JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Study on IgE Mediated Allergic Disorders: A Literature Review

Dr. Md. Younus Ali
MBBS (Dhaka University),
DDV (Bangabandhu Sheikh Mujib Medical University)
Junior Consultant (Skin & VD), Khulna Medical College Hospital
Khulna, Bangladesh

ABSTRACT

Food allergy and intolerance have gained considerable attention. In food-allergic individuals, IgE is produced against naturally occurring food components, primarily glycoproteins that usually retain their allergenicity after heating and/or proteolysis. However the present study has conducted to review of literature about IgE Mediated Allergic Disorders. The study was documentary analysis type. Information and data were collected from secondary sources. Information and data were collected from books, research reports, online Pubmed journal books, journals, different annual reports, different government and non government websites and different websites. A literature review was conducted by using the Pubmed and Medline databases with the keywords: allergy, allergic disorders, IgE mediated allergic disorders. A hand search was also undertaken to relevant journals identified by the electronic search and additional articles identified from the reference list of the key articles. From the review it was found that the diagnosis and management of IgE mediated food allergy that is believed to be responsible for most immediate-type food-induced hypersensitivity reactionsare characterized clinically by a variety of signs and symptoms that occur within minutes or hours after consumption of the offending food. Reactions may be limited or more generalized with involvement of the skin, nose, eyes, and/or lungs. In more severe cases, cardiovascular symptoms including hypotension, shock, cardiac dysrhythmias and death can occur. Adults tend to be allergic to fish, crustaceans, peanuts and tree nuts but children tend to be allergic to cow's milk, egg white, wheat and soy more frequently. "Emerging" food allergens include tropical fruits, sesame seeds, psyllium, spices and condiments. These allergies frequently represent a cross-allergy to an allergen derived from another source, e.g. pollens or natural rubber latex. The evaluation of IgE-mediated food allergy relies on a careful history, physical examination, appropriate skin testing or *in vitro* testing with food extracts, and/or double blind, placebo controlled food challenges. Avoidance remains the mainstay of therapy. However, allergens may be "hidden" and labeling can be non-precise or misleading, thereby severely hampering prevention. Patients with severe allergies should keep at hand an emergency kit with adrenaline, an antihistamine and an injectable rapid onset- of-action corticosteroid. At present there is no evidence to support the use of immunotherapy, except for research purposes. Production of "hypoallergenic" food is hampered by incomplete methods for assessing the allergenic potential of such novel foods.

Key Words: *Allergy, Immunoglobulin E (IgE), Allergic Disorders, Asthma, Bronchial asthma, Allergic rhinitis, Atopic dermatitis.*

INTRODUCTION

Globally, asthma is a significant non-communicable disease and has major public health consequences often leading to high morbidity and mortality rate. Asthma is ranked 16th among the leading causes of lived with disability and 28th among the leading causes of burden of disease according to disability-adjusted life year (DALYs). About 300 million people around the world suffer from asthma (Rai et al., 2007). It is estimated that there might be an additional 100 million asthmatic people by 2025 (Alderson et al., 1987). Most recent studies indicate that allergic diseases (such as atopic asthma, atopic dermatitis, hay fever, etc.) now affect approximately 20% of the worldwide population (Bantz et al., 2014). Furthermore, asthma is among the top 20 chronic conditions in the global ranking of disability-adjusted life years in children; in the mid-childhood ages (5–14 years), it is among the top 10 causes (Asher et al 2014). Atopic asthma is contributing about 8% (Barua et al., 2013) of the asthmatic population in Bangladesh. Now, it has grown into a routine to define asthma as an atopic disease where atopy is defined as a personal or familial propensity to produce

immunoglobulin-E antibodies and sensitization in response to environmental triggers critical in linking with allergic diseases like atopic dermatitis, allergic rhinitis, and asthma (Spergel J. M., 2005). The causal relationship between atopy and asthma may trigger the specific serum Ig-E pathway and influence the manifestation of this disease (Schoos et al., 2016). Atopic airway discomfort is caused through the development of eosinophilic airway inflammation, bronchial hyper responsiveness, and reversible airway obstruction associated with specific Immunoglobulin E (Ig-E) antibodies sensitization to various allergens, as evidenced by serology or skin prick test (SPT).

Again, relationships among allergic diseases of the skin, respiratory tract, and gut were found in different studies that are bidirectional and progressive (Olbrich et al., 2020). It was revealed that people suffered from a distinctive series of allergic diseases where some persisted for several years (Spergel J.M., 2010). A review of four population-based cohort studies with a minimum of 80% follow-up, confirmed that early-life atopic dermatitis (especially IgE-associated) is a significant risk factor for developing asthma later in life (Vander Hulst et al., 2007). Therefore, it is clear that the worldwide prevalence of allergic disease is on the rise as a result of complex genetic-environment interactions. Recent studies also showed an association between the upsurge of allergic diseases and increasingly modern lifestyles (Murrison et al., 2019). It was found that allergens from house dust mites, furred pets (cats and dogs), mice, cockroaches, and fungi help cause atopic diseases (Burbank et al., 2017). Allergic diseases also have a serious impact on the quality of life along with direct and indirect costs (Dierick et al., 2020). Hence, effective interventions and control of environmental exposures can lead to improved asthma outcomes (Anandan et al., 2010; Kader et al., 2018). Primary prevention for atopic asthma can be made of productive environmental situation, leading a healthy lifestyle, elimination of environmental factors (Anuradha et al., 2011).

