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Epidemiology of eczema among Lebanese adolescents

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Summary

Objective: The study aims to determine the prevalence of eczema among Lebanese adolescents and identify demographic, nutritional and environmental characteristics associated with eczema.

Methods: A cross-sectional study conducted on a convenient sample of 3 153 students (13-14 years) selected from five different provinces in Lebanon. Significant unadjusted demographic, nutritional and environmental variables were considered in a stepwise regression model.

Results: Ever having an itchy rash that lasted for a period more than six months was reported by 788 (25.0 %) adolescents, while 404 (12.8 %) reported ever having eczema. Females and passive smokers were at 1.5 increased risk of having eczema than their counterparts. Exercising regularly, living near a busy area, and frequent eating of eggs were positively associated with eczema. Finally, adolescents who suffered from allergic diseases, asthma (Odds ratio (OR): 1.64, 95 % CI: 1.16–2.32), rhinitis (OR: 1.35, 95 % CI: 1.07–1.70) and hay fever (OR: 2.77; 95 % CI: 2.12–3.62) also reported having had eczema.

Conclusion: Environmental factors were found to play an important role in the prevalence of eczema among adolescents.

Keywords: Eczema – Epidemiology – Allergy– Lebanon.

Eczema, or atopic dermatitis, is a chronic disease that usually develops in childhood and might persist to adulthood.[1,2] It is characterized by dry skin, itchy rash, and skin excoriation.[1] Eczema inflicts psychological burden on children. It interferes with their social adaptation and school performance and consequently affects their self-image and self-esteem.[1, 2] The financial constraints on the patients' families and on the healthcare providers add to the burden of the disease.[1]

International literature shows a continuous increase in the prevalence of childhood atopic disease, among which is eczema.[3–5] Lifetime prevalence among 13-year-old children reached 20 % in some developed countries.[6] It is suggested that one of 10 children in western countries develop eczema.[2] However, the results from developing countries are not consistent.[7] In what relates to the Arab world, a study in Qatar reported the prevalence of eczema among school children in 2003–2004 to be 22.5 %.[8] In the Sultanate of Oman[9] and Kuwait[10] the rates of eczema in 13 to 14 year old adolescents were 14.4 % and 11.3 % respectively. For the same age group but in the capital of Lebanon, a study assessed the prevalence of eczema as 11 %.[11] Similarly, the national figure across all Lebanon was reported to be 11.5 %.[12]

The latter studies conducted in the Arab region followed the methodology proposed by the International Study of Asthma and Allergies in Childhood (ISAAC). The ISAAC programme, was developed in 1991 to facilitate comparisons and standardise methodologies in assessing prevalence and factors affecting the prevalence of atopic disease.[3,5,6,13] ISAAC studies extensively looked into the prevalence and determinants of asthma and respiratory allergies.[3,7,10,14,15] Although Eczeme is the first manifestation of future childhood allergies like asthma and rhinitis,[2,6] less attention has been paid to it. Studies on eczema were mainly limited to assessment of prevalence[3,10,13,15,16] and little was investigated about its determinants and correlates.[5] Understanding about the characteristics of eczema will pave the way for better management of the disease.[6]

Given the health implications of eczema and the scarcity of research on its epidemiology in developing countries, this is the first Lebanese national study that looks into the character-

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istics of eczema among school children in the five provinces of the country. The study aims to determine the prevalence of eczema among Lebanese adolescents and to identify demographic, nutritional and environmental characteristics associated with eczema.

Methods

The present study was cross-sectional in design. A random sample of 55 private and public schools from different regions in Lebanon were contacted in spring 2005 to take part in this study. At that time of the year, Lebanon was witnessing security and political turmoil that followed the assassination of the Prime Minister. Due to these unstable circumstances, schools were closed down for several weeks leading to delays in the academic curriculum. Many schools, for the above reason, denied participation in the study. Therefore, a convenient sample of 13 schools (3 public and 10 private) from five Lebanese provinces accepted to take part in the study. Three schools participated from Beirut, capital of Lebanon, and five schools from the suburbs of Beirut. The number of recruited schools in Bekaa, South and North, the remaining three provinces, were 2, 2 and 1 respectively.

