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Prevalence of allergic skin diseases among children attending Ahmed Maher Teaching Hospital, Cairo, Egypt

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ABSTRACT

The prevalence of allergic skin diseases in children varies worldwide and information regarding local prevalence of its various causes may help the development of policies towards better prevention and management. This study was done to determine the prevalence of allergic skin diseases among children attending Ahmed Maher Teaching Hospital, Cairo, Egypt. Atopic dermatitis (AD), urticaria and contact dermatitis were the three allergic skin diseases that had been dealt with. One hundred and forty (140) children (patients group) were selected for the study from the pediatric and dermatology clinics of Ahmed Maher Teaching Hospital (AMTH) during a period of one year from June 2013 to June 2014. Another 140 comparable healthy children were also included as a control group. History and clinical examination were the main tools for diagnosis. Stool analysis was also done for 55 cases of both patients and control groups. Our results clearly revealed that there was a female predominance in both patients and control groups. Regarding the age, there was a significant prevalence of atopic dermatitis and urticaria in the younger age groups; the reverse was observed with contact dermatitis that was more frequent in the older ages. Our results also pointed out to the significant association between the higher prevalence of allergic skin diseases and the presence of animals at homes, the presence of intestinal parasitic infection and the intercurrence of other allergic phenomenae as asthma and allergic rhinitis.

Keywords: Atopic dermatitis, urticaria, prevention, dermatology, patients group.

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INTRODUCTION

The epidemiologic statistics of skin diseases provide us with information about prevalence, age, and sex differences in affected groups, and their regional distribution. It also offers the most useful way of evaluating causes of skin diseases in human populations (Dogra and Kumar, 2003).

On the other hand, studies of pediatric population in the community can play an important role in determining the policies of protective medicine and public health (Tamer et al., 2008).

Among the most important of allergic skin diseases are atopic dermatitis, urticaria and angioedema, allergic contact dermatitis and cutaneous manifestations of drug allergy (Saraclar et al., 1997).

Atopic dermatitis (AD) is a chronic, pruritic, inflammatory skin disease that affects up to 25% of children and 2 to 3% of adults (Eichenfield et al., 2014). The disease often starts in infants aged 2-6 months (Ong and Boguniewicz, 2008). While the majority of affected individuals have resolution of disease by adulthood, 10 to 30% do not, and a smaller percentage first develop symptoms as adults (Ellis et al., 2012). A recent study concluded that the prevalence of AD in children younger than 2 years was 18.6% (Kvenshagen et al., 2009). Interestingly, populations who migrate from areas of low prevalence to areas of higher prevalence have shown an increased incidence of AD, bolstering the idea of strong environmental influences in the development of AD (Ong and Boguniewicz, 2008).

Atopic dermatitis is the result of complex genetic, immunologic and environmental factors (Silverberg et al., 2013). Children of parents with AD have an increased risk of developing the disease by age 3 years (Bisgaard et al., 2009). Much higher concordance rates for AD are observed in monozygotic twins (77%) than in the dizygotics (15%) (Ong and Leung, 2006).

Recent evidence has demonstrated a strong genetic predisposition towards the development of AD in patients with loss-of-function mutations in the gene encoding the epidermal structural protein filaggrin (FLG). Filaggrin deficiency causes a significant defect in the normal epidermal barrier that allows for enhanced allergen absorption through the skin, resulting in a higher incidence of dermatitis, especially in patients who eventually develop asthma (Leung, 2009).

Food allergy is implicated as a cause in one third to one half of children with AD. Food allergens may be the initial trigger for IgE autoreactivity to epithelial autoantigens in young children with AD (Bisgaard et al., 2009). The most common food allergens in children are egg, soy, milk, wheat, fish, shellfish and peanut. Fortunately, many clinically significant food allergies resolve within the first 5 years of life, eliminating the need for long-term restrictive diets (Kvenshagen, 2009).