DEFINITION OF KEY TERMS

Definition of Immunoglobulin E (IgE)

Immunoglobulin E (IgE) are antibodies produced by the immune system. If anyone has an allergy, then immune system overreacts to an allergen by producing antibodies called Immunoglobulin E (IgE). These antibodies travel to cells that release chemicals, causing an allergic reaction. This reaction usually causes symptoms in the nose, lungs, throat, or on the skin. Each type of IgE has specific "radar" for each type of allergen. That's why some people are only allergic to cat dander (they only have the IgE antibodies specific to cat dander); while others have allergic reactions to multiple allergens because they have many more types of IgE antibodies.

DEFINITION OF TYPE 1 HYPERSENSITIVITY

Immediate hypersensitivity reaction - type I reaction, involves immunoglobulin E (IgE)-mediated release of chemical mediators from mast cells and basophils. Th2 cells produce IL-4 and IL-13, which then act on B cells to promote the production of antigen-specific IgE. Reexposure to the antigen can then result in the antigen binding to and cross-linking the bound IgE antibodies on the mast cells and basophils. This causes the release of preformed mediators (histamine, tryptase, tryptase, chemotactic factors), newly synthesized mediators (leukotrienes, prostaglandin, thromboxane, platelet-activating factor, adenosine, bradykinin), and cytokines from these cells that results in structural and functional changes to the affected tissue.

Type I hypersensitivities include atopic diseases, which are an exaggerated IgE mediated immune responses (i.e., allergic: asthma, rhinitis, conjunctivitis, and dermatitis), and allergic diseases, which are immune responses to foreign allergens (i.e., anaphylaxis, urticaria, angioedema, food, and drug allergies). The allergens that result in a type I hypersensitivity may be harmless (i.e., pollen, mites, or foods, drugs, etc.) or more hazardous such as insect venoms.The reaction may be manifested in different areas of the body and may result in instances such as: Nasal allergic rhinitis or hay fever
Ocular allergic conjunctivitis, potentially due to seasonal allergens such as pollen or mold spores
Dermatological hives, atopic eczema, or erythema
Soft tissue angioedema
Pulmonary reactions, such as allergic asthma or hypoxia
Systemic reaction, which is a life-threatening medical emergency, and also known as anaphylaxis.

OBJECTIVES OF THE STUDY

The objective of the study is as follows:

1. To review of literature about IgE Mediated Allergic Disorders.

METHODOLOGY OF THE STUDY

The study was documentary analysis type. Information and data were collected from secondary sources. Information and data were collected from books, research reports, journals, different annual reports, different websites. A literature review was conducted by using the Pubmed and Medline databases with the keywords: allergy, allergic disorders, IgE mediated allergic disorders. A hand search was also undertaken to relevant journals identified by the electronic search and additional articles identified from the reference list of the key articles.

REVIEW OF PREVIOUS STUDIES

Rasul FB et al (2022) found that within Bangladesh, higher educational attainment and socioeconomic status, shorter distance from the household to the health centre, and fewer household members with a chronic disease were associated with seeking care for a chronic non-communicable disease, such as asthma, from a qualified provider. They also found a high burden of out-of- pocket medical expenditures, mostly related to pharmaceutical treatments. This supports our findings that those from the highest wealth quintile were more likely to have received a diagnosis of their condition.

Rasul FB et al (2022) also speculate that there may be limitations in the capabilities of medical practitioner to identify atopic diseases and distinguish them from other common conditions, for example, differentiating scabies from atopic dermatitis. Taken together, it is clear that there is an important opportunity to increase affordable medical interventions, both in identification and diagnosis of cases as well as in prevention and treatment.

Ali MR et al. (2020) conducted a cross-sectional study among 699 participants in the Tangail district of Bangladesh to evaluate common food items responsible for food allergy along with food addiction among Bangladeshi people. Ali MR et al. (2020) found that food allergy is an abnormal response of some particular foods triggered by the body's immune system. Food addiction which generally shares a similar neurobiological and behavioral framework with substance addiction like foods.

Ali MR et al. (2020) found that brinjal was the most frequent food item responsible for 28.3% of people's food allergy. The main symptoms due to the food allergy were about 28.5% itching and 22.7% rash on the skin. According to this study, 50.4% of allergic patients took medicine and most of the allergic patients didn't seek medical advice. A maximum of 72.8% of allergic patients also had an addiction to food. Street foods like jhalmuri, fried foods were the general food addicted items covering 34.9%. Ali MR et al. (2020) described that food-addicted participants with food allergies reported significantly more problems with foods, where obesity and heart disease are recognized as clinical effects due to having higher amounts of fat and sugar to these foods.

Ali MR et al. (2020) revealed some important determinants of food allergic and food addiction that will help to increase our knowledge for the greater interest of our health and further research.
Khorshed Alam Mondal et al (2020) conducted a prospective open label observational study at the Department of Dermatology & Venereology in 250 Bedded Mohammed Ali Hospital, Bogura, Bangladesh.

Khorshed Alam Mondal et al (2020) conducted the study to assess food allergy and its associated factors in atopic dermatitis patients. Khorshed Alam Mondal et al (2020) taken total of 112 patients of either sex were included in this study who was suffering from atopic dermatitis.

Khorshed Alam Mondal et al (2020) examined parameters were food allergy (to wheat flour, cow milk, egg, peanuts and soy), bronchial asthma, and allergic rhinitis, duration of atopic dermatitis, family history and onset of atopic dermatitis. The statistical evaluation of the relations among individual parameters monitored was performed; it was evaluated, if there is some relation in patients, who suffer from food allergy to the occurrence of bronchial asthma, allergic rhinitis, to the duration of atopic dermatitis lesions (persistent or occasionally), occurrence of positive family history about atopy and the onset of atopic dermatitis. The diagnosis of food allergy was made according to the results of specific IgE (SIgE), skin prick tests (SPT), atopy patch test (APT) and open exposure tests.