The study was reviewed and approved by the Institutional Review Board of the Faculty of Medicine at the American University of Beirut. Approvals were also obtained from the Ministry of Education and the administrations of the selected schools. The study was conducted using the ISAAC procedures and questionnaires which consisted of three parts: (i) a core questionnaire, (ii) an environmental questionnaire, and (iii) a video questionnaire. The ISAAC questionnaire was administered in Arabic. It was adopted from a study conducted in Sultanate of Oman that has already translated the questionnaire into Arabic and back translated it to English to adjust for any discrepancies.[9] Minor adjustments were made to the adopted questionnaire to accommodate for the cultural differences. Seventh and eighth grade classes, with 13-14-year-old students, were visited and asked to participate in the study. Response rate of students from within the selected schools was above 95 %. During class time, students were asked to complete the ISAAC questionnaires. Two trained research assistants were available to answer questions and guide the video questionnaire in accordance to ISAAC procedure.

For the present study, the main study outcome was ever having eczema assessed by the question: "Have you ever had eczema?" The independent variables examined were demographic, nutritional and environmental factors. The demographic variables were sex, class level, nationality, province and birth order. The examined environmental factors were regular exercise, passive smoking including parental nargileh (hubble bubble) or cigarette smoking, residing in a busy area and ever having other allergic disease (asthma, rhinitis and hay fever). The nutritional determinants were assessed as frequent eating (≥ 3 times a week) of different types of food categories. The body mass index (BMI) was also investigated as a potential predictor for eczema. BMI was calculated by using self reported measurements of height and weight and categorized according to the classification of Centers for Disease Control & Prevention.[17] Missing BMI information were grouped into a "not known" category.

With regard to unadjusted analysis, differences in the distribution of eczema were assessed among the different levels of each independent variable. Cross tabulations and odds ratio (OR) with 95 % confidence interval (CI) were reported. Logistic regression using stepwise modeling was computed on the unadjusted determinants that proved significant. Adjusted OR and 95 % CI was reported for the final model. All the analysis was computed in the Statistical Package for Social Sciences (SPSS 15.0).

Results

A sample of 3 153 students was selected from public and private schools of five different provinces in Lebanon. There were 645 (20.5 %) participants from Beirut, the capital city of Lebanon while 29.7 %, 24.6 %, 15.7 % and 9.5 % of the students were from Beirut suburbs, Bekaa, South and North provinces respectively. The mean age of participants was 13.7 years (Standard deviation = 1.1) whereby 50.8 % (N = 1 603) were females and 48.0 % (N = 1 512) were males.

A total of 788 (25.0 %) reported to have ever had an itchy rash that lasted for a period more than 6 months, 404 (12.8 %) reported to have ever had eczema, and 234 (7.4 %) students reported to have ever had eczema and itchy rash. The prevalence of ever having other allergic diseases in the study population were 45.2 % for rhinitis, 8.3 % for asthma and 14.2 % for hay fever.

Ever having eczema (N = 404) was the main outcome of the study. Table 1 represents the univariate analysis for the association of ever having eczema with demographic, environmental and nutritional factors. For the crude analysis, sex was the only significant demographic variable, whereby the prevalence of eczema was 1.26 times more common among females. No significant variations in the prevalence of eczema was evident among the different Lebanese provinces. Frequent eating (≥ 3 times a week) of peanuts, olive oil, butter, eggs, pastry and fast food were all associated with increased odds of eczema. Students exercising regularly (at least once

Table 1. Univariate association for ever having eczema with demographic, nutritional and environmental characteristics.

