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Full Length Research

Prevalence of allergens of atopic asthma at Square Hospitals Limited, Dhaka, Bangladesh

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ABSTRACT: Asthma is one of the major substantial public health problems, caused by both the genetic and the environmental factors (allergens and air pollution). Here, the prevalence of allergens of atopic asthma was investigated and carried out at Square Hospitals Limited., Dhaka from November 2019 to July 2020. 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.

Keywords: Allergens, atopic asthma, allergy, family history, skin prick test, serum immunoglobulin E level, risk factors.

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 years 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 et al., 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 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 et al., 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 (van der 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).

Justification

If the allergens of atopic asthma are successfully identified, then primary preventive measures can easily be taken which in turn can decrease the morbidity of the population of Bangladesh. In the present study, the prevalence of common allergens will be considered which can ease the process to identify the causes as well as help to recommend primary prevention techniques.

MATERIALS AND METHODS

A structured questionnaire was developed by the researchers to collect data. The study was conducted from November 2019 to July 2020. A total of 168 asthmatic respondents were interviewed randomly during that timeframe who had come to the Respiratory Medicine Department of Square Hospital Limited, Dhaka, particularly for clinical evaluation for their allergic discomforts. The study examined their clinical history, skin prick test (SPT) results including the serum immunoglobulin-E level reports. Fifty-six (56) different allergens were tested by SPT for all the respondents despite the severity of asthma. Needless to say, this was a cross-sectional descriptive study. Questionnaires were primarily closed-ended with a few open-ended ones. The specific objective was measured using appropriate statistical tests. Chi-square test was utilized for the different variables (Univariate, Bi-variate, and Multi-variate) and to check the associations of allergens with various risk factors of the respondents. IBM SPSS version 26 computer tool was used in the analysis. The statistical inference was made and the association related variable was expressed in the form of cross tables. The questionnaire was also used to find out the knowledge of allergens of atopic asthma among the interviewed respondents.

RESULTS

Demographic factors

During this study, 56 different types of allergens and serum Ig-E levels of the respondents with clinical history were recorded to explore the prevalence of atopic asthma. The study revealed that most of the respondents who suffered from asthma triggered by various allergens were male, belonged to the age group of 11-25 years, was born predominantly in autumn, and hailed from the residential area of the city (Table 1).

Knowledge of known allergens and family history of allergy

About 78% of respondents were unaware of any allergens that aggravated atopic asthma attacks or had not noticed any symptoms that worsened their health condition. Only 22% were knowledgeable about allergens that aggravated their symptoms of asthma. Moreover, 64.9% of respondents claimed to have a positive family history of allergic disease where another 35.1% did not have any knowledge.

Symptoms and medication history

During the study period, the presentation of asthma had been seen to find out the cause that intended the respondents to seek medical attention. Several questions were asked to classify the symptoms. Different types of

Table 1. Descriptive characteristics of the studied population, (N= 168.

Characteristics	Percentage of population
Gender	
Male	59.5% (100)
Female	40.5% (68)
Age	
<10yrs	19.6% (33)
11-25yrs	35.1% (59)
26-45yrs	33.9% (57)
46-65yrs	11.3% (19)
Season of birth	
Spring (February-April)	19.6% (33)
Summer (May-July)	20.2% (34)
Autumn (August-November)	36.9% (62)
Winter (December-January)	23.2% (39)
Living area	
Rural	11.9% (20)
Commercial	26.2% (44)
Residential	61.9% (104)
Educational status	
No formal qualification	39.9% (67)
Secondary education	26.2% (44)
Tertiary education	33.9% (57)
Profession	
Student	57.7% (97)
Working	29.8% (50)
Non-working	12.5% (21)

symptoms such as skin problems, respiratory illness e.g. cough, respiratory distress, or nose/eye or throat irritations were recorded. The results indicated that 40.5% came with cough, wheeze, chest tightness, throat spells, or shortness of breath; 27.4% with persistent nasal obstruction, runny nose, postnasal drip, decreased sense of smell, itching eye, nose, or throat (allergic rhinitis); whereas 10.7% with itchy or dry skin or skin rash (atopic dermatitis). Moreover, 21.4% had a cough as well as nasal obstruction or skin problems, 3.6% had itchy skin, eye or nose and nasal obstruction, 15.5% with cough, shortness of breath and nasal obstruction, 2.4% complained of itchy skin, cough and shortness of breath. Hence, 53.57% of respondents used different types of medication such as cough syrup, anti-histamine drug, local cream etc. for fast relief from their symptoms before paying a hospital visit.