Khorshed Alam Mondal et al (2020) found that the age of all the patients was above 15 years. From 112 patients, 66(58.93%) suffer from bronchial asthma and 83(74.11%) patients suffer from allergic rhinitis. Persistent lesions of atopic dermatitis in one last year were recorded in 69(61.61%) patients, only occasionally lesions were recorded in 43(38.39%) patients. Positive findings about atopy in family history were recorded in 63(56.25%) patients; no data about atopy in family history were recorded in 49(43.75%) patients. Food allergy was altogether confirmed in 39 patients (34.82%). The food allergy was confirmed to milk in 01 patients (0.8%) to wheat flour in 03 patients (2.68%), to peanuts in 24 patients (21.43%), to soy in 4 patients (3.57%) and to egg in 07patients (6.25%). Sensitization was altogether confirmed in 73 patients (65.17%). Sensitization to milk was confirmed in 13 patients (11.61%), to wheat flour in 15 patients (13.39%), to peanuts in 18 patients (16.07%), to soy in 26 patients (23.21%) and to egg in 23 patients (20.54%). The sequence of recorded symptoms of food allergy is: oral allergy syndrome in 24 patients (21.42%), pruritus in 15 patients (13.39%), worsening of atopic dermatitis in 15 patients (13.39%), gastrointestinal problems as abdominal pain and cramps in 06patients (5.35%) and anaphylactic reaction after egg and peanuts in 02 patients (1.78%).

Khorshed Alam Mondal et al (2020) concluded that the prevalence of bronchial asthma and allergic rhinitis is recorded more often in adolescent and adults atopic dermatitis patients who suffer from food allergy; these patients also suffer more often from persistent eczematous lesions and have positive data about atopy in their family history.

Fairoze Masuda Akther and Hamida Khanum (2020) conducted a study at Square Hospitals Limited., Dhaka from November 2019 to July 2020 to investigate the prevalence of allergens of atopic asthma. The study group consisted of 168 asthmatic subjects who suffered from asthma. Skin prick test of 56 listed allergens, serum immunoglobulin E level, and clinical history were assessed to investigate the prevalence.

The survey depicted an 80% positive reaction to Dermatophagoides farinae and a 71% to Dermatophagoides pteronyssinus. For these allergens, a high prevalence was recorded in males (50% and 47.02%) who belonged to the age group of 26 to 45 years (28.57% and 24.40% respectively). Furthermore, the significance of family history of allergy (51.79% and 48.81%) and medication history (41.07% and 39.29%) was found to be substantial for these allergens.

Additionally, 57% of respondents were tested positive for dog epithelia and cockroach allergens, 56% for grain (wheat) dust, 44% to mosquito allergen, 42% for house dust and Aspergillus fumigatus, 36% to chicken feather, 35% for pigeon feather, and 6% to latex. Moreover, 80.36% of respondents had elevated serum immunoglobulin E level concerning their ages and 11.90% did not have serum reports. Interestingly, the respondents who had no family history of allergy were found to be more allergic to fungi allergens. Lastly, 39.1% of respondents were allergic to different kinds of foods like aquatic or seafood, animal products, dairy products, fruits, and vegetables. Among the respondents, 64.9% reported to have a positive family history. Association and correlation of allergens with different risk factors were analyzed and it was concluded that people predominantly suffered from mite allergens followed by animal dander, insect, dust, fungi and pollen, and a minute amount of latex allergens.

Courtney J Pedersen et al (2020) conducted a study Prevalence of atopic dermatitis, asthma and rhinitis from infancy through adulthood in rural Bangladesh. The participants of the study were 7275 individuals who are randomly selected clusters within 156 villages. Courtney J Pedersen et al (2020) found that Children aged 2 years had the highest prevalence of atopic dermatitis 18.8% (95% CI 15.2% to 22.4%) by UK criteria and 14.9% (95% CI 11.6% to 18.1%) by ISAAC and asthma (20.1%, 95% CI 16.4% to 23.8%). Prevalence of rhinitis was highest among 25–29 year olds 6.0%, (95% CI% 4.5 to 7.4%).

Courtney J Pedersen et al (2020) found that the history of a medical diagnosis was lowest for atopic dermatitis (4.0%) and highest for rhinitis (27.3%) and was significantly associated with severe disease compared with those without severe disease for all three conditions (atopic dermatitis: 30.0% vs 11.7%, $p=0.015$; asthma; 85.0% vs 60.4%, $p<0.001$; rhinitis: 34.2% vs 7.3%, $p<0.001$) and having a higher asset-based wealth score for asthma (29.7% (highest quintile) vs 7.5% (lowest quintile), $p<0.001$) and rhinitis (39.8% vs 12.5%, $p=0.003$).

Prevalence of having >1 condition was highest (36.2%) at 2 years and decreased with age. Having atopic dermatitis (ISAAC) was associated with significantly increased odds ratios (OR) for comorbid asthma (OR 5.56 (95% CI 4.26 to 7.26)] and rhinitis (3.68 (95% CI 2.73 to 4.96)). Asthma and rhinitis were also strongly associated with each other (OR 8.39 (95% CI 6.48 to 10.86)).

Courtney J Pedersen et al (2020) concluded that atopic disease burden was high in this rural Bangladeshi population. Having one atopic condition was significantly associated with the presence of another. Low incidence of ever obtaining a medical diagnosis highlights an important opportunity to increase availability of affordable diagnosis and treatment options for all age groups.

