmosphere and has a strong positive reaction. If an allergen can be eliminated by good environmental control, there is no need for treatment. These include pets, cockroach, and certain types of fungi. Almost all international guidelines do not recommend the latter allergens.

Dust mites almost always should be treated because of the difficulties in its elimination and the availability of good quality vaccines in the market. The patients with dust mites positive may also be positive to storage mites. The storage mites cross-react with the dust mites; hence the latter need not be specifically treated. Cat and dog immunotherapy is not needed if the pet can be removed but very often it is found that pets, especially amongst adolescent girls, are stress busters and they would rather endure suffering than let go of the pet animal. In such a scenario, immunotherapy would be advisable.

In cases of insect bite allergy, the risk to life is so high coupled with the urgency of the situation, that there's a need to admit the patient and administer ultra-rush immunotherapy. In this high dose, immunotherapy is administered especially for honeybees as per the scheduled protocol over a period of 7 days. This is done in a hospital setting.

Oral sublingual immunotherapy has now been tried for some food such as milk, eggs, and peanuts and has shown encouraging results. It is now recommended and validated for peanuts. There's no SCIT for food allergens.

Duration of Immunotherapy

Once the immunotherapy has been started, it should be religiously continued for the recommended period of 3 to 5 years. It is not unusual for the patients stopping treatment either because the response is taking time, or they find good relief and find it cumbersome to complete the entire length of the treatment. In both scenarios, we find the persistence of the disease.

Ideal Age for Immunotherapy

Immunotherapy drug can be given at any age after two years. However, sublingual administration is difficult for a child below 4 to 5 years. Some authors advocate early starting and some later around 10 years in the hope that the child might outgrow. Both have their valid reason and there are no fixed uniform rules and guidelines regarding the age. However, all are unanimous that its effectiveness decreases with advancing age especially beyond the forties and it better be avoided after 55 years of age.

Impact of Immunotherapy

Both short-term and long-term clinical benefits have been demonstrated. It provides a sustained effect after completion of treatment. Subsequently, it modifies the course of allergic disease in children with rhinitis conjunctivitis and asthma. SIT halts the atopic march, preventing the development of new allergies. It prevents the development of asthma in patients with rhinoconjunctivitis.

As the patient responds to immunotherapy, the need for pharmacological drugs keeps coming down gradually. This may take a minimum of at least six months.

Case Outcome

There is a series of patients with allergic rhinitis and/or asthma. These patients were for years on pharmaco therapy. They showed improvement in six months of immunotherapy. Almost all of them were off pharmacotherapy medication after two years. Those who failed to get off medications were still much better than before with a marked improvement in the quality of life.

Key Pointers:

- Immunotherapy modifies the course of allergic disease in children and adults suffering from rhinitis, conjunctivitis, and asthma.
- Criteria to start immunotherapy are very strict.
- The drug can be given as a subcutaneous injection (SCIT) or sublingual (below the tongue) drops (SLIT).
- Immunotherapy can be given against multiple allergens, but the safety and effectiveness are not the same as giving against a single family of allergens.

*If it is less than there is a possibility of an adverse reaction with subcutaneous. Hence it is advisable that the desired value is achieved before starting the SCIT course.

6

COUNSELLING

The chapter is concerned with the problems faced by both the patients and the healthcare provider when dealing with different allergic disorders and how to overcome them. Many parents have apprehensions about the diagnosis of asthma, and we suggest ways to overcome them. Counselling is basically having a detailed and empathic discussion with the patients to overcome the problems faced by both.

Counselling is an art that is both challenging and helpful to the physician. It can take anywhere from 5 minutes to an hour. But it is a very important part of a successful practice if we are to transform our community into an educated one which in turn makes our job easier when they return for follow up.

I personally enjoy this gratifying task very much and try to make the time for it. This is indeed a way of interacting with the patient and a free sharing of thoughts and ideas. We discover what hurdles they face in managing their illnesses and try to help them cope with their lives in a better manner. There are many social, mental, and physical issues I learn from the patient in the course of counselling and thus it becomes a very educational and enlightening experience.

Since allergy is a chronic disorder that the patient has to live with, it is imperative that we should give sufficient time and energy to allay the fears and apprehensions of the patients. So, let's analyse each condition and how the discussion plays out.

Asthma

This diagnosis in a child is for some parents worse than cancer. No amount of convincing will work for a minority of such patients. They can bear all sorts of descriptive words such as wheezy chest, hyperactive airways, and chesty cough and be given all the asthma medications but not the word asthma. The moment it is announced, it's like a death sentence to them.

So, the next question is: What should you do? To simply put, the answer is that if you have done the entire required test and have enough knowledge about the disease and have total confidence and not pseudo confidence, then you should be honest and tell the truth rather than be economical with the truth. However, my primary responsibility lies towards my patient. As confident as I may be about my diagnosis of asthma, I should be able to gauge how my patient will respond to it if my instinct is telling me that the stress could work towards exasperating asthma in itself. In tough situations like this, I would first win the confidence of the patient and then let the diagnosis seep in gradually.

More important is once you've announced the diagnosis, please don't be like a judge who after announcing a death sentence breaks the pen and walks out. On the contrary, it becomes binding on you to give as much time to the patient and respond to all their queries. Hence, making time is the essence. If you have an office assistant, do train him or her to explain basic written information about the diagnoses you would commonly see. Print simple patient handouts for parents and children that the assistant can go over in detail with each patient family while you are seeing your next patient. This saves the doctors time and helps assistants spread accurate information provided they are required to stick to the script and not add in any personal bias or hearsay. The handout needs to say that if anything they hear or think about the condition is not clearly written in the handout then it needs to be double-checked with the doctor.

Adults are very easily convinced about the diagnosis but in children, it's like moving a mountain. Sometimes we don't give the diagnosis of asthma but prescribe all the asthma medications especially the inhalers. The irony is that patients are willing to take the bronchodilator drug salbutamol as oral

form or as nebuliser form but not as an inhaler. The reason behind this practice is that inhalers are synonymous with asthma treatment. It is the same drug but with a different mode of the delivery mechanism. The spray is like travelling by air and the oral drug is like travelling by train to your destination. Both will reach the destination, but the only question is that which mode of transport would the patient take. Sometimes they look convinced but there's no doubt that physicians need to come up with a lot of analogies to convince the patient and each physician can come up with his own analogy based on the patient's background and knowledge. There is always the urge from the patients to discuss with other patients of similar background with similar problems. It's here where patients support groups are a game changer. Through this, they get an opportunity to share their joys, sorrows, experiences, and future plans with others having similar problems. It helps them to understand and appreciate the difficulties which parents go through and come out successfully. Educating groups of patients and families is a powerful and time-saving tool.

