© INNOVATIVE RESEARCH THOUGHTS | Refereed | Peer Reviewed | Indexed
ISSN : 2454 – 308X | Volume : 04 , Issue : 04 | January – March 2018

Study About Allergy, Its Mechanism And Age, Structure, Function And Manifestation Of Disease

Dr. Ashwani Arya B.H.M .S , M D Research Scholar
Dr. Parveen Sharma M.D Homoeo , M.sc Anatomy , Ph.d. Medical Anatomy,
Director Academic & Researchers at Tantia university

Abstract :
Allergic respiratory disorders - is a hypersensitivity reaction at the level of respiratory system. Classically the term "Hypersensitivity" \ "Hyper-responsiveness" \ "Allergy" is coined by **Von Pirquet (1906)**. Allergy may be considered as immunologicaly mediated disease of man directed at unidentified exogenous or endogenous antigens. It is one of the most common illnesses affecting the mankind especially in urban area. It is precipitated by air pollution, food adulteration, and stress of modern living and by some individual unknown factors.

C.P. Von Pirquet almost a century ago noticed that some patients on receiving a 2nd injection of horse serum several days after receiving the initial injection developed attacks of asthma, urticaria. He coined the term allergy for this phenomenon. The term "Alias" mean altered and "Eargen" means reaction, hence allergy means altered reaction. Subsequent modification of the terms meaning has equated allergy with hypersensitivity.

Allergic disorders are among the most common problems seen by Pediatricians and primary care physicians, affecting 25% of the population in developed countries[28] Allergic respiratory disorders are one of the most common clinical conditions that a spectrum of physicians comes across in their day-today practice especially in coastal areas. The prevalence of allergic rhinitis, asthma has increased in recent years.

Among school age children and adolescence these illnesses result in significant morbidity and school absenteeism, with adverse consequence for school performance and quality of life, and may cause emotional stress. Understanding the language of allergy and the basic mechanism involved may help physicians while treating this patients.

Key Words : Allergy, Respiratory Disorders, Infections

Introduction :

The term **"allergy"** refers to the adverse physiological reactions resulting from the interaction of an antigen with humoral antibody and or lymphoid cells. The term allergy should not be limited

to only those reactions involving humoral antibody or cellular immune responses, and occurring in a host sensitized by prior exposure to the antigen.

The term **'antigen'** and **'allergen'** are often used interchangeably, but not all antigens are good allergens and vice versa. For example, tetanus and diphtheria toxoids are excellent antigens but rarely cause adverse reactions. On the other hand, the ragweed pollen proteins are the most potent allergens but are not particularly potent antigens, by immunologic criteria.[5] Most naturally occurring allergens share several common characteristics. They are protein in part, are acidic with isoelectric points of 2 - 5.5, and have molecular weights of 10,000 - 70,000 d. Molecules smaller than 10,000 d would be unable to bridge the gap between adjacent immunoglobulin E (IgE) antibody molecules on the surface of the mast cells. Molecules larger than 70,000 d would not easily pass through mucosal surfaces to reach IgE - forming plasma cells."

'Atopy' and **'atopic '** refer to certain allergic disorders.

The words are used in recognition of a familial tendency to develop hay fever, asthma and eczema. Individuals with this tendency are commonly identified as atopic.

Atone is an abnormality with the following features:

(1) hereditary characteristic expressed as a high incidence of asthma, hay fever and atopic eczema in the families of affected individuals,
(2) Eosinophilia of blood and tissue secretions,
(3) predisposition to selective synthesis of IgE antibodies on exposure to environmental allergens,
(4) A hyper-reactivity of the airways in asthmatics on exposure to environmental factors like cold air and irritant odors, and
(5) Certain endogenous body chemicals.[53]

Allergic reactions are usually the end result of antigen antibody reaction. Several factors may be responsible for modifying these reactions and may be caused by immunological or non-immunological causes.

Allergy is best viewed as a specialized case of immunity in which the reaction to foreign material terminates in a deleterious outcome. Allergy may be considered as one of several type of immunologicaly mediated disease of man directed at exogenous antigens.