In 2020, Ubags stated that the development of food allergy can also enhance the risk of allergic asthma and allergic rhinitis where the mechanisms underlying co-occurrence of allergic diseases were poorly understood.

Anvari S. et al (2019) described that food allergies are defined as adverse immune responses to food proteins that result in typical clinical symptoms involving the dermatologic, respiratory, gastrointestinal, cardiovascular, and/or neurologic systems. IgE-mediated food-allergic disease differs from non-IgE-mediated disease because the pathophysiology results from activation of the immune system, causing a T helper 2 response which results in IgE binding to Fcε receptors on effector cells like mast cells and basophils. The activation of these cells causes release of histamine and other preformed mediators, and rapid symptom onset, in contrast with non-IgE-mediated food allergy which is more delayed in onset.

Anvari S. et al (2019) discussed that the diagnosis of IgE-mediated food allergy requires a history of classic clinical symptoms and evidence of food-specific IgE by either skin-prick or serum-specific IgE testing. Symptoms of IgE-mediated food allergies range from mild to severe. The severity of symptoms is not predicted by the level of specific IgE or skin test wheal size, but the likelihood of symptom onset is directly related. Diagnosis is excluded when a patient can ingest the suspected food without clinical symptoms and may require an in-office oral food challenge if testing for food-specific IgE by serum or skin testing is negative or low.

Anvari S. et al (2019) found that anaphylaxis is the most severe form of the clinical manifestation of IgE-mediated food allergy, and injectable epinephrine is the first-line treatment. Management of food allergies requires strict avoidance measures, counseling of the family about constant vigilance, and prompt treatment of allergic reactions with emergency medications. Guidelines have changed recently to include early introduction of peanuts at 4–6 months of life. Early introduction is recommended to prevent the development of peanut allergy. Future treatments for IgE-mediated food allergy evaluated in clinical trials include epicutaneous, sublingual, and oral immunotherapy.

Anvari S. et al (2019) described that the immune system plays an integral role in the maintenance of tolerance to innocuous antigens. IgE-mediated food allergies occur as a result of a loss of integrity in the key immune components that maintain a state of tolerance and prevent benign food antigens from being recognized as pathogens. More specifically, oral tolerance to foods is defined as the crossing of food antigen across the mucosal barrier, processing by dendritic cells in a non-activated state, and the induction of suppressive cytokines, such as interleukin 10, by those antigen-presenting cells. This in turn results in the differentiation of naïve Tcells into T regulatory cells and suppression of food antigen-specific Th2 cells, as well as increased IgA and IgG4 production and a decrease in IgE by B cells. Finally, there is immune suppression of eosinophils, basophils, and mast cells, effector cells which cause symptoms.

Anvari S. et al (2019) defined sensitization as the state of having detectable food-specific IgE which can be a precursor to the development of clinical food allergy. It occurs when food crosses disrupted barrier and as a result of this disruption, danger signals and inflammatory cytokines are released which activate dendritic cells into phenotypes that are normally acquired during the defense against pathogens. These activated dendritic cells in turn activate naïve Tcells into acquiring a T helper cell 2 (Th2) phenotype,which in turn promote inflammatory signals which induce food Ag-specific B cells to class switch and produce food antigen-specific IgE. In short, sensitization is mistaken identification of food antigen as pathogen. All patients with IgE-mediated food allergies are sensitized to food allergen. This section will discuss five key components of the immune system involved in the development of tolerance and sensitization or allergy to

food: the epithelium, innate immune cells, T cells, B cells, and finally, the effector cells of the allergic response, mast cells, eosinophils, and basophils.

Campo et al. (2019) talked about the presence of a new asthma phenotype and showed that 28% study population suffered from allergic rhinitis and asthma-like symptoms triggered by house dust mites.

Zellweger F and Eggel A. (2016) described IgE-associated allergic diseases belong to the most common inflammatory conditions. Their clinical manifestation ranges from mild symptoms to life-threatening episodes. Often patients experience a reduction in physical and psychologic wellbeing and suffer from a decreased quality of life due to disease activity. The continuously rising number of people that are affected by an allergic condition indicates an urgent need for better diagnostics and more efficient treatment options.

Zellweger F and Eggel A. (2016) found that recent progress in the understanding of pathophysiologic mechanisms underlying IgE-associated allergic disorders has led to the identification of novel therapeutic targets and the development of drug candidates that are currently under evaluation. In this review, we highlight studies and clinical trials, which have helped to gain further insight in the etiology of IgE-associated allergic conditions as well as advances in the development of diagnostic tools and therapeutic approaches recently published in Allergy (European Journal of Allergy and Clinical Immunology).

Zellweger F and Eggel A. (2016) described that the discovery of immunoglobulin E (IgE) in 1967, it has become increasingly evident that this antibody plays an essential role in allergic diseases. Even though IgE is the least abundant antibody in human serum, it has the ability to induce potent inflammatory immune responses in various tissues and organs. The serum levels of total IgE, however, rarely provide information about the amount of allergen-specific IgE, and the presence of specific IgE does not necessarily translate into a clinically meaningful response to the corresponding allergen. Over the last decades, researchers and physicians have learned that the contribution of IgE to the etiology of allergic disorders may considerably vary and that other parameters might be equally important in the pathogenesis.
Olivieri M et al (2016) investigated the association of allergen-specific IgE with asthma in adult patients both report that specific IgE is the most efficient predictor for asthma symptoms.