There's a need to educate teachers too about inhalers. We have found that many schoolteachers are unaware and some even consider inhalers as a taboo. The wrong perceptions in the community and the schools need to be corrected. This can be achieved through education and public awareness programs. I have found greater acceptability among those parents who have relatives using these medications in Western countries. Among these patients, there's almost a spontaneous acceptance of inhalation therapy.

There is also much apprehension about the use of steroid inhalers in asthma patients. One can refer to the chapter on drugs and devices for inhaled steroid information. In this regard, great credit goes to Priyanka Chopra, the Bollywood icon, who at the peak of her career has chosen to come out with her asthma and speak up for it. Her mere poster in my clinic espousing about inhalers through her personal benefits helps a long way in convincing my patients.

Atopic Dermatitis

In atopic dermatitis or eczema, parents and patients accept the diagnosis easily. Sometimes I feel that 'ignorance is bliss' works in this state since eczema, especially the severe type, is more distressing and troublesome than asthma.

In spite of detailed counselling, doctor shopping is high in eczema because of the chronic state and frequent relapses. The patients need to be taught in detail not only the use of all medicines that are to be used but also the reasoning behind its use. It's when patients understand the underlying disease and the principles behind the usage of the medications that they're better able to follow the given prescription. Here again, the formation of an eczema support group helps in the long-term care of the patients.

Contact Dermatitis

This is more often present in the elderly. They have, in a way, learnt to live with the suffering and are usually not forthcoming in taking the treatment seriously on a long-term basis. There is no doubt that the treatment shows benefits initially on avoidance and on diligent topical applications. But somehow the patients aren't able to sustain it for too long. It is essential to identify the irritants through the patch test. Since the patch test is a tedious process and the results not so reassuring, there is less use of the test in clinical practice.

Urticaria

Urticaria, especially if longstanding or chronic, leads to a lot of frustration among the patients. In the idiopathic type or the chronic spontaneous urticaria (CSU) where the cause is not known and a full workup has revealed no underlying disorder, we need to reconcile the patient about the chronic state and the need to take the medication on a long-term basis. When there are patients with hypertension and diabetes on lifelong medications, it's not surprising that patients with urticaria should also be prompted to do so. All that the patients need is an assurance that there's no tolerance nor are there any side effects on long-term use of these medications. It is also

important to emphasise that this condition will not lead to any further complications, unlike diabetes and hypertension.

Hope is what keeps us going when life has hurdles and it is very important to promote hope. It could be for better days or simply a change in the status quo. There's none who wouldn't want a change. It is normal and realistic that these patients would look for alternatives. In their quest for the miraculous cure, they may get trapped by unscrupulous elements that would promise them the moon but ultimately leave them empty-handed or even in a worse shape than before. They get carried away by stories of miraculous recoveries and would not hesitate from giving a try. The truth is that all these cures are unscientific, unsubstantiated, and misleading. At times, patients do recover spontaneously in the courses of those treatments and invariably give the credit to those therapies.

The truth is that urticaria is very often self-limiting due to changed circumstances within the body itself. The allopathic medicines help in keeping it under control until such times. As a challenge, the patients would be well advised to avoid allopathic medications when they are taking alternative medicine. This usually doesn't happen because unlike modern medicine doctors, practitioners of alternative medicine usually do not allow stoppage of modern medicine except sometimes in homeopathic medicine.

Allergic Rhinitis

In cases of allergic rhinitis, the approach to counselling is not much different. In fact, many patients consider this as sinusitis and freely say that they have sinusitis. Here they need counselling about the untoward effects of sinusitis and those of allergic origin need treatment for removal of allergy. There is a big misconception that allergies are permanent and there is no permanent cure for them. This is half-knowledge as the first part is true but there is a permanent cure called immunotherapy. The patients need to be educated about the safety and the importance of this treatment modality in the permanent cure of the disease.

Since the disease interferes with the quality of life (QOL) with all its social consequences, there's much apprehension and patients are willing to go to any extent for its treatment depending on the impact that it may be having on their social life. Interestingly, I have found many parents from poorer backgrounds willing to go to any extent for the treatment of their marriage eligible daughters suffering from allergic rhinitis. Here the concern is what impact it will have on the in-laws about the disease and the subsequent consequences. If the spouse has an acceptance for the condition post marriage, there would be laxity in the treatment of the girl with consequent suffering and if not accepted then the treatment will continue on a war-like footing. It is the social consequences of allergic rhinitis which drives patients to seek treatment more than the suffering.

Food Allergies

These are increasing with a change in the lifestyle of the people. There is no doubt that due to the changes in the food environment, we are noticing an increase in the incidence of food allergies in developing countries, especially in India. There is a tendency to ask for treatment for the allergy. We counsel that except for a few foods like peanuts, egg, and milk, there is no specific treatment for food allergies and avoidance is the only option.

Anaphylaxis

This needs a lot of explanation for the parents and the patients. The risk of death is like 'the Sword of Damocles' hanging above the head. Life becomes very restricted because the patient cannot eat the allergic food but is also needed to strictly avoid all food substances containing even minute quantities of that particular food item. Every place and restaurant they visit, the ingredients have to be cross verified with the chef since the waiters are not much aware of the contents. They also need to make sure that cooks should not share unwashed utensils or spoons for dishes that should not

contain for example nuts or shellfish or other high allergy protein. It indeed has a psychological impact on the child's life and there is a need for much sympathy from all concerned. We find that schools usually tend to avoid such children to avoid the risk and responsibility that they may incur in case of death. There's a scare of the adverse publicity the school might get in case of mishaps. It indeed is very difficult to prevent a child from following all the strict norms he has to follow in the company of other playing kids in the school. A very cautious and balanced approach needs to be undertaken in school.

The most important question the parents have at the end of all the counselling is 'Why my child?' We try explaining everything about epigenetics and its role when comes the reflex Q that why this child only and not any of the other family members? The answer lies in the Allergy Threshold. The allergy threshold is the point at which a person starts to exhibit symptoms. The threshold varies in different individuals at different times and in different circumstances.

An illustration will make it more explicit. All individuals, including the healthy ones, will start sneezing when exposed to 20 micrograms of dust mites per gram of dust. This doesn't suggest that we are suffering from allergic rhinitis but an individual with dust mite allergy will start sneezing to as low as 2 micrograms of dust mite per gram of dust. This can vary in different individuals which form the basis for the variation of symptoms and the treatment required to overcome the disease. The allergy threshold decides whether the duration of intranasal steroids required will be for minimum two weeks or longer, or more rarely for a lifetime.