Environmental allergens repeatedly are important risk factors in the occurrence, and triggering exacerbations of AD in susceptible individuals. Contact irritants, climate, sweating, aeroallergens (house dust mite, molds, pollen, dander), microbial organisms and stress/psyche commonly trigger exacerbations (Bisgaard et al., 2009).

Urticaria, commonly referred to as hives, appears as raised, well-circumscribed areas of erythema and edema involving the dermis and epidermis that are very pruritic. It may be acute (< 6 weeks) or chronic (> 6 weeks) (Frigas and Park, 2009). Urticaria affects 15 to 25% of the population at some time in their lives (Kaplan, 2003), and the condition occurs most commonly in children and young adults (Sackesen et al., 2004).

Urticaria results from the release of histamine, bradykinin, leukotriene C4, prostaglandin D2 and other vasoactive substances from mast cells and basophils in the dermis (Hide et al., 1993), leading to activation of histamine H1 receptors on endothelial and smooth muscle cells increasing capillary permeability (Zuberbier and Maurer, 2007), and activation of histamine H2 receptors leading to arteriolar and venular vasodilation (Criado et al., 2013).

Urticaria may result from exposure to certain factors including drugs as non-steroidal anti-inflammatory agents (Viola et al., 2008), antibiotics such as penicillin (Sheikh, 2004), foods such as peanuts, eggs and shellfish (Cardinale et al., 2008), inhalants, insect bites and infections, particularly viral and bacterial ones (Schuller, 1982), in addition to chronic parasitic infestation (Wedi et al., 2009).

Contact dermatitis is exceedingly common, accounting for 4 to 7% of all dermatologic consultations affecting whites more frequently than other races (Brasch and Geier, 1997), and it is most common during adulthood, but it affects people of all ages (Warshaw et al., 2003).

Contact dermatitis may result from exposure to certain chemicals such as nickel, lanolin and benzocaine and drugs like neomycin (Rudzki et al., 1996).

The type of contact dermatitis is frequently age related. Infants are most likely to have irritant contact dermatitis in the diaper area. Toddlers and older children become increasingly exposed to poison ivy, poison oak and poison sumac. Adolescents are more likely to develop irritant reactions from excessive exposure to soap and allergic reactions to nickel preservatives in creams and lotions (Warshaw et al., 2003).

The diagnosis of contact dermatitis is based upon the history taken, clinical features and be confirmed by Patch test (Brasch and Geier, 1997).

Aim of the study

The aim of this study was to determine the prevalence of allergic skin diseases among children attending Ahmed Maher Teaching Hospital.

SUBJECTS AND METHODS

This study was carried out on 140 children who attended the outpatient Pediatric and Dermatology clinics of Ahmed Maher Teaching Hospital during the period from June 2013 till June 2014. Their ages ranged from birth up to 12 years old. One hundred and forty (140) comparable healthy children were also included as a control group. According to age, all children were classified into 4 main subgroups starting from:

Birth - < 3 years;
3 years - < 6 years;
6 years - < 9 years and
9 years – 12 years

All children and /or their parents were inquired about age, sex, family history of allergy or similar skin condition and the presence of animals at home. Additionally, the history of exposure to some precipitating factors was also inquired into.

All children were subjected to clinical examination with great attention given to identify certain allergic skin diseases that had been confirmed by the dermatologist. Special emphasis was devoted towards diagnosing associated allergic conditions among such children.

Diagnostic criteria of AD had been proposed by Hanifin and Rajka (1990) and largely adopted by the American Academy of Allergy, Asthma and Immunology.

Stool analysis was done for 55 cases of both patients and control groups in our hospital laboratory (routine work).

Statistical analysis

The data were coded, entered and processed on computer using Statistical Package for Social Science (SPSS), version 22 (2013). Probability (P) value was used as a determinant of significance:
If $P > 0.05$ = statistically insignificant
If $P \leq 0.05$*= statistically significant
If $P < 0.01$**= statistically highly significant

Chi-Square test (X^2) was used to test the association variables for categorical data.