Del Giacco et al. (2016) also found that fungal allergy played an important role in severe asthma with several contributing factors like smoking, pollution, and work-related exposures.

Vandenplas et al. (2016) also found a strong link between latex allergen and asthma (3 out of 12 recombinant natural rubber antigens).

Ballardini N et al (2015) assessed IgE responses (i.e. sensitization) against food and inhalant allergens in a pediatric population that has been prospectively followed for 16 years reports that 51% of children have been tested positive for allergen-specific IgE at least once during this period.However, 23% ofsensitized children did not experience allergic asthma. Nevertheless, the authors state that specific IgE is strongly associated with the development of asthma from an age of 4 years. Additionally, the sensitized group of children that did not develop asthma was characterized by less parental allergy occurrence, suggesting that genetic factors play an important role in disease manifestation.

Kanchongkittiphon et al. (2015) revealed a systematic review of 69 studies that focused on modifiable indoor exposures and foundevidence for a causal relationship between asthma morbidity and exposure to indoor dampness and mold, rodents, dust mites, cockroaches, and pet dander as well as with tobacco smoke and other pollutants.

Burney PGJ et al (2013) examined different regions of Europe has found that the overall prevalence of IgE sensitization to food allergens lies in the range of 7–24%. Generally, animal derived foods, such as milk, egg, and fish, showed weaker sensitization responses than plant-derived allergens. Interestingly, the authors described that IgE sensitization to food extracts correlated well with IgE sensitization to pollen allergens. This is explained by the observation that IgE againstplant-based food allergens may cross-react with certain pollen-derived allergens. Local or systemic responses to cross reactive airborne allergens might therefore be initiated upon first-time ingestion of a particular food. Along these lines, new cross-reactive food allergies are expected to emerge due to the increasing prevalence of pollen allergies.

Boyce JA et al (2011) grouped food allergies in two general categories: IgE-mediated and non-IgE-mediated. IgE-mediated reactions are typically of rapid onset with clinical symptoms usually developing within minutes to a few hours of ingestion. Non- IgE-mediated disease is typically chronic and may be more difficult than IgE-mediated disease to control with food avoidance alone. IgE-mediated food-allergic disease is associated with fatal anaphylaxis, especially with peanut, tree nuts, and seafood. The potential for this devastating outcome and the widespread media coverage of this epidemic has resulted in increased awareness of food allergies and fear for those affected. More people believe they have food allergies than prevalence estimates show based on physician diagnosis.

Wang J, Liu AH (2011) and Krogulska et al. (2015) reported that children with asthma and concomitant food allergy had severe diseases, poorer control, greater morbidity, and required more anti-asthmatic medications.

Later, Frith et al. (2011) and Just et al. (2012) presented a clear quantitative relationship between the level of serum Ig-E and the size of SPT responses for asthma severity, both in adults and children. Consequently, after an extensive review, SPT and serum Ig-E levels were chosen as the investigative/analysis tools. It is worthwhile to note that the severity of asthma using the serum Ig-E level and SPT could not be achieved due to limitation in time and funding issues.

Baxi et al. (2010) found the relationship between different type of allergens (outdoor, indoor, and food), and the development and severity.
M. Alamgir Chowdhury et al (2008) conducted a study to review allergic rhinitis, asthma and atopic diseases in Bangladesh. M. Alamgir Chowdhury et al (2008) described that there are many indoor, outdoor, occupational and food allergens that trigger allergy. More over many pollutants, allergens are still unidentified in the poor and developing countries due to fund constrains for research activities. In addition to multiple known and unknown allergens, over population, un-hygienic living, poverty, lack of education and awareness, negligence to take treatment leads to increasing incidence of these diseases.

M. Alamgir Chowdhury et al (2008) found that diagnostic facilities are yet depending on history and clinical examination for majority of our patients. Skin prick tests and IgE estimation are not available outside capital Dhaka as well as these are expensive too. Majority of our population can't afford them. Asthma and allergies are affecting the quality of life that has impact on national economy and development a lot. Treatment modalities and drugs available with the costs in our country are discussed. More evidence based studies and dissemination of ARIA, WHO and other guidelines to health professionals will be needed to improve the situation.

Murray et al. (2007) showed a strong interaction of inhalant allergens and respiratory virus infection with serum Ig-E level in increasing the risk of severe asthma exacerbations requiring hospital admission.

Weiland et al. (2004) found the etiology like allergy and climate change as the suspected element of the asthma attacks.

D.G. Ebo & W.J. Stevens (2001) described that adverse reactions to food, i.e. food allergy and intolerance have gained considerable attention. This overview focuses on the diagnosis and management of IgE mediated food allergy that is believed to be responsible for most immediate-type food-induced hypersensitivity reactions. Clinically, these reactions are characterized by a variety of signs and symptoms that occur within minutes or hours after consumption of the offending food.

D.G. Ebo & W.J. Stevens (2001) discussed that reactions may be limited or more generalised with involvement of the skin, nose, eyes, and/or lungs. In more severe cases, cardiovascular symptoms including hypotension, shock, cardiac dysrhythmias and death can occur. In food-allergic individuals, IgE is produced against naturally occurring food components, primarily glycoproteins that usually retain their allergenicity after heating and/or proteolysis. While adults tend to be allergic to fish, crustaceans, peanuts and tree nuts, children tend to be allergic to cow's milk, egg white, wheat and soy more frequently. "Emerging" food allergens include tropical fruits, sesame seeds, psyllium, spices and condiments. These allergies frequently represent a cross-allergy to an allergen derived from another source, e.g. pollens or natural rubber latex.