Allergens of atopic asthma

In this study, two crucial tests, namely skin prick test (SPT) and serum Immunoglobulin-E level (Serum Ig-E) were employed to identify the allergens of atopic asthma. Serum Ig-E levels were seen to be elevated from the normal level related to the age groups which served as an indicator of the presence of immune reaction against the allergens (Table 2). It seemed that 80.36% (135) showed an elevated level of serum Ig-E level compared to their age limits, 7.73% (13) did not show any allergic reactions against the allergens that were being tested, 11.90% (20) lacked serum Ig-E reports.

Table 2. Serum immunoglobulin-E level according to age group.

Serum Immunoglobulin-E level (total)	Reference value (IU/mL)
<1 year	1.5
1-5 years	<60
6-9 years	<90
10- 15 years	<200
Adults	<100

Table 3. Allergens distribution among the population, (N= 168).

Type of allergen	N (%)
Mites	10.5%
Fungi	14.6%
Pollen	7.3%
Dust	12%
Epithelia	9%
Insects	7%
Foods	39.1%
Miscellaneous	0.5%

Prevalence of allergens of atopic asthma

The survey unveiled that the study population was mostly allergic to the food allergens. A total of 31 different types of food allergens were tested to pinpoint the exact allergens that aggravated asthma exacerbation of the study population. These allergens were categorized into eight major groups (Table 3) and two subgroups: the animal origin and plant origin. The study illustrated that 14.8% were allergic to aquatic foods, 15.2% to animal products, 3.9% to manufactured dairy products, 28.6% to fruits, 23.1% to vegetables, and 14.4% to other plant origin allergens. On the other hand, mite allergens contributed to 10.5% of allergic reactions where *D. farinae* and *D. pteronyssinus* accounted for 79.2% and 71.4%, respectively (Table 4).

Association between the risk factor and different allergens

Respondents who participated in this study were either

Table 4. Allergen distribution among the population, (N= 168).

List of allergens	N (%)
Mites	**10.5%**
Dermatophagoidesfarinae	79.2% (133)
Dermatophagoidespteronyssinus	71.4% (120)
Fungi	**14.6%**
Aspergillus fumigatus	41.7% (70)
Aspergillus niger	34.5% (58)
Aspergillus flavus	34.5% (58)
Aspergillus tamari	21.4% (36)
Aspergillus versicolor	23.2% (39)
Penicilliumsp	28% (47)
Candida albicans	23.8% (40)
Pollen	**7.3%**
Cynodondactylon	22.6% (38)
Amaranthusspinosus	29.8% (50)
Argemonemexicana	15.5% (26)
Brassica nigra	16.7% (28)
Eucalyptus sp.	19% (32)
Dusts	12%
Cotton dust	16.7% (28)
Saw dust	23.8%(40)
Hay dust	30.4% (51)
House dust	42.3% (71)
Grain dust (wheat)	55.4% (93)
Epithelia	**9%**
Dog epithelia	56.5% (95)
Chicken feather	35.7 (60)
Pigeon's feather	35.1% (59)
Insects	**7%**
Cockroach	56.6% (95)
Mosquito	44% (74)
Foods	**39.1%**
Aquatic foods	
Prawn	26.8% (45)
Crab	28.6% (48)
Lobster	28.6% (48)
Hilsha	25% (42)
Animal products	
Egg yolk	16.1% (27)
Egg white	12.5% (21)
Mutton	16.7% (28)
Chicken	16.7% (28)
Beef	11.3% (19)
Dairy products (manufactured)	
Milk	11.3% (19)
Cheese	12.5% (21)
Fruits	
Grape	11.3% (19)
Mango	16.1% (27)
Coconut	19% (32)
Guava	16.1% (27)
Banana	11.3% (19)
Lemon	12.5% (21)
Pineapple	20.2% (34)
Apple	23.8% (40)
Strawberry	17.9% (30)
Vegetables	
Cabbage	11.9% (20)
Lady's finger	17.3% (29)
Tomato	20.8% (35)
Brinjal	13.1% (22)
Pumpkin	14.3% (24)
Others food from plant origin	
Soya bean	19.6% (33)
Corn	22% (37)
Wheat	21.4% (36)
Peanut	20.8% (35)
Masoor dal	23.8% (40)
Barley	17.3% (29)
Miscellaneous	**0.5%**
Latex	6.5% (11)

newly diagnosed or have known to be asthmatic for a long time. The relation between several risk factors and allergens were investigated to analyze the result of this study. Significant changes were found through the course of this study.