Case Study

Somuan, an eight-year-old male had allergic rhinitis and asthma. He was prescribed a nasal spray and an inhaler. He was seen by many busy paediatricians and prescribed antibiotics and anti-allergic. In spite of repeated doctor shopping, there wasn't much relief.

When they came to me quite exasperated, I explained the diagnosis and why each of the medication was given and how it works. There was no change in my prescription. The same medicines now did wonders to the same patient.

Key Pointers:

- Time is of the essence in the counselling of allergic disease and time should be given for patient education.
- Patient education consists of explaining the disease and drug usage in detail.
- Practical demonstration of each drug and device is essential.
- Patient's hunger for knowledge for a long-standing disorder should not be undervalued.
- We are bound to transform our community into an educated one.

Section 7

Community Help and Traditional Treatments

The pleasures of life are in the service of one's country and community. Many a solution to the modern-day malice's may just well be in our traditions which have been cherished for more than a millennium.

1

Traditional Indian Practices

Different civilisations have been dealing with diseases over centuries and have developed traditional and natural ways of handling them. There are many traditions followed in India, based on centuries of observation. Many of these traditions are now being validated by studies. The chapter looks at the various traditional practices.

There are many traditions followed in India, many with sound medical benefit, but not everyone understands the reasoning behind the traditions. Here are a few examples and their reasons. Some practices have been based on centuries of observations and only more recently validated by studies. In some cases, traditional habits may not be beneficial, and each has to be evaluated individually now that we have so much literature available.

- Usually, bed sheets, pillow covers, and clothes are washed weekly in hot water, sun-dried and then shaken before being used. This is a good idea because dust mites are killed by hot water and sun drying. However, it is interesting to note that even dead mites can be allergenic. Hence it is very essential that the sheets should be shaken not only after drying but every night.
- It's also a common practice that all new clothes are washed and sun-dried. This is because clothes stored in shops and warehouses collect mites. Many people

handling these clothes as an occupation have been found to have allergies.

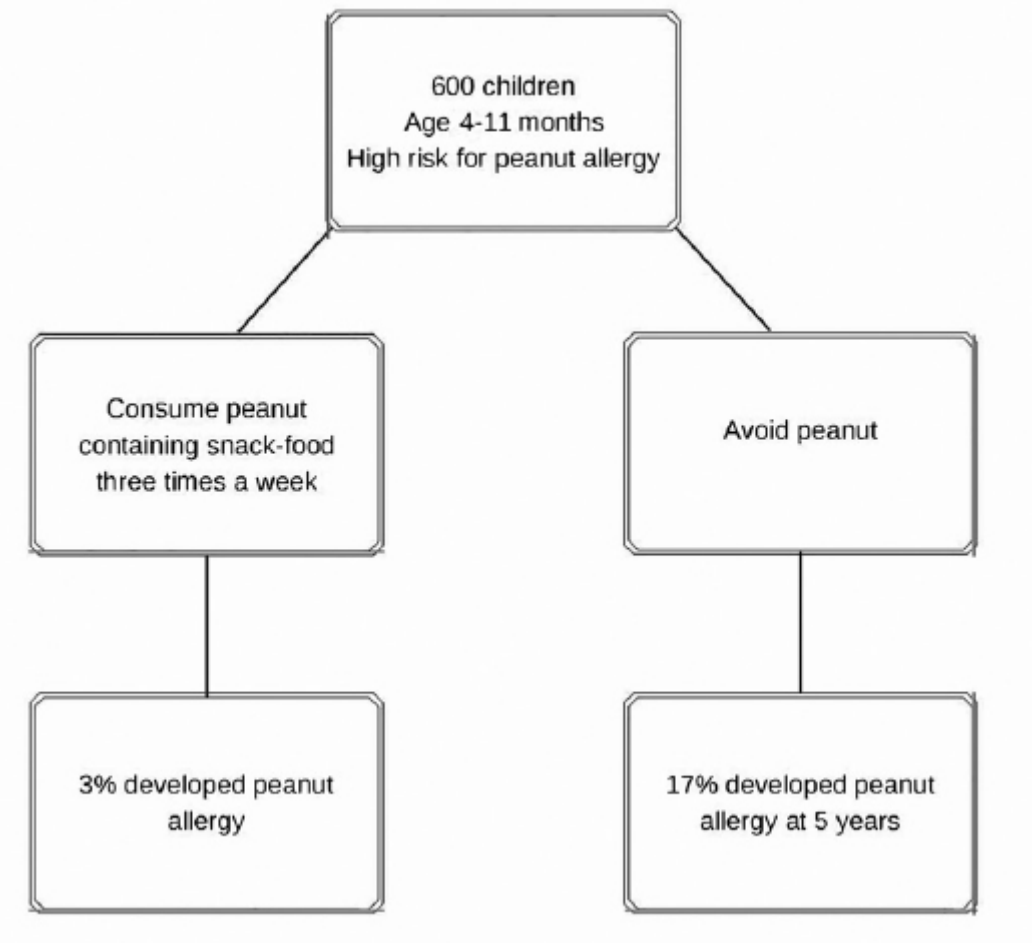
- Indian houses are built on the principle of Vaastu. This is a traditional Indian science which suggests various aspects of living such as: what direction rooms should face, how much sunlight is recommended, where the doors and the windows should be, and how beds and seating should be arranged within rooms. Sunlight is the biggest enemy of the dust mites and thus allowing sunlight to come in abundance will destroy the mites. At the same time allowing good cross ventilation and the position of the kitchen to let the smoke escape freely helps ameliorate asthma and other respiratory diseases.
- It's always been emphasised in the Indian tradition that after eating food, especially wheat, one shouldn't exercise or have a bath. For years, this must-have sounded strange from an allopathic perspective until the description of exercise-induced wheat anaphylaxis. People predisposed to this condition are allergic to wheat but normally the consumption of this wheat in any form has no effect on the body. But when the same person exercises after the consumption of wheat, he can experience a severe allergic reaction which may progress to anaphylaxis, a fatal condition.
- Breastfeeding is the most important feed embedded in traditional Indian culture. All mothers are encouraged to breastfeed until two years of age. The mothers are encouraged to take a diet which would promote breastfeeding. In the Indian concept, the milk bank was a wet nurse. The breast milk promotes favourable colonisation of fermentation products which are anti-inflammatory.

It's always been a tradition to strictly exclusively breastfeed babies and subsequently start weaning foods early. These weaning foods are vegetarian sources high in protein content especially peanuts and using unprocessed and unrefined food products. We tend to use jaggery instead of sugar.