D.G. Ebo & W.J. Stevens (2001) found that the evaluation of IgE-mediated food allergy relies on a careful history, physical examination, appropriate skin testing or in vitro testing with food extracts, and/or double blind, placebo controlled food challenges. Avoidance remains the mainstay of therapy. However, allergens may be "hidden" and labelling can be non-precise or misleading, thereby severely hampering prevention.

D.G. Ebo & W.J. Stevens (2001) identified that patients with severe allergies should keep at hand an emergency kit with adrenaline, an antihistamine and an injectable rapid onset- of-action corticosteroid. At present there is no evidence to support the use of immunotherapy, except for research purposes. Production of "hypoallergenic" food is hampered by incomplete methods for assessing the allergenic potential of such novel foods.

D.G. Ebo & W.J. Stevens (2001) described that in vitro diagnostic tests (e.g. RAST and ELISA) also may be applied to evaluate suspected IgE-mediated food allergy. Overall, these tests are considered less sensitive and specific than SPT. For example, more than 60% of grass-allergic patients express IgE serological but not clinical sensitivity to cereals and the same may be true for peanut.

Sicherer SH et al (2000) found that the presence of IgE to linear epitopes of ovomucoid predicts persistence to cow's milk a-casein. Allergies to fish, crustaceans, peanut and tree nuts do not remit (7, 15) and seem to be due to specific IgE antibodies that predominantly recognize linear epitopes.

Thaminy et al. (2000) and Krogulska et al. (2016) found food allergy, regardless of the accompanying asthma, had an association with increased nonspecific bronchial hyper responsiveness.

Mowat AM and Weiner HL (1999) found that exposure to food allergen generally occurs via the gut where non-immunologic and immunologic mechanisms prevent intact food antigen to enter the body. However, some food antigens remain immunologically active, pass through the epithelium and enter the circulation. Generally, these antigens do not elicit reactions because highly efficient mechanisms exist for suppression of immune responses to food allergens. Recent developments have provided significant insights into the underlying cellular and molecular events of these so-called oral tolerance.Th3 cells that are generated in the mucosal associated lymphoid tissue and that are educated by the gut flora play a pivotal role in the induction of oral tolerance. Upon stimulation with antigen, by production of transforming growth factor-b, Th3 cells inhibit the activation of neighbouring Th1 as well as Th2 cells irrespective their antigen-specificity (bystander suppression). Failure(s) in this oral tolerance mechanism is (are) believed to lead to a variety of food-induced hypersensitivity reactions.

Mowat AM and Weiner HL(1999) identified that the development of an IgE-mediated response to food allergen results from a cascade of cellular and molecular interactions involving antigen presenting cells (APCs), T lymphocytes, and B lymphocytes. APCs, after intracellular proteolysis of food allergen, present short peptides in conjunction with MHC class II molecules to T lymphocytes bearing the appropriate complementary T cell receptor. As a consequence the T lymphocyte is activated and generates different cytokines that will promote an IgE response. Both activated T lymphocytes and their products interact with B lymphocytes leading to isotype switching and synthesis of allergen-specific IgE antibodies. These IgE antibodies bind high-affinity FceRI receptors on mast cells and basophils, which, on repeated encounter of specific allergen, secrete and generate bioactive mediators (e.g. histamine, leukotrienes, etc) that facilitate the development of the IgE-mediated reactions.

Pearce et al. (1999) also observed the development of asthma in conjunction with allergens' exposure. In this study, the severity of asthma could not be observed due to time limitations. Only the prevalence of different allergensof asthmatic respondents was observed. Significant findings related to asthma and allergens were unmasked through this study.

Blanco et al. (1998) illuminated that cornstarch powder acted as an aeroallergen and is responsible for asthma exacerbation.

Sampson HA and Ho DG (1997) conducted a retrospective study including serum samples from 196 children and adolescents with atopic dermatitis and confirmed IgE-mediated food allergy. Sampson and Ho

DG (1997) have undertaken an attempt to identify distinct levels of food-specific IgE that would be highly predictive of food allergy. Compared with DBPCFCs, both the CAP System FEIA and SPTs for different food allergens provided excellent sensitivity and negative predictive accuracy, but poor specificity andpositive predictive accuracy. Allergen-specific IgE levels of 6 kU/L for egg, 32 kU/L for milk, 15 kU/L for peanut and 20 kU/L for fish, were determined to be predictive of clinical reactivity with greater than 95% certainty and were called "decision points".

Cooke SK and Sampson HA (1997) suggest that the presence of IgE to linear epitopes of ovomucoid predicts persistence to egg allergy in adult childhood, whereas IgE to conformational epitopes is associated with resolution in the usual time scale in infancy and their pre-school years.
Sears et al. (1996) showed tobacco smoke, parental atopy, exposure to allergens, and season of birth as the factors of asthma. He found that those who were born during autumn and winter seasons were most susceptible to asthma or allergic disease.

Ortolani C et al (1995) found that non-immunological reactions may result from an enzyme deficiency (e.g. lactase deficiency), a pharmacological effect (e.g. tyramine in cheese), or, as in a majority of cases, idiopathic. Food allergy is generally subdivided into IgE-mediated and non-IgE mediated disorders. In a recent position paper, the EAACI Adverse Reactions to Food Subcommittee deals with illnesses that are attributed to food allergy/intolerance and the diagnostic procedures and therapeutic practices whose validity remains controversial.

Barbee et al. (1976) and Vohlonen et al. (1989) also found SPT as an important tool for epidemiological studies to identify atopic subjects.