Fisher exact test was performed in tables containing values less than 5.

RESULTS

All the results are illustrated in Tables 1 to 6. Table 1 shows statistical significant difference (P value < 0.05) between both groups regarding the age distribution, but regarding the sex, there is no significant difference (P value > 0.05) with female predominance in both groups.

Table 2 shows statistical significant difference between different types of allergic skin diseases and age groups, with AD and urticaria more prevalent in the younger age groups, while contact dermatitis is more prevalent in young adults. Regarding the sex, female predominance is observed in all types of allergic skin diseases.

Table 3 shows statistical significant difference between the precipitating factors and types of allergic skin diseases. Certain foods and infection are significant precipitating factors in AD, food and insect bites in urticaria, while exposure to certain chemicals and certain drug intake are significant factors in contact dermatitis.

Table 4 shows statistical significant difference between the presence of animals at home and the types of allergic skin diseases; 63.3% of children with AD, 68.4% of children with contact dermatitis and 87.1% of those having urticaria are in close association with animals at their homes.

Table 5 shows statistical significant difference between both groups of study according to gastrointestinal parasites detected among them.

Table 6 shows a highly statistical significant difference (P value < 0.001) between both groups of study according to other allergic conditions including asthma, allergic rhinitis and allergic conjunctivitis (24.3, 28.6 and 15.7% respectively) in patients group in comparison to control group (8.6, 11.4 and 6.4% respectively).

DISCUSSION

Multiple factors operate in the genesis of allergic skin diseases. Their development may be due to genetic, environmental, medicational and geographic factors (Kay, 2000).

In our study, regarding the sex, female predominance was observed in both patients and control groups (57.9 and 56.4% respectively), in comparison to male (42.1 and 43.6% respectively). This was in agreement with a study from Turkey done by Tamer et al. (2008) in which male to female ratio was (1:1.1), while in a study from India by Sardana et al. (2009), male predominance was observed with a male to female ratio (1.07:1).

Regarding the age, our findings clearly revealed a statistical significant difference between both groups, with the higher percentage of age group 0 to 3 years in both patients and control groups (49.3 and 65.7% respectively), while the age group 9 to 12 years represented the lower percentage in both groups (12.9 and 6.4% respectively). On distribution of such results, there was also a statistical significant difference between different types of allergic skin diseases and age groups, where out of 90 cases with AD, 62.2% were of <3 years old, 18.9, 12.2 and 6.7% were of 3 to 6, 6 to 9 and 9 to 12 years old, respectively.

These results were in full agreement with a study of Georgala et al. (1994) who revealed that 75% of children with AD presented by the first year of life.

In our study, out of 19 cases with contact dermatitis, 42.1% were young adults, 26.3, 21.1 and 10.5% were of 6 to 9, 3 to 6 and <3 years old respectively. These findings were in agreement with several studies obtained by different authors (Rudzki et al., 1996; Hanifin and Rajka, 1990) who reported that teenagers and young adults are the group most at risk to develop allergic contact dermatitis.

Our results also revealed that out of 31 cases with urticaria, 35.5% were of <3 years old, 32.3, 19.4 and 12.9% were of 3 to 6, 6 to 9 and 9 to 12 years old, respectively. These data were in agreement with a study done by Mathews (1993) who mentioned that urticaria and angioedema may occur in all ages, but acute urticaria is most common among the younger ages. Also, studies obtained by several authors (Takeda et al., 1996; Leung, 1997) found that urticaria and atopy were more frequent among the younger than the older age groups.