Gender and mite allergens

Around 10.5% of the population suffered from mite allergens (*D. farinae* and *D. pteronyssinus)* where 79.2% (133) of respondents were skin prick test positive for *D. farinae* and among them, a higher percentage were males (63.17%). Similarly, 71.4 % (120) of the respondents were SPT positive for *D. pteronyssinus* where male to female ratio was 65.8% (79) to 34.2% (41). At the completion of the study, it was established that males were more vulnerable to mite allergen, a key allergen of atopic asthma, and the association was found significant ($p<0.000$) (Tables 5 and 6).

Table 5. Association across genders for *D. farinae* and *D. pteronyssinus*

Parameters	Gender	*D. farinae*	*D. pteronyssinus*
Chi-Square	6.095[a]	57.167[a]	30.857[a]
df	1	1	1
Asymp. Sig.	0.014	0.000	0.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 84.0.

Table 6. Correlation with respect to gender for *D. farinae* and *D. pteronyssinus.*

Parameters		Gender	*D. farinae*	*D. pteronyssinus*
Gender	Pearson Correlation	1	0.144	0.203**
	Sig. (2-tailed)		0.062	0.008
	N	168	168	168
D. farinae	Pearson Correlation	0.144	1	0.389**
	Sig. (2-tailed)	0.062		0.000
	N	168	168	168
D. pteronyssinus	Pearson Correlation	0.203**	0.389**	1
	Sig. (2-tailed)	0.008	0.000	
	N	168	168	168

**Correlation is significant at the 0.01 level (2-tailed).

Table 7. Food allergens prevalence with age.

Food allergens (n= 31)	Prevalence with increasing age
Aquatic sea food	
Prawn, Crab	Increased
Lobster, Hilsha	Decreased
Animal products	
Beef, Egg white	Increased
Egg yolk, Mutton, Chicken	Decreased
Dairy products	
Cheese	Increased
Milk	Decreased
Fruits	
Pineapple	Increased
Grape, Mango, Coconut, Guava, Banana, Lemon, Apple, strawberry	Decreased
Vegetables	
Cabbage, Lady's finger	Increased
Tomato, Brinjal, Pumpkin	Decreased
Others food from plant origin	
Soya bean, Masoor dal	Increased
Corn, Wheat, Peanut, Barley	Decreased

Age group and food allergens

It was crucial to investigate the relationship between age and allergen attacks. However, in this study, the contribution of food allergens in the exacerbation of atopic asthma was found to be significant. It was found that the impact of allergens had different results with increasing ages (Table 7). In this study, aquatic foods like prawns, crab, lobster, and hilsha totaled for around 27% of the allergic reactions of the population. As these allergens contributed the most to the asthma attacks, the association between these allergens and age group is tabulated on the Table 8.

Family history and fungi allergens

The study suggests that most of the respondents who were diagnosed with atopic asthma had a positive genetic background for allergic diseases. Here, 64.88% (109) expressed to have a positive family history for allergic diseases. As fungi allergens contributed 14.6% to an asthma attack, the association between these allergens and family history was overviewed and the study disclosed that respondents who gave no history of allergic diseases were more allergic to fungi allergens (Tables 9 and 10).

Season of birth and allergen

Here in this study, it seemed that respondents who were born in the autumn season were more allergic to diverse

Table 8. Association between age group and aquatic food allergens.

Parameters	Age	Prawn	Crab	Lobster	Hilsha
Chi-Square	26.762[a]	36.214[b]	30.857[b]	30.857[b]	42.000[b]
df	3	1	1	1	1
Asymp. Sig.	0.000	0.000	0.000	0.000	0.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 42.0.
b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 84.0.

Table 9. Fungi allergens prevalence with genetic history.

Fungi allergens (14.6%)	Skin prick test (SPT) and family history (FH)			
	SPT (+) & FH (+)	SPT (+) & FH (-)	SPT (-) & FH (+)	SPT (-) & FH (-)
Aspergillus fumigatus (41.7%)	27.38% (46)	14.29% (24)	37.50% (63)	20.83% (35)
Aspergillus niger (34.5%)	19.05% (32)	15.48% (26)	45.83% (77)	19.64% (33)
Aspergillus flavus (34.5%)	19.05% (32)	15.48% (26)	45.83% (77)	19.64% (33)
Aspergillus tamari (21.4%)	13.69% (23)	7.74% (13)	51.19% (86)	27.38% (46)
Aspergillus versicolor (23.2%)	14.29% (24)	8.93% (15)	50.60% (85)	26.19% (44)
Penicilliumsp (28%)	16.67% (28)	11.31% (19)	48.21% (81)	23.81% (40)
Candida albicans (23.8%)	14.88% (25)	8.93% (15)	50% (84)	26.19% (44)

Table 10. Association among fungi allergens and genetic history.

