Allergies, Pollen grain, Human health and Factors responsible: A Review

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Abstract:

Allergy which is not specific to its type and mode of occurrence; is the most torment disease among other disease of the modern world as it is widespread and can affect a person of different age at any instance. Different types of symptoms can be observed in the different people who receive allergies, which can be mild (runny nose) to severe (anaphylaxis). These symptoms result from the immune system reaction of a person in response to any allergic component in contact. This paper is a review work done to understand the concept of Allergy and its type and related symptoms specifically due to pollen allergy mainly occurring due to various environmental factors now days. Pollen is well studied as allergens among all other aeroallergens and is important source of pollinosis.

Keywords: Allergy, allergen, histamines, aeroallergens, pollen.

Introduction:

Worldwide with India being no exception, allergic diseases has become a major health concern. More than 25\% of the total population of India is presently sensitized with different forms of allergens [1]. An allergy is an immune reaction to substances that are normally harmless in the environment [2]. When the immune system overreacts to substances that do not affect most people i.e. known as allergies or hypersensitive reaction. These substances, also known as allergens, could be pollen, animal dander, chemicals, fungi, dust mites, or foods such as nuts, eggs, shellfish, fish, and milk [3]. When the allergen comes in contact with the conjunctiva and nasal mucosa tissues, release mediators such as histamine or leukotrienes and induce annoying allergic symptoms [4].

The potency of every individual to get allergies is different and varies from person to person and or the individual’s immune system plays the major role in interacting with the allergen or person having allergy. It is also important to consider that there are some who are susceptible to receive allergies because of their genes only. But it’s not mandatory in every case as many other prospects vary and comes out as matter of probability too.
The Major Route of Exposure to Allergens

The atopic population of India is exposed to allergens by inhalation, ingestion, and contact which is similar in other regions of the world too. Airborne pollen grains, insects, mites, and fungal spores, causes of pollinosis, asthma, and ocular allergy in this country [5]. Dust mites and moulds have been found to act as contact allergens that will cause skin-related diseases [6]. In India as a large variety of foods are consumed across the country, food allergens are quite predominant sensitizers [7].

Immunology of allergies:

The human immune system is protected against pathogens and other foreign substances by producing a kind of glycoprotein known as immunoglobulin (Ig) or antibodies. These antibodies or immunoglobulins are produced from plasma cells or B-cells (a type of lymphocyte). Immunoglobulins are of five types and among them IgE, antibody-mediated immunoglobin is involved in the allergic reactions [8]. During an allergic response immunoglobulin E (IgE) are produced. When the allergen enter first time in human body, an allergic person becomes sensitized by producing allergen specific IgE. The IgE binds with IgE receptors on mast cells (in tissues) and basophils (in circulation). If the individual is reexposed to the same allergen, cross linkage of membrane bound IgE occur to mast cells. These activated mast cell releases some mediators (e.g., histamines, leukotrienes), which induce vasodilation, smooth muscle contraction, mucus secretion, edema and skin blisters [9].
Types Of Allergies:

Allergies itself is a vast concept to consider and to understand well. Different environmental conditions; food and food habits or innumerable type of exposure can lead or can stimulate allergic reaction in any living organism including humans too. For the ease to grasp well the types of allergies is defined on the basis of their causal agent. On the basis of reasons behind allergies being caused; different allergies are categorized as:

- Drug Allergy
- Food Allergy
- Insect Allergy
- Latex Allergy
- Mold Allergy
- Pet Allergy
- Pollen Allergy
- Ragweed Pollen

It requires extensive data set with detailed study to analyze the responsible factors along with conditions, to study different type of allergies, causing agents (allergen) and response of individual towards allergies which is not time bound process. This paper work is mainly a review work done focusing on allergies which are caused by “pollen”.

Figure 2: Cascade of allergy

Source: https://it.wikipedia.org/wiki/File:Mast_cells.jpg
Pollen Allergies:

The most common triggers of seasonal allergies are Pollen. Pollen allergy is also known as hay fever, usually refers as seasonal allergic rhinitis. In every spring, summer and autumns, plants produce tiny pollen grains to fertilize other plants of the same species. Pollen grains i.e. the male gametes (sperm cells) have specific protein covering for recognition by female gametes of the same species. These specific proteins cause allergic reactions in sensitive people. The range of pollen grains and fragments between 10 and 50 μm transported by the air.