For many decades in the recent past, Western society had been promoting formula feedings and late weaning. Whether it had any true scientific basis or was industry driven by the baby food industry is difficult to state or judge. However, now the Western medical recommendations have returned to the unquestionable value of breastfeeding, including exclusive of breastfeeding for six-month duration. As far as weaning is concerned, there is the LEAP study from Germany, which suggests the early introduction of peanuts in newborns who have a family history of peanut allergy in order to prevent the development of peanut allergy. This is exactly what we have been doing traditionally.

The Western medical model was earlier advocating the late introduction of high protein-containing foods. There have been numerous studies in the West regarding the weaning foods and the timing of weaning. There is not only a difference in the time of weaning and the type of food but even reputable organisations such as AAP(American Academy of Paediatrics) policy recommendations of each decade have shown vacillations in contrast with a steadfast commitment to breastfeeding in the Indian traditional model.

LEAP Study Results



*Based on the hypothesis:

Regular eating of peanuts when started during infancy will elicit a protective immune response instead of allergic immune reaction.

There's also the traditional recommendation of not taking eggs with milk or fish with curd or milk. The foods which are the most allergenic and commonly allergic are seafoods, peanuts, milk, and eggs. Hence, it does make sense to avoid these food substances in combination.

However, there are at the same time many practices which are unexplainable and at best to be considered a fad. There are other practices which are very useful, and time tested but now has better alternatives. Infants would be given an oil massage and kept in the sun. This would not only provide tactile stimulation but more importantly provide vitamin D to the baby. It would be easier and more convenient to provide

vitamin D drops to the baby and also vitamin D tablets to the mother especially when she is breastfeeding the baby.

The ancient Indian Yogic System is an integral part of our culture and is intimately blended with the lifestyle. If one strictly adheres to them, one achieves better quality and longevity of life. This science has withstood the test of time for a millennium. Yoga is for body, mind and soul. The body requires a balanced diet, exercise with rest, fresh air and hygiene. The mind requires positive and constructive thoughts. The soul needs meditation or awareness of consciousness.

Yogic exercises rejuvenate and cleanse the body, mind, and soul. They are physico-physical for body, physico-psychological for mind, and physico-spiritual for metaphysical seekers. A yogi achieves control over the limbic, autonomic nervous, neuro endocrinal, endocrinal, and thymic system by regular practice.

Pranayama has immune and disease modulating effects. There are specific pranayamas designed to heal a given disease. Even with basic pranayama, the cardiovascular and respiratory systems are immensely benefited.

Breathing exercises improve the lung functions and hence tissue oxygenation. These breathing exercises are now incorporated in respiratory physiotherapy. The role of pranayama in allergic reactions is being explored with encouraging results. It is an established fact that the cleansing and hygiene of nasal airways is achieved by Jal neti and Sutaneti and that Vamana clears the central bronchi.

In Wudu, the practice of self ablution before prayers, the nose is flushed with water three times at a time and repeated five times a day. In addition, the steps of application of water to the face, nape of neck, forearms, and legs five times a day helps in protecting the susceptible sites in eczema.

Key Pointers:

- It has been a tested fact that westernised style of living has been a major cause of lifestyle disorders. Therefore, it is beneficial that we return to our traditional practices which have stood the test of time and protected us from many of the modern lifestyle disorders.

2

Role of Community Education in the Control of Respiratory and Allergic Diseases

The community has a major role in the control of chronic disease and community-based programmes go a long way in the management of chronic disorders. This chapter describes how to reach out to the community with community-based teaching modules.

Mostly we are able to only treat patients who are able to come to our clinic. But there are so many who lack access to our clinics. With this realisation, we formed a trust in 2009 called SOWED (Specialists on Wheels for the Economically Deprived). For images, refer to SOWED page on www.allermy.com. The purpose was to educate those who live in utmost deprivation, usually totally neglected by elected officials until it's time for election campaigns again. The government has programmes, but they never reach them. The government says that it's producing doctors to serve these people but what they get are practitioners of alternative systems of medicine not knowledgeable about scientific literature, dishing out unscientific prescriptions. Many organisations, some with vested interests and agendas, have tried to train these general practitioners especially certain private corporations that could then receive a regular stream of referrals for their hospitals, but it hasn't had the desired impact. The government is trying

to come up with a bill which would legally allow these doctors to practice allopathic medicine after they have undergone a bridge course. While there is much opposition from the medical organisation, nobody seems to care about improving the knowledge or information level of these deprived people. It's a tough situation.

SOWED doctors from various specialities especially chest, allergy, and paediatric diseases have been conducting health camps in these areas. The camp is usually in a school building located in the deprived areas. At the beginning or at the end of the camp, there is a lecture and an interactive session with the audience which usually predominantly consists of women. There's an immense hunger from these semi-literate people to acquire information about various diseases and their prevention. The women folk show a greater hunger for knowledge and information. They seem to be more concerned with the health and well-being of the house as compared to the men.

We have taken efforts to answer each and every query pertaining to health and disease. Since their lives are mired in poverty, their living conditions suffer from inadequate sanitation, poor ventilation, and overcrowding. Although it is the responsibility of the government to work on the infrastructure, we have found that mere education of this populace on health issues goes a long way in the mitigation of diseases. They're looking for answers from reliable sources for various queries. Unfortunately, due to social, educational, and economic reasons, they cannot venture out of their environment. Both the print as well as the electronic media has them last on their radar. Also, the corporate world isn't interested in them because of their poor purchasing capability. The government and NGOs do act holistically but more for curative care rather than education or disseminate knowledge amongst them.

SOWED over the years has provided such people free consultation and free investigations on specific tests and free medications. It has been seen that the patients in spite of their poverty are eventually willing to purchase these sometimes costly medications if through education and beneficial effects

by the use of the medications has made a positive impact on their lives.

The large interactive sessions each consisting of at least 200 people make a greater and far-reaching impact as compared to if it was done on an individual basis.

This form of education would be termed as a ‘bottom up’ approach wherein the lowest end of the community i.e. the common populace, through their acquired knowledge would put pressure on the next end and these are the health providers, sanitation officials, and public work officials. It is only when there’s a pressure from the bottom through that newly acquired knowledge that the public representatives would start acting and implementing regulations for the needs of the community. The question that arises is who would bell the cat for providing this education on a mass scale. Our NGO is limited by its size and finances. Hence, the government and corporate world as part of their social responsibility can pay for workers to disseminate such knowledge on a regular basis through a structured program.