Importance:

Allergy is a subject of great importance because every doctor, whether he is a pediatrician or not, will encounter allergic manifestations in his practice among children. Though some of them cannot be avoided, early detection and wise management are essential not only to help amelioration of allergic symptoms and development of irreversible changes

MECHANISMS :
Though very little is known about the exact mechanisms of allergy, the following factors seem common to allergic states:

1. Hereditary Predisposition: In about 60 % of cases of hypersensitivity there is a family history of allergy. The term, constitutional susceptibility or "atopy", is applied to these children (coca). A child has 25% chances of developing allergies if one of the paients is allergic; when both parents are allergic, the chances rise to between 50 and 75 %.

2. Exposure To The Sensitising Factors:
(a) By contact - (contactants - wool, soap, oils, cosmetics, rubber, feathers, etc),
(b) By inhalation (dust, pollen, etc.), (the common inhalants that induce eczema as well as asthma and nasal allergy are house dust (on the floor, on chairs and beds, on mattresses, etc.), wool, feathers, seasonal allergens (pollens), dyes and synthetic material on garments and animal dander (from pets kept at home), or (c) By ingestion of foods.

3. Psychological Factors: Some times precipitate symptoms, probably again by the release of histamine. The role of emotion as an "allergen" producing asthma, eczema, etc. has been well documented in recent years.

4.Infections: Are liable to produce allergy and, likewise, allergic children are more prone to upper respiratory infections than non-allergic children. The classical example is erythema nodosum in tuberculosis. Many other diseases like acute nephritis, rheumatic fever, henoch's purpura, scabies, etc. have been explained on the bases of allergy.

5.Drugs: May induce sensitivity and produce allergic symptoms. Examples are sulfa drugs, antibiotics, aspirin, antitoxins, etc.

Age, Structure, Function And Manifestation Of Disease:
When the structure and mechanical behavior of the young infants and child's respiratory system are compared to the mature adult, important difference emerge that are likely to influence the pattern of disease:

Children are not simply "little adults", because their bodies have not yet fully developed, exposure to toxic substances can affect a child's growth, causing the development of functionally immature organs and body systems. Many toxins and other harmful substances are more easily absorbed in to an infant's maturing tissue. In addition, children spend more of their time outdoors, they have narrower air - ways and breathe more rapidly than adults. Consequently, they inhale more pollutant per pound of body weight and are more exposed to air pollution.

1. The young lung lacks elastic recoil, and as a result of this, airways are less well supported. This will be particularly true if there are fewer parenchymal attachments. Thus there are greater airway closure favoring in homogeneity of gas exchange and development of patchy atelectasis frequently observed in the child under school age.
2. Airway walls of young lungs are thicker, this combined with reduced elastic recoil favors greater airway narrowing for any degree of smooth muscle contraction.
3. The chest wall is relatively more compliant in the young child and stiffens with increasing age. As a result of this infants can develop paradoxical respiration. Respiratory muscle activation during inspiration can produce inward displacement of the ribcage contributing to increased respiratory work for a given level of ventilation particularly during REM sleep. The apparent fatigue resistance of the infant's respiratory muscles may offset the increased demand for respiratory work.
4. Finally infants and children have frequent respiratory tract infections particularly if they attend day care or school or come from large families.

It may be that profuse secretions are aspirated and with a shorter path length to the peripheral airways, epithelial lining these structures are infected. This plus airway cell sloughing, loss of ciliated epithelial cells, injury to epithelial cells with cytokine release, and possible broncho-vascular permeability may contribute to airway wall thickening, edema of the airway wall, and attenuation of the tethering effects of parenchymal airway wall attachments".

Host Defence System:
Distinct innate and adaptive defense systems mediate various aspects of host responses in the lung. During the postnatal period the number and types of immune cells present in the lung expand markedly.

Alveolar macrophages, dentritic cell, lymphocytes of various subtypes, polymorphonuclear cells, eosinophils, and mast cells each have distinct role in host defense. Immune cells mediate acute and chronic inflammatory responses accompanying lung injury or infection. Both the respiratory epithelium and inflammatory cells are capable of releasing and responding to a variety of polypeptides that initiate the expression of genes that are involved in

1. Cytoprotection, e.g. Antioxidants.
2. Adhesion, influencing the attraction, binding of inflammatory cells to epithelial and endothelial cells of the lung.
3. Cell proliferation, appoptosis and differentiation that occur following injury or infection.