In our study, there was a statistical significant difference between the precipitating factors and allergic skin diseases. Forty percent (40%) of AD cases and 41.9% of cases with urticaria had given a history of eating certain foods (e.g. egg, fish, milk and bananas). The involvement of food in the pathogenesis of AD had been clearly documented by both clinical and experimental data. Fatal and near fatal anaphylactic reactions to food have become frequent in recent years especially to commercially prepared food products with protein additives (Delvin et al., 1991). Our findings were in agreement with a study done by Sampson and Scalon (1989) who pointed out to the possible role of diet in influencing allergic diseases.

In this study, more than 40% of cases with contact dermatitis and around 13% of cases with urticaria had given a history of exposure to certain local chemicals and topical drugs. These results were in agreement with a study of Esama (1996) who described a lot of chemicals causing allergic contact dermatitis that included cosmetics, cements and fungicides.

In our work, 12.2% of cases with AD and 6.5% of those with urticaria had given a positive history of infections including tonsillitis and bacterial and viral skin infections. That was in full agreement with the results of Bahamadan et al. (1995) who reported the aggravation of AD in the

Table 1. Demographic data of studied children.

		Patients group (140)	Control group (140)	Chi-Square X^2	p value
Age (years)	0 - <3	69 (49.3%)	92 (65.7%)	8.418	0.038*
	3 - < 6	31 (22.1%)	23 (16.4%)		
	6 - < 9	22 (15.7%)	16 (11.4%)		
	9 - 12	18 (12.9%)	9 (6.4%)		
	Total	140 (100.0%)	140(100.0%)		
Sex	Male	59 (42.1%)	61 (43.6%)	0.058	0.809 (NS)
	Female	81 (57.9%)	79 (56.4%)		
	Total	140 (100.0%)	140 (100.0%)		

Table 2. Distribution of patients group according to age, sex and type of allergic skin disease.

Parameter		Patients group (140)			X^2	p value
		Atopic dermatitis N (%)	Contact dermatitis N (%)	Urticaria N (%)		
Age (years)	0 - <3	56 (62.2%)	2 (10.5%)	11 (35.5%)	29.562	0.001*
	3 - < 6	17 (18.9%)	4 (21.1%)	10 (32.3%)		
	6 - < 9	11 (12.2%)	5 (26.3%)	6 (19.4%)		
	9 - 12	6 (6.7%)	8 (42.1%)	4 (12.9%)		
	Total	90 (100.0%)	19 (100.0%)	31 (100.0%)		
Sex	Male	36 (40.0%)	9 (47.4%)	14 (45.2%)	0.498	0.780 (NS)
	Female	54 (60.0%)	10 (52.6%)	17 (54.8%)		
	Total	90 (100.0%)	19 (100.0%)	31 (100.0%)		

Table 3. Distribution of patients group according to history of exposure to some precipitating factors.

Precipitating factors	Patients group (140)			X^2	p value
	Atopic dermatitis N (%)	Contact dermatitis N (%)	Urticaria N (%)		
Food	36 (40.0%)	0 (0.0%)	13 (41.9%)	97.259	0.001*
Chemicals & drugs	0 (0.0%)	13 (68.4%)	4 (12.9%)		
Insect bite	0 (0.0%)	0 (0.0%)	6 (19.4%)		
Infection	11 (12.2%)	0 (0.0%)	2 (6.5%)		
Non specified	43 (47.8%)	6 (31.6%)	6 (19.4%)		
Total	90 (100.0%)	19 (100.0%)	31 (100.0%)		

Table 4. Distribution of patients group according to the presence of animals at home.

Animals at home	Patients group (140)			X^2	p value
	Atopic dermatitis N (%)	Contact dermatitis N (%)	Urticaria N (%)		
+ ve (97)	57 (63.3%)	13 (68.4%)	27 (87.1%)	6.126	0.047*
-ve (43)	33 (36.7%)	6 (31.6%)	4 (12.9%)		
Total (140)	90 (100.0%)	19 (100.0%)	31 (100.0%)		

presence of staphylococcal skin infection. This could be explained by the results of a study done by Ong and Leung (2006) who stated that more than half of patients with AD are colonized by *Staphylococcus aureus* strains

Table 5. Comparison between both groups of study according to gastrointestinal parasites detected.