Module for Teaching

1. Of deprived people
2. By educated people
3. With a minimum of scientific background
4. For prevention of respiratory and diarrheal diseases

Logical Preventive Approaches for Restoring Environmental Balance

Eat plants	70% of immune system is located in the gut. Consumption of whole foods and plant-based foods directly supports immune defences.
Favour cooked	Many raw foods are high in allergens

meat	and therefore, cooking helps.
Keep it fresh	Leftovers can cause problems for allergy sufferers. Histamines grow on foods the longer they sit.
Support digestive enzymes	A lot of allergens are fragile and digestive enzymes in the stomach or pancreas will render them inert.
Skip the antacids	Regularly taking antacids may suppress stomach acid.
Heal the gut	Gut health is the foundation of all health.
Improve indoor air	New furniture (particle board) and carpet release household dust.
Body and household care	Steer clear of products with synthetic fragrances as they contain endocrine disrupters. Propylene glycol, a common allergy trigger, is a common addictive in the body-care products.
Embrace few germs	Use soap and water but stay away from the big guns - antibacterials and antimicrobials.
Reduce plastic in your life	This is a major concern throughout the world.

Simple Solutions to Complex Diseases

- House should be neat and simple.
- No carpets, cotton rugs, floor beds, and floor luggage.
- If water for washing is splashed from one end of a tiled floor, it should easily flow to the other end.
- Walls are free of hangings to enable wet wiping of the walls.

- Wash pillow covers and bed sheets in hot water weekly, sun dry and use after dusting since dead mites too can be allergenic.
- Avoid soft and stuffed toys. If these are used, they should be washed regularly.
- Keep all foods out of the bedroom.
- Keep food and garbage in closed containers.
- Avoid dumping outside the house.
- Fix leaky pipes, taps, or other sources of water. Don't let water stagnate.
- Clean mould covered surfaces with a cleaner that allows bleach in it.
- Don't use mosquito coils, mats, or liquidators. Use netlons/mosquito nets instead and wash them weekly.
- Allow cross ventilation. If wind enters through one opening, it should be able to exit through another.
- The sunlight should fall on the bed either in the morning or in the evening.
- Allow the smoke to exit easily from the kitchen. No one should be allowed to smoke at any time inside the house.
- Agarbattis and other incense shouldn't be used on a regular basis and that too very briefly.
- Avoid using kerosene stove and firewood.

Hydration

- Use clean drinking water by boiling and then filtering.
- Wash hands regularly before handling food.
- Do not leave food open at any time.
- In case of diarrhoea or vomiting, start oral rehydration solution immediately. This should be taken liberally.
- Oral rehydration solution is prepared by adding a spoon of sugar, a three-finger pinch of common salt, and a squeeze of lime or lemon to a 3 oz glass of water. If available, it is better to use the market available powder

which is prepared by adding a level teaspoon to a glass of water.

- Watch for urine output strictly. Consult immediately if altered.
- Babies with diarrhoea should be without diapers since diarrhoea + diaper = death. Use the baby washable cotton diapers or keep the disposable diapers open to air during diarrhoea to monitor the urine output.
- In case of high fever, immediately use paracetamol along with tepid water sponging. If fever persists or if there is an increased respiratory rate or poor feeding, consult the health workers immediately.

Care for Babies

- Breastfeeding should be done exclusively for six months. Weaning should be done at 6 months. Stop breastfeeding at 2 years.
- Even if the option of breastfeeding is not available, avoid powder formula at all times. Use cow or buffalo milk which has been pasteurised. Boil all utensils in hot boiling water. Never use a bottle.
- The feeding should be done with a cup and spoon of steel.
- The common practice of instilling oils anywhere in the body including the nose and ears should be stopped.
- Babies should be given vaccines on schedule and should have regular weight monitoring.
- The recent lockdown to combat the coronavirus throughout the world has brought about a dramatic change in the environment. The air is much cleaner with excellent visibility. Most importantly the complete closure of eateries has led to people eating strictly homemade foods. All this has reduced hospital visits to a negligible number whether it's for infections or lifestyle disorders including allergies. This is all that good community living involves and needs to be practised.

Key Pointers:

- Each one teaches one for the upliftment of our backward community.

Section 8

ADDENDUM

1

COVID-19

A Novel Pandemic

Since the world is in the grip of a pandemic leading to grave consequences, this chapter has been added to explain about the coronavirus, its manifestations, implications followed by the treatment and outcome. As an educated community, it is binding on us to be rightly aware.

Introduction

The world is in grip of the Covid-19 pandemic. Its impact which has brought most countries to a standstill needs to be understood. This virus is not the first to have such a devastating effect.

The Spanish flu in 1918 was the last such global pandemic which caused havoc on a widespread scale and due to the lack of adequate health facilities and poor communication, the mortality rate was on an incomparable scale as compared to the present pandemic. Undivided India itself lost three million souls in the Spanish flu.

Global Prevalence

Covid-19 has affected the entire world with no exception. However, the countries and towns maximally affected have a few aspects in common. It is more prevalent in the temperate regions i.e. the colder countries and while in the warm

countries, it is more in the cities and urban areas. In India there's a possibility that because of reverse hygiene hypothesis as explained in chapter 'Hygiene Hypothesis', there is a good built up of innate natural immunity in Indians because of repeated exposure to the viruses and bacteria since early life. It is early to surmise, and there are many other theories including use of BCG which are predicting a less prevalence in the Third-World countries.

Clinical Effect

The coronavirus has always been there but a strain of this virus which was in wild animals such as bats has now jumped into humans and replicated itself. This new coronavirus strain SARS-CoV 2 or the SARS Corona Virus 2 which causes the disease now termed as Covid-19 (coronavirus disease of 2019) is far more lethal than the earlier strain of coronavirus which caused negligible deaths. It is ten times more lethal than the annual influenza flu which kills half a million each year. In mid-2020, we are still discovering the range of illnesses it causes and the number of human organ systems it can affect. It has a unique mechanism of afflicting the body but the most frequently affected organ is the lungs. There are emerging reports of isolated skin, brain, and heart affection besides the common lung and intestinal affection. Some of the manifestations are due to direct cell invasion by the virus and some manifestations are due to the body's immune reaction to the infection called a 'cytokine storm' resulting in ARDS (acute respiratory distress syndrome) with severe immune-mediated inflammation of the lungs with consequent respiratory failure. Predisposing factors for mortality is hypertension, diabetes, obesity, environmental pollution, and an elderly population.

Impact of the Virus

Since it is highly communicable, physical isolation is the mainstay in the prevention of the spread of the virus. The deaths are more in the densely populated cities where physical

distancing is an issue. The result is that many countries have imposed a lockdown. It has moved entire sections of people indoors especially in urban areas. All non-essential businesses, malls, restaurants, and transport services have come to a halt. This has made a tremendous impact on the environment and health of individuals albeit at a terrible cost to the economy and living of the people.

Treatment

At this very moment, the exact treatment is in a very fluid state. There are various drugs including hydroxychloroquine, anti-viral, azithromycin, and biological and plasma therapy which have been tried and have shown a mixed response. A definite drug is yet to be proven. Hence, the entire emphasis has been on prevention.