Parameters	Family history of asthma of the respondent	SPT positive for *Aspergillus fumigatus*	SPT positive for *Aspergillus niger*	SPT positive for *Aspergillus flavus*	SPT positive for *Aspergillus tamari*	SPT positive for *Penicillius sp.*	SPT positive for *Candida albicans*
Chi-Square	14.881[a]	4.667[a]	16.095[a]	16.095[a]	54.857[a]	32.595[a]	46.095[a]
df	1	1	1	1	1	1	1
Asymp. Sig.	0.000	0.031	0.000	0.000	0.000	0.000	0.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 84.0.

types of allergens. Among the 56 allergens, mite allergens were largely responsible for those respondents who were born in the autumn season (Figures 1, 2 and 3). Among the five dust allergens (cotton dust, saw dust, hay dust, house dust, and grain dust), only grain dust had a positive relationship with the autumn season. The rest of the allergens portrayed no relation with the season of birth.

DISCUSSION

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. Barbee et al. (1976) and Vohlonen et al. (1989) also found SPT as an important tool for epidemiological studies to identify atopic subjects. Also, 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. 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. In this study, the results of serum Ig-E level of the respondents were quite high (80.36%) concerning their age. Yet, 7.73% of the asthmatics had normal serum Ig-E level. 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.

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. Similarly, the researchers of this study also experienced the same trend of people born in autumn and winter being relatively more asthmatic.

Baxi et al. (2010) found the relationship between different type of allergens (outdoor, indoor, and food), and the development and severity. Again, Kanchongkittiphon et al. (2015) revealed a systematic review of 69 studies that focused on modifiable indoor exposures and found

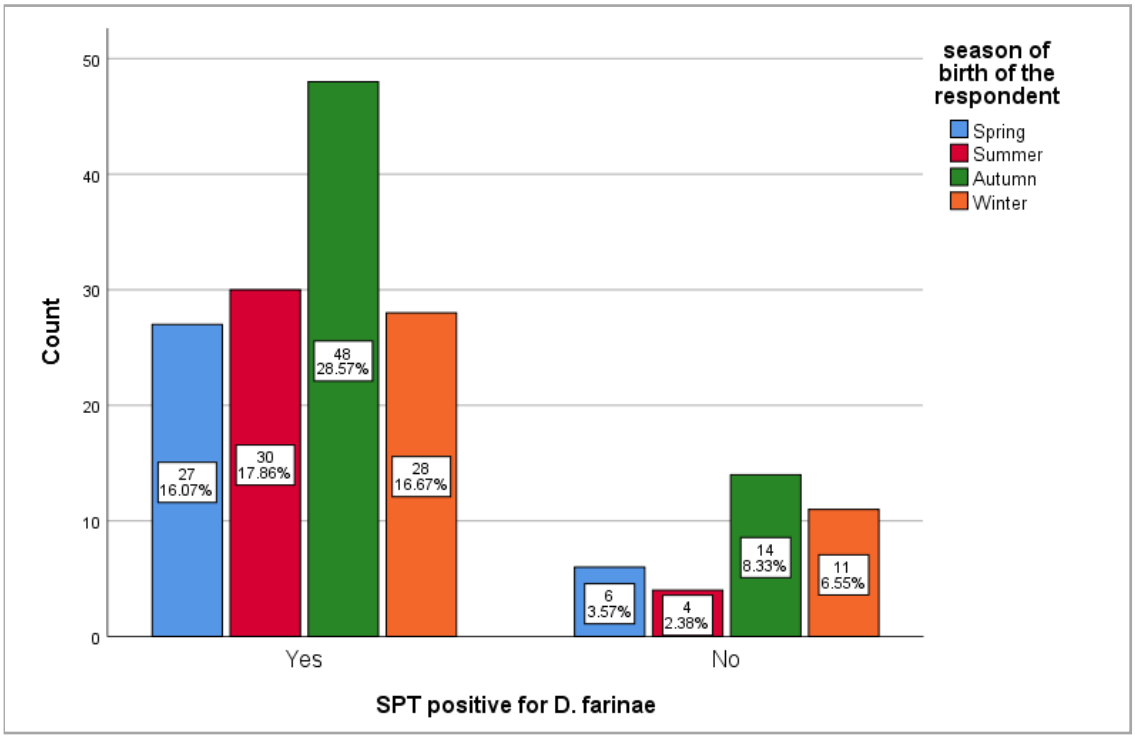

Figure 1. *Dermatophaoides farinae* prevalence with season of birth.