Pepys and Hutchcroft (1975) investigated and showed that SPT is an important method in observing an immediate allergic reaction in response to allergens, also known as Type-I hypersensitivity.

Exposure to fungal allergens is universal and can be associated with asthma in a variety of ways. It was Schwartz (1978) who first confirmed an association between asthma severities with fungal sensitization. Denning et al. (2014) showed poor control of asthma such as complications like bronchiectasis and chronic allergic bronchopulmonary aspergillosis (ABPA) with fungal allergy.

Atopic dermatitis was associated with increased odds of concurrently having asthma or rhinitis, and asthma was associated with rhinitis. Thus, comorbid development of these atopic diseases clearly occurs in this population. However, the proportion of those affected with any one condition decreased with age and those with two or more conditions did not substantially increase.

Research among a Ugandan birth cohort found that atopic sensitization increased to the level of HICs with age, but the prevalence of atopic disease did not increase as expected based on data from HICs leading the authors to conclude that the atopic march did not occur in this population.

The most recent estimate of atopic dermatitis in Bangladesh was reported in 2005 among 6–7 and 13–14 years age groups to be 6.0% and 7.1%, respectively, and 6.5% overall. This falls within both the UK criteria and ISAAC measures for our 10–14 years age group but is higher than our estimates for the 6–9 years age group. The overall estimate is also within our sample's estimated prevalence when the two groups are combined.

More recently asthma prevalence has been reported as high as 20.2% and 6.8% in 4.5 and 10 years old, respectively. These are higher than the estimates reported here; however, an asthma prevalence of 8.7% in 5 years from the same surveillance site was also reported, similar to the prevalence we report here. These differences in prevalence could be due to environmental variation between the research sites within the country.

Wide variations were seen between Indian centers from the ISAAC Phase 3 study which reported prevalence ranging from 4.6% to 45.7% for rhinitis and 0.9% to 9.2% for eczema among 13–14 years. While we followed the ISAAC Phase 3 Manual instructions for translation closely, there is also the

possibility that differences in translation resulted in different understandings of the questions for our study sample compared with other samples within the country or region.

The prevalence provided by the UK criteria was higher than the ISAAC prevalence for 1–5 years. The ISAAC questionnaires are typically deployed in populations 6–7 and 13–14 years old but they have been used in children as young as 2 years in modified versions.
The deviation in the 1–4 years age groups, with higher prevalence measured by the UK criteria than ISAAC, was likely due to the use of the 'questions only' format of the UK criteria, which uses one major criterion plus two or more minor criteria and eliminates the photographical protocol. This format showed increased sensitivity and decreased specificity in a paediatric population under 11 years of age. The original authors of the UK critieria also suggested that in communities with lower prevalence of atopic dermatitis, this modified version may exhibit a reduced specificity due to increased prevalence of pruritus of other aetiologies.

Of concern, there was a paucity of official medical diagnoses among participants who were positive by the study's various criteria. There are several potential reasons for this, including limited care-seeking, and limitations in reaching a medical diagnosis. Rhinitis was most likely to be diagnosed, possibly due to it being a condition experienced later in life and frequently for more years than asthma and atopic dermatitis. Asthma was more commonly medically diagnosed than atopic dermatitis, likely due in part to a higher proportion of severe disease.

REFERENCES

Alderson, M. (1987). Trends in morbidity and mortality from asthma. Population Treads, 49, 18-23.

Ali, M. R, Ashraf Hossain Talukder, Md. Tarek Molla, Nur-E-Alam, Md. Omar Faruque, A. K. M. Mohiuddin, Shahin Mahmud, Prevalence, severity and risk factors of food allergy and food addiction among the people of Tangail district, Bangladesh, *International Journal of Community Medicine and Public Health 2020 Oct;7(10)*:3810-3817.

Anandan, C., Nurmatov, U., van Schayck, O. C. P., Sheikh, A. (2010). Is the prevalence of asthma Declining? Systematicreview of epidemiological studies. *European Journal of Allergy and Clinical immunology, 65(2),* 152-167.

Anuradha, A., Lakshimi Kalpana, V., &Narasingaro, S. (2011). Epidemiology study on bronchial asthma. *Indian Journal Allergy Asthma Immunol, 3(12),* 434-436.

Anvari S, Jennifer Miller, Chih-Yin Yeh and Carla M. Davis, IgE-Mediated Food Allergy, Clinical Reviews in Allergy & Immunology (2019) 57:244–260.

Asher, I., & Pearce, N. (2014). Global burden of asthma among children. *The International Journal of Tuberculosis and Lung Disease, 18(11),* 1269-1278.

Ballardini N, Bergstr€om A, Wahlgren C-F, van Hage M, Hallner E, Kull I et al. IgE antibodies in relation to prevalence and multimorbidity of eczema, asthma, and rhinitis from birth to adolescence. Allergy 2015;71: 342–349.

Bantz, S. K., Zhu, Z., & Zheng, T. (2014). The atopic march: progression from atopic dermatitis to allergic rhinitis and asthma. *Journal of Clinical and Cellular Immunology, 5(2),* 202.

Boyce JA, Assa'ad A, Burks AW, Jones SM, Sampson HA, Wood RA, PlautM, Cooper SF, Fenton MJ, Arshad SH, Bahna SL, Beck LA, Byrd-Bredbenner C, Camargo CA Jr, Eichenfield L, Furuta GT, Hanifin JM, Jones C, Kraft M, Levy BD, Lieberman P, Luccioli S, KM MC, Schneider LC, Simon RA, Simons FE, Teach SJ, Yawn BP, Schwaninger JM (2011) Guidelines for the diagnosis and management of food allergy in the United States: summary of the NIAID-sponsored expert panel report. J Allergy Clin Immunol 126:1105–1118.