Prevention

The best and most effective way of prevention is the vaccine which hasn't come into the market. It will be another minimum of ten months before it actually reaches the people. The vaccine does give protection but there's always the possibility that in future, the virus might undergo mutation rendering the vaccine to be not fully effective. At this time, in mid-2020, the important principles of control are:

- Test as many people as possible for the virus
- Social distancing
- Basic public health and hygiene measures

Also, there should be a physical isolation of at least 6 feet when outside the house. It is said that if people would freeze at a distance of 6 feet from each other for 14 days, the virus would die a natural death, but that is a near impossible feat. Hence, the proper wearing of mask has been instructed since the virus enters the body through the respiratory tract in order to reduce droplet transmission to others. Other preventive measures include:

- Isolating elderly people or patients with risk factors.
- Quarantine for those suspected of Covid-19 or those who have tested positive and their contacts.
- Abiding by all curfew rules in the region and cooperating with authorities in the area.
- Frequent hand washing with soap and water or sanitising hands with a liquid containing 70% alcohol as well as sanitising commonly used surfaces such as doorknobs and handles, lavatory taps and fixtures, pens, light switches, and phones, etc. carefully as per directions.

In addition to the above basic rules, the following simple measures can have beneficial effect:

- The practice of greetings that doesn't allow shaking of hands. In the East Asian countries, greeting involves bending to each other while in India, a simple Namaste is used and in Middle Eastern countries, it is a salutation. This prevents the virus and other germs from being transmitted through physical contact.
- When one sneezes rather than to use hands, it is better to do it in the bend of your elbow or below to your shoulder because hands touch others or many surfaces. Viruses survive for varying duration on different surfaces and on inanimate objects.
- It is advisable practice to leave the shoes outside the house when entering. There are reports from Italy that shoes have been a major source of the entry of the virus into homes.
- The washing of hands legs and face repeatedly has been given a lot of importance. Hand washing is extremely important after using the bathroom as the coronavirus is shed in stool as well. No spitting can be permitted on streets or outside bathrooms.
- Another traditional practice followed by some countries such as India involves immediately having a bath after returning from a funeral as the unknown germs of the dead individual may afflict the attendees.

- Using minimum furnishings at home since these objects can act as fomites.
- Sunlight has played a major role in the Indian culture. There are reports that UV rays present in abundance in sunlight will kill the virus. It is a common practice to put everything in sunlight. This includes putting the washed vessels and clothes and sitting directly under the early morning sunlight for an hour. The latter is an excellent source of Vitamin-D which is essential for buildup of immunity. It has been observed that sick animals often lie down in the sun.

There was another practice although very controversial which eventually had a negative impact on society. The practice of untouchability must have come to break the chain of transmission of the diseases from individuals dealing with the handling of excreta and garbage. It may sound scientific but unfortunately over the years, it took on religious connotations and became discriminatory in nature. Hence, it should not be encouraged towards people of any profession. However, there is a new tragedy arising in our country right now, where physicians, nurses, paramedics, and ancillary workers who are risking their own lives to take care of Covid patients are being abused in the same way. There are many instances of actual violence against doctors and nurses. There is much that people need to learn if historical mistakes are not to continue and if ignorance and aggression are to be eradicated along with diseases.

Many people have been asking whether there should be any special diet. One of the many reasons the Spanish flu had a major effect in India was because of the concomitant famine prevalent in many parts of the country. A well-balanced diet rich in vitamins, especially vitamin C, which is present in citrus fruits and food containing minerals especially zinc and multivitamins is essential. It is a common practice in some states to drink warm water only. This could be a very healthy practice since chilled temperatures facilitate viral reproduction and heat helps ameliorate viral replication on the throat surface. In our diet, there are lots of traditional spices and

herbs such as turmeric mustard and ginger which are known to build up immunity but this study hasn't been scientifically validated. Amongst the spices, *kalonji* or black seeds containing thymoquinone which is of the same family as chloroquine has been studied extensively in Middle Eastern countries which states that daily consumption may help boost the immunity with some anti-inflammatory effects. (Citation in references). At the same time, the Indian government has been promoting Ayush medicine i.e. alternative medicine.

It needs to be emphasised and reiterated that all the above measures will have no effect on the treatment of the Covid-19 disease. At best, they will build up some general immunity. In addition, it is necessary to avoid listening to unqualified people giving opinions whether on TV or in the media, especially on social media like Whatsapp forwards and YouTube clips from non-professional sites and people. If additional information is needed, then one should refer to journals or articles from reputed newspapers or government sites.

The above two chapters in section 7—Community Health and Traditional Treatments also have important lessons which help in the prevention of the virus disease.

Outcome of the Pandemic

We need to wait for herd immunity when at least 50% of the population overcomes infection and gets antibodies. This is a costly option because of the huge collateral damage it can cause. India is fortunate that it has a huge young population wherein the median age is 27 years but the country lacks the necessary healthcare infrastructure. The incidence of the illnesses will come down with time and hopefully the vaccines may come as early as possible.

Key Pointers:

- Covid-19 is a unique disease caused by a mutation of the coronavirus.
- Almost the entire world has been afflicted physically and economically.
- The manifestations of the disease are protean.
- No definitive treatment has been standardised to date (30th May 2020).
- Social isolation is the best preventive measure.
- Traditional forms of treatment will at best improve immunity an essential preventer of mortality.
- Individuals should stop believing unsubstantiated reports in circulation.
- Only a vaccine is the best hope for the future.

International Guidelines and Recommendations

GINA Guidelines for the Management of Asthma

The GINA (Global initiative against asthma) works with healthcare professionals and public health officials around the world to reduce asthma prevalence, morbidity, and mortality. There is a set of guidelines made by this international body. These guidelines may vary in some minor form from one continent to another. However, it is important that the treating physicians should follow these guidelines for the optimum treatment of asthma. At the same time, patients who are partners in the chronic management of asthma should clarify with their physicians that these guidelines are being adhered to by the attending doctor.