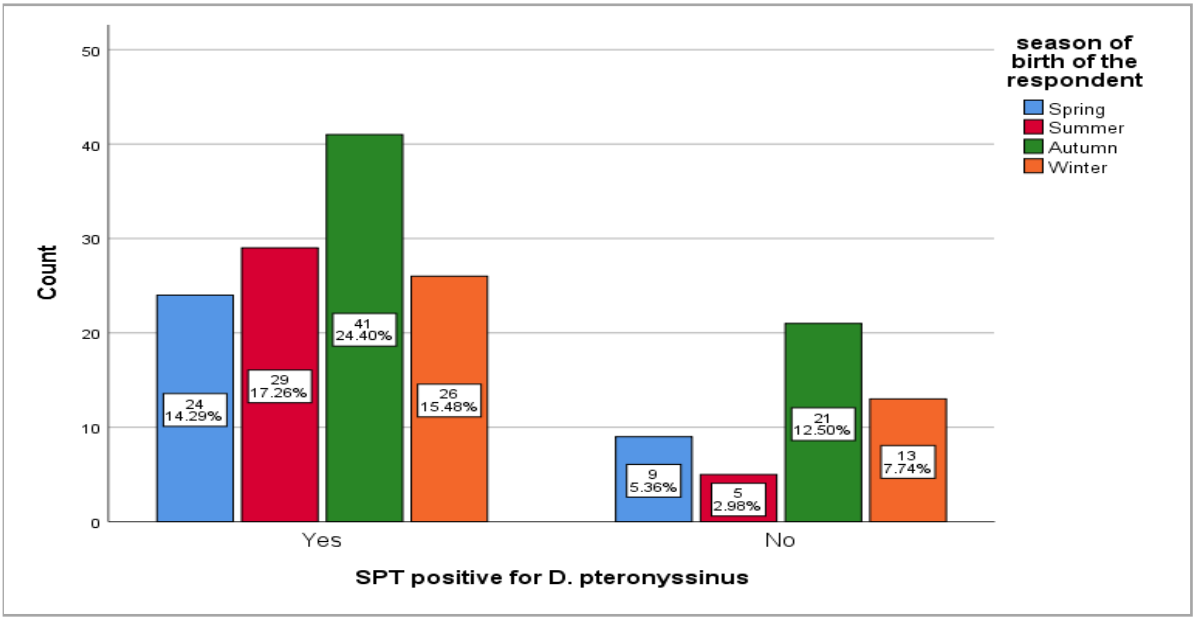

Figure 2. Dermatophyoides pteronyssinus prevalence with season of birth.

evidence 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.