The adoptive immune system includes; both antibody and cell mediated response to antigenic stimuli. Adoptive immunity depends upon the presentation of antigen by macrophages, dentritic

cells or the respiratory epithelium to mononuclear cells, triggering the expansion of immune lymphocytes and initiating antibody production and cytotoxic activity needed to remove infected cell from the lung. The lung contains active lymphocytes (natural killer cells, helper and cytotoxic T cells) that are present within the paranchyma and alveolus organized populations of mononuclear cells are also found in the lymphatic system along the conducting airways termed the bronchiolar - associated lymphocytes (BALT). Cytokines and chemokines - (I.L-1, I.L.-8, T.N.Fα) are produced by respiratory epithelial and other pulmonary cells, providing proliferative and differentiate signal to inflammatory cells that, in turn amplify these signals by releasing cytokines or other inflammatory mediators within the lung.[14]

Each day the average adult inhales more than 9000 It. of air. The respiratory tract therefore provides a major source of contact between humans and their environment and must contain an elaborate defense mechanism to protect itself against such damaging agents such as bacteria, and other particles or noxious gases that may pollute the atmosphere.

The respiratory tract is better equipped than the peripheral lung parenchyma to deal with inhaled particles. Because of the turbulence and inertal impaction, particles larger than 10gm in diameter are largely filtered out in the nose; those between 2-10μm settle out on the mucocilliary blanket. Smaller particles in the range of 0.5-31μm penetrate to the alveolar ducts and alveoli. Smaller particle shows no appreciable deposition and is exhaled. Humidification of incoming air causes hygroscopic particles to increase in size and thus to land at a higher point in the tracheo-bronchial tree. Once deposited particles are subject to several excretory transport mechanisms. The mucous lining layer is propelled by ciliary activity at the rate of 10-20mm/min. So 90% of the material deposited on the tracheal mucosa is physically cleared in an hour.
The anatomic structure of the airway and the dichotomous branching of the lower airways make an important contribution to the defense of the lungs against infection. The initial barrier is the nose, which acts as an effective filter. The nasal hairs (fimbriae) filter very large particles. The tonsils and adenoids are strategically located to deal with larger soluble particles, by specific local defenses. If the tonsils and adenoids are markedly enlarged, nasal resistance may be increased, resulting in mouth breathing, which bypasses the nasal defenses. Edema of the turbinates from viral infections or allergies may produce similar effects. Several airway reflexes that augment the nonspecific host defense system are sneezing, coughing and bronchospasm.

References :

1. CHERNICK, VICTOR.et: al.-"Kendigs" Disorders of the Respiratory tract in children. 6th Ed:1998, W.B. Saunders Company Philadelphia. Page: 24 - 26, 70 -71, 244 - 260, 731-743.
2. CLARKE J.H.- The Prescriber. Reprint Ed. 1997, B.JainPublishers (P) Ltd NewDelhi. Page: 99,100,111,121,215.

3. CLARKE J.H.- A Cl inical Repertory to the Dictionary Of MateriaMedica. Reprint Ed. 1997, B.JainPublishers (P) Ltd. NewDelhi. Page 39, 51, 58,95,108,152,158.
4. FAUCI ANTHONY.S. et. all. - "Harrisons" Principles of Internal medicine"14th ED. 1998,Vo1-2, Mc Graw HilLInc.Page:1419- 1424, 1426 - 1427, 1451.
5. GUPTA GIRISH. - Asian Homoeopathic Journal Vol. 7 1997, Page 14- 27.
6. GUPTE SURAJ. - The Short TextBook of Pediatrics. 8thEd. 1998. Jaypee Brothers Medical Publishers. NewDelhi, Page 206 - 230.
7. VANDENBURG M.W.- Homoeopathic Therapeutics of Respiratory System, 1994 Ed. B. Jain Publishers (P) Ltd. New Delhi. Page: 117, 194,285, 302,351 - 356.
8. VISHWANATHAN.Let: al. -"Achars" Textbook of Pediatrics, 3rd Ed, 1999, Orient Longman Ltd. Chennai, Page: 250 - 264.
9. WALLACE K.P.- Homoeopathic Treatment of Asthma and Allergies. National Journal of Homoeopathy, Vol. 4 Jan.-Feb.95