Personalised Management of Asthma in Children 5 Years and Younger

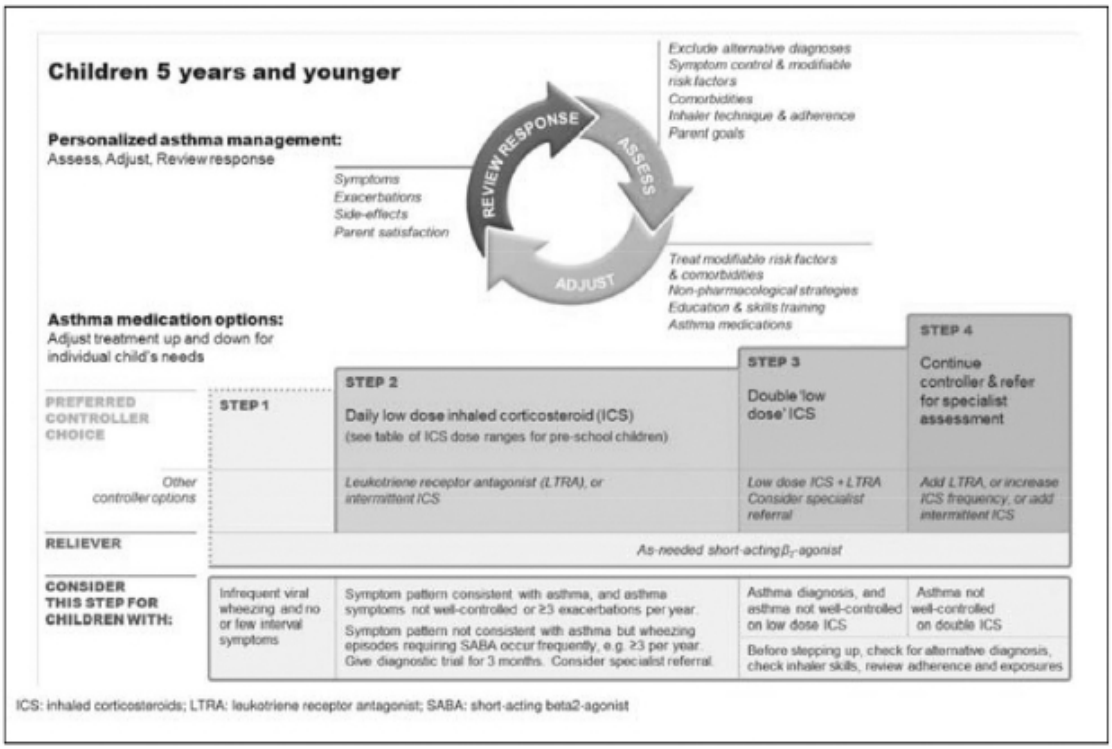


Image Credit: GINA

Personalised Management to Control Symptoms and Minimise Future Risk for Children 6-11 Years

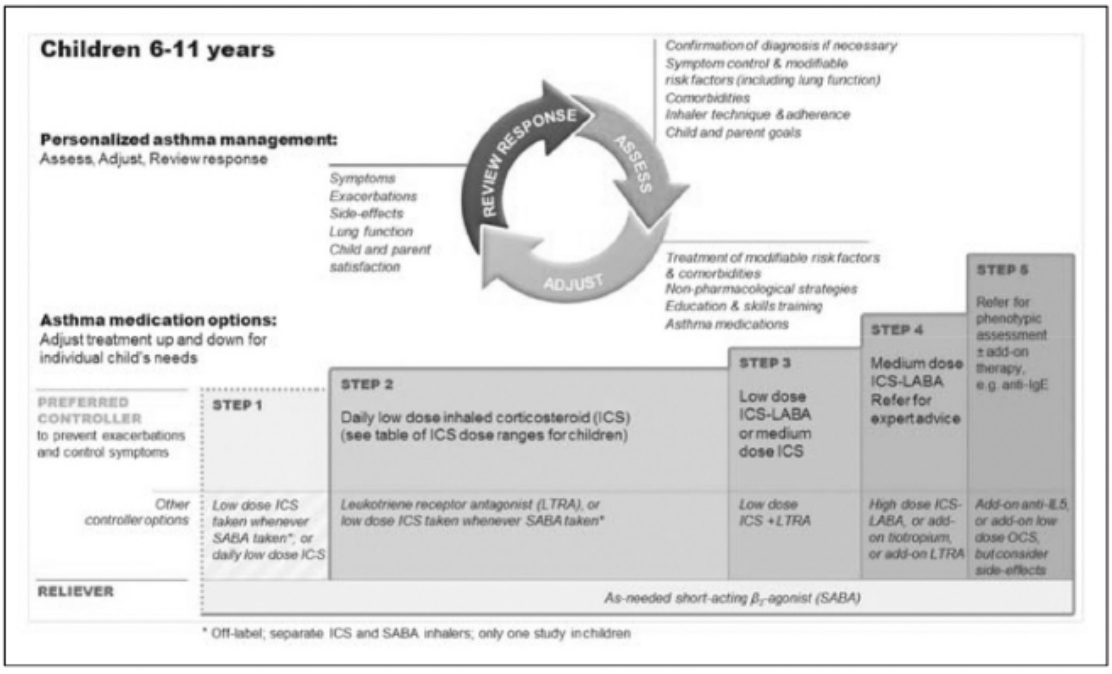


Image Credit: GINA

Personalised Management to Control Symptoms and Minimise Future Risk for Adults and Adolescents

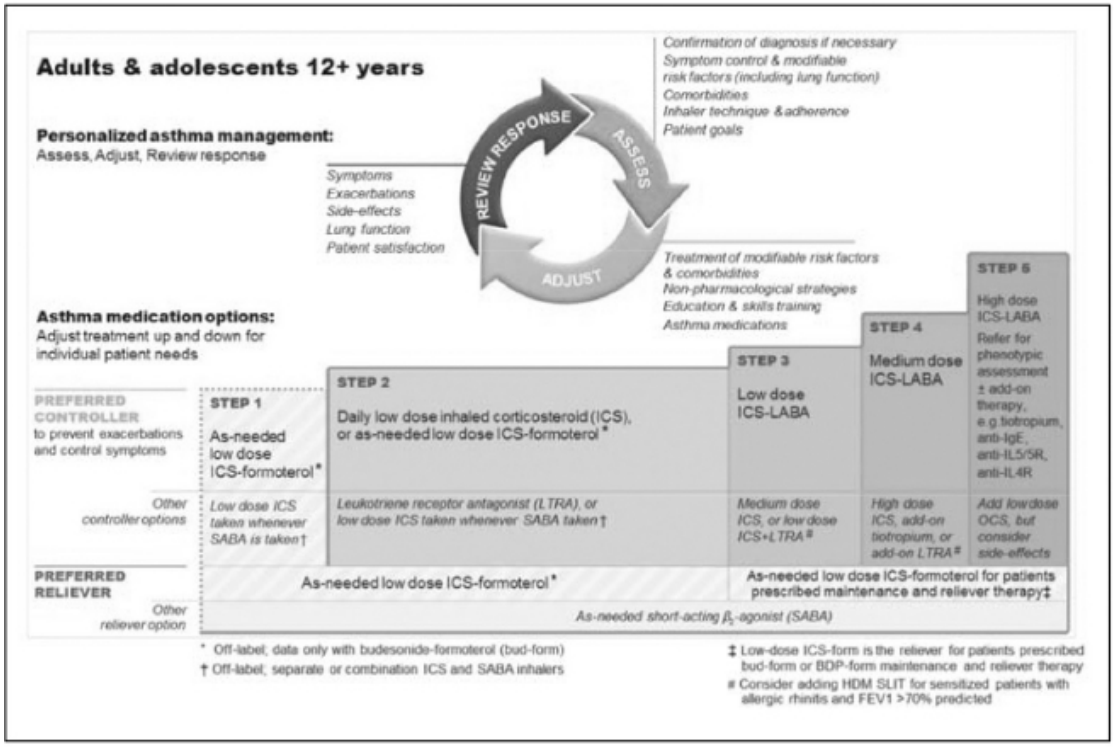


Image Credit: GINA

GLOSSARY

Antigens: Molecules that stimulate antibody production.