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

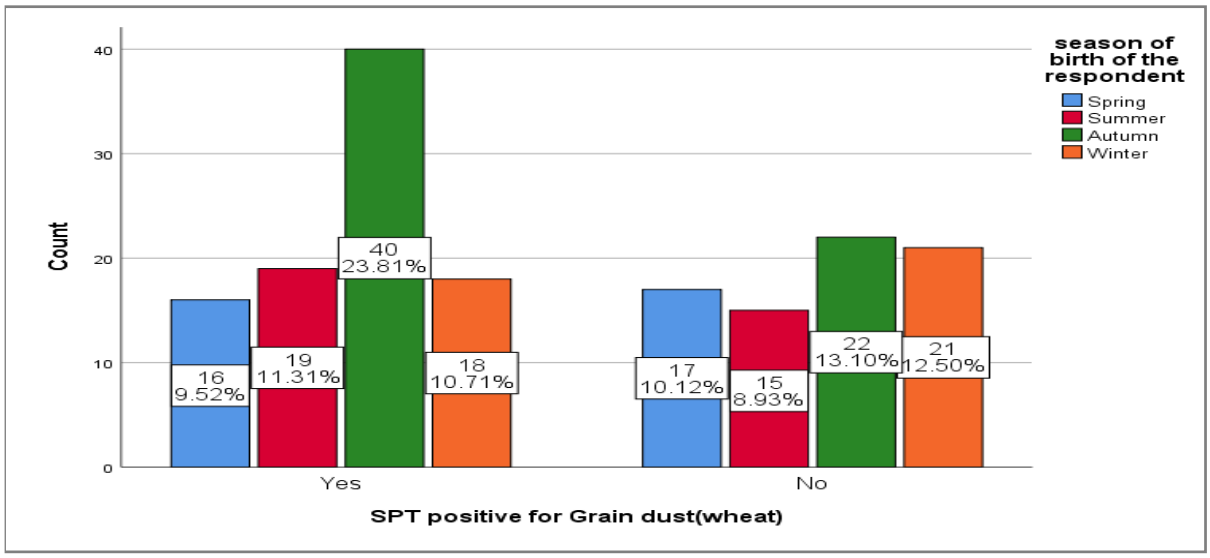

Figure 3. Grain dust allergen prevalence with season of birth.

of asthmatic respondents was observed. Significant findings related to asthma and allergens were unmasked through this study.

It was concluded that 10.5% of the respondents were allergic to mite allergens, 14.6% to fungi allergens, 7.3% to pollen allergens, 12% to dust allergens, 9% to different epithelial allergens, 7% to insect allergens, 39.1% to foods allergens and 6% to latex allergen. Hendrick et al. (1975) found *D. farinae* as a decisive allergen of atopic asthma. He tested 22 common allergens such as different pollens, animal dander, foods, and other molds. In the current work, two mite allergens were separately tested that revealed around 80% of the respondents being allergic to *D. farinae,* and 70% to *D. pteronyssinus.* Moreover, mite allergens prevalence was more in the male gender who belonged to the age group of 26 to 45 years, born in the autumn season, had a positive family history of allergy and medication history, and had coughing as the external indicator of discomfort.

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. 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. In this study, 7 fungi allergens were tested and analyzed separately. 41.7% of the respondents were allergic to *Aspergillus fumigatus,* 34.5% to *Aspergillus niger* and *Aspergillus flavus*, 28% to Penicillium sp, 23% to *Aspergillus versicolor* and *Candida albicans*, and 21% to *Aspergillus tamari*.

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. However, the present study shows that 42.3% of the asthmatic respondents were allergic to house mites. A few other dust allergens were also investigated in this study among which 55.5% of the respondents were allergic to grain (wheat) dust. Wang and Liu (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 antiasthma medications. But 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.

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. In this study, food allergens were found to be prevalent (around 40%) where certain food allergens were tested individually to observe the association. The respondents were more allergic to different kinds of fruits such as grapes, mango, coconut, guava, banana, lemon, pineapple, apple, and strawberry. The percentages of these fruit allergies ranged from around 11 to 23%. On the other hand, aquatic foods allergens owing to the food sources like prawn (26.8%), crab (28.6%), lobster (28.6%) and hilsha (25%) stood out to be significant. Around 12% of the respondents were allergic to dairy products (milk and cheese). Animal products, vegetables and some other food allergens also displayed a significant level (total 85.2% of 39.1%) of allergic response. As a whole, it was established that the prevalence of food allergens was

higher at young ages and diminishing as the age proceeds. Most of the vulnerable population was between 11 to 25 years old who suffered predominantly from food allergens. Blanco et al. (1998) illuminated that cornstarch powder acted as an aeroallergen and is responsible for asthma exacerbation. Vandenplas et al. (2016) also found a strong link between latex allergen and asthma (3 out of 12 recombinant natural rubber antigens). In this study, only 6.5% of the respondents showed a positive reaction to latex allergen.

Conclusion

A total of 168 asthmatic respondents participated in this study where serum Ig-E level and SPT of 56 different allergens along with clinical history were examined to expose the prevalence of allergens of atopic asthma. It was found that 11 to 25 years old were more affected by atopic asthma followed by 26 to 45 years and then the elderly people. Therefore, a decreasing trend of allergic prevalence with respect to age was observed. Furthermore, males were seen to be affected more. Most of these asthmatic respondents had a positive genetic history, were born mostly in the autumn season, and hailed from a residential area. Immunoglobulin-E levels were quite elevated for most of the respondents. Respondents mostly suffered from food allergens followed by fungi allergens, dust allergens, mite allergens, epithelia, pollen allergens, insect allergens and latex allergen. But mite allergens alone demonstrated a strong prevalence compared to others. The severity of asthma in response to serum immunoglobulin-E level and SPT responses could not be observed because of the time and funding limitations. Needless to say, all the respondents were tested for the 56 allergens due to administrative regulations which also infers that the acquired results through the study were conclusive

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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