Parasites	Patients group (140)	Control group (140)	X^2	p value
Giardiasis	10 (18.2%)	8 (14.5%)		
Amoebiais	8 (14.5%)	8 (14.5%)		
Hymenolepis	5 (9.1%)	6 (10.9%)		
Ascariasis	6 (10.9%)	4 (7.3%)	10.102	0.023*
Entrobiasis	9 (16.4%)	4 (7.3%)		
-ve	17 (30.9%)	25 (45.5%)		
Total	55 (100.0%)	55 (100.0%)		

Table 6. Comparison between both groups of study according to other allergic conditions.

Allergic condition	Patients group (140)	Control group (140)	X^2	p value
Asthma	34 (24.3%)	12 (8.6%)		
Allergic rhinitis	40 (28.6%)	16 (11.4%)		
Allergic conjunctivitis	22 (15.7%)	9 (6.4%)	49.939	<0.001**
-ve	44 (31.4%)	103 (73.6%)		
Total	140 (100.0%)	140 (100.0%)		

capable of producing superantigens inducing the activation of inflammatory cells in the skin of those patients. In addition, Alzolibani et al. (2012) reported that methicillin-resistant *S. aureus* strains with reduced susceptibility to vancomycin are increasing worldwide and have been documented in AD. Also, studies done by Dahl et al. (1995) and Hanifin et al. (1996) stated that chronic pyogenic infection is of prime importance in the aetiology of urticaria.

In our study, there was a statistical significant difference between the presence of animals at home and the type of allergic skin diseases. The results reported that 63.3% of children with AD, 68.4% of cases with contact dermatitis and 87.1% of those having urticaria were in close contact with animals at their homes. That was reported by Abdulrazzaq et al. (1994) who pointed out in their study to the close association of individuals with animals at their homes and its role in the aetiology of allergic diseases. However, several works done by Biagini et al. (2010), Langan et al. (2007) and Epstein et al. (2011) explained that the data regarding the exposure to pets are conflicting. Two recent studies done by Schuttelaar et al. (2009) and Bisgaard et al. (2008) have shown that cat but not dog ownership enhanced the effect of filaggrin mutations in promoting the development of AD.

In this study, there was a statistical significant difference between the detection of parasitic infection in both groups (Table 5), and also the occurrence of other allergic diseases in both groups (Table 6). The parasites detected were giardiasis, amoebiasis, hymenolepis nana, ascariasis and entrobiasis. This was in agreement with a study from China done by Palmer et al. (2002) who reported that the interrelationship of current and past intestinal parasitic infection, especially Ascaris Lumbricoides, was associated with a significant increase in asthma risk and atopy in children. Another study done by Leonardi et al. (2006) concluded that intestinal parasitic infection was associated with small, non-significant increase in asthma risk. However, a study from Ethiopia done by Dagoye et al. (2003) was in disagreement with our results as they reported that intestinal parasitic infection, especially Ascaris Lumbricoides and Trichuris, was not associated with increased risk of wheezes and skin sensitization in children. Finally, according to Schafer et al. (1996), they reported that among the most common causes of urticaria are infections with intestinal parasites, and the association between asthma, allergic rhinitis and eczema has been clearly documented.

RECOMMENDATIONS

i) Risk factors for allergic skin diseases including allergenic foods, drugs and topical medicines should be cautiously used and within limits. Additionally, infections and insect bites should be treated immediately and promptly.
ii) Children should be supervised not to be in close contact with animals, especially at homes.
iii) Health promotion and proper environmental sanitation are important for combating parasitic infections which represent potential risks for allergic diseases.
iv) The other allergic diseases such as asthma, allergic rhinitis, allergic conjunctivitis,…etc, should be managed

while dealing with allergic skin diseases to ensure the best preventive measure.

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