Angioedema: Angioedema is an area of swelling of the deeper layers of skin and tissue just under the skin or mucous membranes.

B lymphocytes: White Blood Cells, whose function involves antibodies.

Bilateral: Both sides (right and left).

Bronchodilators: Drugs which open up the respiratory passages in asthma.

Chemokines: Molecules that induce movement in certain cells.

Cytokines: Molecules that have an effect on the behaviour of certain cells.

Chronic: Long-standing (minimum 6 weeks duration).

Corneal: The glass-like structure covering the eyes.

Cyanosis: Bluish discolouration of lips, tongue, and nails.

Cysteinyl leukotrienes: Cysteine (an amino acid) containing leukotriene (molecules originally isolated from leucocytes and are metabolites of arachidonic acid, containing three conjugated double bonds).

Degranulation: Process that releases granules (may contain antimicrobial cytotoxic or other molecules) found inside the

cells.

Drug tolerance: Reduced reaction to a drug following its repeated use.

Eosinophils: White blood cells that have granules easily stained by eosin.

Epidermis: The most superficial layer of the skin, lying over the dermis.

Eustachian tube: A tube connecting the nose to the ears.

Epitopes: The part of an antigen or allergen molecule to which an antibody attaches itself.

Fungi: microscopic growth of moulds found on rotting food or damp areas.

Haptenation: Reaction or coordination with a hapten.

Herd immunity: When a large section of the population becomes immune to an infectious disease either through vaccination or through the spread of infection. This provides indirect protection.

Histamine: Histamine is a protein molecule with the chemical formula C5H9N3, that mediates local immune responses, physiological function in the gut and acts as a neurotransmitter.

Hypoxia: Condition in which tissues are deprived of oxygen.

Immunological: To do with the immune system.

Intradermal: Within the skin.

Inflammatory: To do with inflammation (body's natural response to an external or rarely an internal stimulus resulting in swelling, redness, and pain).

In vitro: Performed or taking place outside a living organism (especially in a test tube or culture dish).

In vivo: Performed or taking place in a living organism.

Lymphatic: To do with lymph (a colourless fluid with white blood cells, that bathes the tissues and drains through the lymphatic system into the bloodstream).

Leukotrienes: Molecules originally isolated from leucocytes and are metabolites of arachidonic acid, containing three conjugated double bonds.

Mast cells: WBC with granules containing histamine, heparin, and a non-lobulated round nucleus (present in tissues, outside blood).

Microscopic: Not visible to the naked eye.

Mucous: Pertaining to or secreting mucus (free slime of the mucous membrane).

Neutrophils: White blood cells that stain neutral pink on hematoxylin and eosin (H&E) preparation.

Pathology: Abnormality in the body.

Perennial: Existing for a long or apparently infinite time.

Photophobia: Burning sensation in eyes on exposure to light.

Pollens: Fine powdery substance discharged from flowers.

Serum: Clear watery portion of the blood after centrifuge.

Sinuses: Empty well-aerated box-like structure of different shape and size in the skull.

Subepithelial: Situated beneath an epithelial layer (layer covering all the body cavities and surface).

Turbinate: A curled shelf of bone that protrudes into the nasal cavity.

Treating through: It is the continuation of a drug treatment in the presence of a developing or established drug hypersensitivity reaction.

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ABBREVIATIONS

ACAAI: American College of Asthma Allergy and Immunology

AD: Atopic dermatitis

AR: Allergic rhinitis

AHR: Airway hyper responsiveness

CMPA/CMA: Cow's milk protein allergy

CRD: Component resolved diagnosis

DPT: Drug provocation test

EAACI: European Academy of Allergy and Immunology

FEIA: Fluorescent-enzyme immunoassay

FPIES: Food protein-induced enterocolitis syndrome

GA^{2}LEN: Global Allergy and Asthma European Network

GERD: Gastro-oesophageal reflux disease

GINA: Global Initiative for Asthma

HDM: House dust mite

IAP: Indian Academy of Paediatrics

IgG: Immunoglobulin G

LEAP: Learning early about peanut allergy

MDI: Metered dose inhaler

NSAID: Non-steroidal anti-inflammatory drugs

PEFR: Peak expiratory flow rate

PM: Particulate matter followed by size in microns

QOL: Quality of life

RAST: Radioallergosorbent test

SCIT: Subcutaneous immunotherapy

SIT: Specific immunotherapy

SLIT: Sublingual immunotherapy

SOWED: Specialists on Wheels for the Economically Deprived

SPT: Skin prick test

VKC: Vernal keratoconjunctivitis

WAO: World Allergy Organisation

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Arif Ahmed is an allergist and a paediatrician educated in India, UK, and the USA. He graduated in medicine from the Seth GS Medical College in Mumbai and then pursued his post-graduation in paediatrics from the same reputed institute. In the United Kingdom, he worked as a senior resident in paediatrics and neonatology at the NHS hospitals for three years. He was a senior resident in paediatrics at the Sparrow Hospital and Michigan State University of Lansing, MI, USA.

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Dr Arif 's interest was drawn towards allergy on account of witnessing the manifestation of allergies in individuals of paediatric age group, which were left unattended or worse, brushed under the carpet of sinusitis or common cold, which in turn snowballed into full-blown problems in adulthood.

He did a Clinical Attachment in Allergy & Immunology at The Royal Manchester Children's Hospital and has passed the European Board for Allergy and Immunology examination conducted by the European Academy of Allergy and Clinical Immunology. He has done extensive research work in allergy and immunology and presented numerous publications (national and international), books, papers, lectures, conferences, and workshops all over India besides oral and poster presentations in UAE, USA, and Europe. Almost 200 lectures or workshops on allergy have been conducted by him in nook and crannies across India for raising awareness amongst doctors.

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