Burbank, A. J., Sood, A. K., Kesic, M. J., Peden, D. B., & Hernandez, M. L. (2017). Environmental determinants of allergy and asthma in early life. *Journal of Allergy and Clinical Immunology, 140(1),* 1-12.
Burney PGJ, Potts J, Kummeling I, Mills ENC, Clausen M, Dubakiene R et al. The prevalence and distribution of food sensitization in European adults. Allergy 2013;69:365–371.

Cooke SK, Sampson HA. Allergenic properties of ovomucoid in man. *J Allergology Clin Immunol* 1997;159 :2026-32.

D.G. Ebo & W.J. Stevens (2001) IgE-Mediated Food Allergy – Extensive Review of the Literature, Acta Clinica Belgica, 56:4, 234-247.

Dierick, B. J., van der Molen, T., Flokstra-de Blok, B. M., Muraro, A., Postma, M. J., Kocks, J. W., & van Boven, J. F. (2020). Burden and socioeconomics of asthma, allergic rhinitis, atopic dermatitis and food allergy. *Expert Review of Pharmacoeco-nomics and Outcomes Research, 20(5),* 437-453.

Fairoze Masuda Akther1 and Hamida Khanum Prevalence of allergens of atopic asthma at Square Hospitals Limited, Dhaka, Bangladesh, *Journal of Public Health and Diseases Volume 3(6),* pages 119-128, December 2020.

Kader, R., Kennedy, K., & Portnoy, J. M. (2018). Indoor environmental interventions and their effect on asthma outcomes. *Current Allergy and Asthma Reports, 18, Article Number17.*

Khorshed Alam Mondal1,, Md. Shafiqul Islam, Md. Rashedul Kabir, An Assessment of Food Allergy and Its Associated Factors in Atopic Dermatitis Patients: A Study in a Tertiary Care Hospital, Bogura, Bangladesh, *American Journal of Dermatology and Venereology 2020, 9(2)*: 27-31.

M. Alamgir Chowdhury, ARM Lutful Kabir, Md. Monjurul Alam , Allergic rhinitis, asthma and atopic diseases: Bangladesh perspective, *Bangladesh J of Otorhinolaryngology 2008; 14(2)* : 66-70.

Mowat AM, Weiner HL. Oral tolerance. Physiological basis and clinical applications. In : Orga, et al. Mucosal Immunol Acad Press Ed; 1999. p. 587-618.

Murrison, L. B., Brandt, E. B., Myers, J. B., & Hershey, G. K. K. (2019). Environmental exposures and mechanisms in allergy and asthma development. *The Journal of Clinical Investigation, 129(4),* 1504-1515.

Olivieri M, Heinrich J, Schl€unssen V, Anto JM, Forsberg B, Janson C et al. The risk of respiratory symptoms on allergen exposure increases with increasing specific IgE levels. Allergy 2016;71:859–868.

Ortolani C, Bruijnzeel-Koomen C, Bengtsson U, et al. Controversial aspects of adverse reactions to food. *Allergy* 1999;54 :27-45.

Pedersen CJ, Uddin MJ, Saha SK, Darmstadt GL. Prevalence of atopic dermatitis, asthma and rhinitis from infancy through adulthood in rural Bangladesh: a population-based, cross-sectional survey. BMJ Open. 2020 Nov 4;10(11)::e042380.

Rai, S. P., Patil, A. P., Vardhan, V., Marwah, V., Pethe, M., & Pandey, I. M. (2007). Best treatment guidelines for bronchial asthma. *Medical Journal Armed Forces India, 63(3),* 264-268.

Rasul FB, Kalmus O, Sarker M, Adib HI, Hossain MS, Hasan MZ, Brenner S, Nazneen S, Islam MN, De Allegri M. Determinants of health seeking behavior for chronic non-communicable diseases and related out-of-pocket expenditure: results from a cross-sectional survey in northern Bangladesh. J Health Popul Nutr. 2019 Dec 23; 38(1):48. doi: 10.1186/s41043-019-0195-z. PMID: 31870436; PMCID: PMC6929492.

Sampson HA, Ho DG. Relationship between food-specific IgE concentrations and the risk of positive food challenges in children and adolescents. *J Allergy Clin Immunol* 1997;100 :444-51.

Schoos, A. M. M., Chawes, B. L., Rasmussen, M. A., Bloch, J., Bønnelykke, K., & Bisgaard, H. (2016). Atopic endotype in childhood. *Journal of Allergy and Clinical Immunology, 137(3)*, 844-851.

Sicherer SH, Sampson HA, Burks AW. Peanut and soy allergy: a clinical and therapeutic dilemma. *Allergy* 2000;55 :515-21.

Spergel, J. M. (2005). Atopic march: link to upper airways. *Current opinion in allergy and clinical immunology, 5(1)*, 17-21.

Van der Hulst, A. E., Klip, H., & Brand, P. L. (2007). Risk of developing asthma in young children with atopic eczema: a systematic review. *Journal of Allergy and Clinical Immunology, 120(3)*, 565-569.

Wang J, Liu AH. Food allergies and asthma. Curr Opin Allergy Clin Immunol. 2011 Jun;11(3):249-54. doi: 10.1097/ACI.0b013e3283464c8e. PMID: 21467928; PMCID: PMC3155248.

Zellweger F, Eggel A. IgE-associated allergic disorders: recent advances in etiology, diagnosis, and treatment. Allergy 2016; 71: 1652–1661.