The pollens that cause allergic reactions come from trees, weeds and grasses. These plants make pollen grains small, light and dry that travel by the wind. Main cause of weed allergies is a ragweed. Additional general sources of weed pollen include sagebrush, pigweed, lamb’s quarters and tumbleweed. Much highly allergenic pollen is produced by birch, cedar and oak.

On Migration of Pollens, Effect of Climate Change

It is well known that, in Indian subcontinent variable climatic conditions prevail. Various environmental factors like air, temperature, sunlight and rainfall together with carbon dioxide (CO₂) are among the main factors affecting phenology (the times of the appearance of first leaves, first flowers, and autumn leaf coloration, and so on) and pollen production by plant. In specific pollen, climate change affect the pollen production, include impacts on pollen production and atmospheric pollen concentration, pollen season, plant and pollen spatial distribution, pollen allergenicity.

Increase of the Pollen Season (Season Becoming Longer)

Especially in summer and in late flowering species, duration of the pollen season has extended. Increase in temperature and carbon dioxide (CO₂) cause the substantially increase in pollen production of ragweed. The major impact of climatic changes i.e. increased temperatures and carbon dioxide levels has inferred with pollination cycle of weeds and ultimately pollen load in the air has been increased due to extended time period.
Figure 3: Direct pollen response to increases in carbon dioxide concentrations in the atmosphere.

(Source: Extreme Allergies and Global Warming”2010 AAF and NWF)

The Symptoms of Pollen Allergy

People with pollen allergies exhibit different symptoms in response to the allergen they come into contact with. These symptoms vary from person to person and depend on their contact or interaction with exposed allergen, so these observable symptoms include:

• Runny nose and mucus production

• Sneezing

• Red and watery eyes

• Stuffy nose (nasal congestion)

• Itchy nose, eyes, ears and mouth

• Swelling around the eyes

Recommendations

Among the entire natural allergies pollen allergy is most dangerous. Precaution during particular seasons is the best way to avoid pollen allergy. Some preventive measures can be taken to avoid the entry of pollen into the house.

1. For better conditions in residential area windows and doors should be kept closed to avoid the pollens to subside in residential area during peak seasons.
2. Air conditions should be preferred over fans as they don’t let the allergen to spread in wide area by uniforming the air circulation.
3. Cars windows should be kept closed while driving mainly during flowering and pollinating season and avoid moving in areas having weeds and plantations.
4. Avoid drying of clothes in open as many minute pollen particles and allergen can stick in them.
5. Fur of pets is major carrier of pollen grains and is major carriers of various kinds of allergens, so avoid contact with pets or abandoning their movement at least in bed-rooms and bathing area.
6. Individual effort in maintaining health and keeping ourselves and family members safe from allergen is realistic approach to control infection. By avoiding first hand contact with the person having allergic symptoms and try to visit specialist and know which pollen or allergen can cause allergy to you or susceptible to your family members.
7. It is better to know how to control the infection before it flourishes well and worsens, so ask doctor about the medicines which could relief symptoms at their initial stage.
8. Special precaution should be taken if residence is near the park area or having indoor garden/backyard area to prevent flowering by often cutting the grass and removing weeds in that environment.
9. If one cannot control his/her’s symptoms through home remedies or medications prescribed then it’s better to get blood tests done for various probable allergens present in that season and following immunotherapy religiously.

Conclusion

Allergic diseases have become a major health concern worldwide. An allergy is an immune reaction to different substances present in environment which may not be harmful to one but can affect the other individual’s health due to different responsible allergens like pollen grains, fungal spores; foods, insects, and dust mites also environmental factors air, temperature, sunlight and rainfall together with carbon dioxide contribute to rise in cases of different allergies. The allergic symptoms vary from person to person and depend on their contact or interaction with exposed allergen, so these observable symptoms can worsen and progress causing complications so medical attention and proper maintenance of clean environment by prohibiting the interaction with outside during the blooming season can be the best precaution for maintaining individual’s health.

References