	Total population	Prevalence of ever having eczema	Unadjusted odds ratio
	N[a]	%[b]	OR[c] (95 % CI)[d]
Demographic Characteristics			
Sex			
Male	1 512	11.4	**1**
Female	1 603	14.0	**1.26 (1.02–1.56)**
Class			
Seventh grade	1 613	12.1	1
Eighth grade	1 500	13.7	1.51 (0.93–1.42)
Nationality			
Lebanese	2 862	12.6	1
Non-Lebanese	159	15.7	1.29 (0.83–2.00)
Regions			
Beirut	645	11.6	1
Beirut suburbs	936	11.8	1.01 (0.74–1.38)
Bekaa	775	13.9	1.23 (0.90–1.69)
South	493	14.8	1.32 (0.93–1.87)
North	301	12.6	1.10 (0.72–1.67)
Rank			
Only child	65	13.8	1.22 (0.58–2.56)
Youngest	705	11.9	1.03 (0.74–1.42)
Middle	1 461	12.7	1.11 (0.84–1.46)
Eldest	714	11.6	1
Nutrition			
Meat (Frequent eating)			
No	2 394	12.2	1
Yes	695	14.5	1.22 (0.95–1.56)
Chicken (Frequent eating)			
No	2 493	12.4	1
Yes	609	13.3	1.08 (0.83–1.40)
Fish (Frequent eating)			
No	2 735	12.4	1
Yes	322	15.5	1.30 (0.94–1.79)
Vegetables & Fruits (Frequent eating)			
No	583	12.3	1
Yes	2 458	12.4	1.00 (0.74–1.32)
Beans (Frequent eating)			
No	2 284	13.1	1
Yes	798	12.0	0.91 (0.71–1.16)
Peanuts (Frequent eating)			
No	2 087	12.0	1
Yes	978	14.6	**1.26 (1.01–1.57)**
Wheat (Frequent eating)			
No	996	14.1	1
Yes	2 072	12.0	0.83 (0.67–1.04)
Olive oil (Frequent eating)			
No	1 879	11.5	1
Yes	1 198	14.2	**1.27 (1.02–1.57)**

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Table 1. continued.

	Total population	Prevalence of ever having eczema	Unadjusted odds ratio
	N[a]	%[b]	OR[c] (95 % CI)[d]
Butter (Frequent eating)			
No	2 523	12.0	1
Yes	499	16.0	**1.40 (1.07–1.83)**
Milk (Frequent eating)			
No	1 103	13.1	1
Yes	1 961	12.6	0.96 (0.77–1.19)1
Eggs (Frequent eating)			
No	2 417	12.0	1
Yes	629	15.7	**1.36 (1.07–1.75)**
Fast food (Frequent eating)			
No	2 020	11.8	1
Yes	1 063	14.4	**1.25 (1.01–1.56)**
Pastry (Frequent eating)			
No	2 011	11.7	1
Yes	1 033	14.6	**1.29 (1.04–1.61)**
Sweets (Frequent eating)			
No	1 163	11.8	1
Yes	1 935	13.3	1.15 (0.92–1.43)
Body mass index			
Underweight	182	9.3	1
Healthy weight	1 687	13.1	1.46 (0.87–2.46)
Risk of overweight	271	12.9	1.44 (0.78–2.66)
Overweight	106	16.0	1.85 (0.90–3.81)
Not known	1 007	12.6	1.40 (0.82–2.39)
Environmental Characteristics			
Exercise regularly			
Never or rarely	1 823	10.5	1
Once or twice a week	791	15.9	**1.61 (1.26–2.05)**
Three or more times a week	451	14.9	**1.48 (1.10–2.00)**
Buses/Trucks pass by house			
Never or rarely	1 281	10.6	1
Continuously during daytime	1 059	12.8	1.24 (0.96–1.60)
All day long	694	15.6	**1.55 (1.18–2.04)**
Maternal cigarette smoking			
No	1 962	11.7	1
Yes	1 046	13.6	1.18 (0.94–1.48)
Maternal nargileh smoking			
No	2 365	11.7	1
Yes	580	15.3	**1.37 (1.06–1.78)**
Paternal cigarette smoking			
No	1 578	11.1	1
Yes	1 409	14.1	**1.32 (1.06–1.64)**
Paternal nargileh smoking			
No	2 121	11.6	1
Yes	797	14.1	1.24 (0.98–1.58)

Table 1. continued.

	Total population	Prevalence of ever having eczema	Unadjusted odds ratio
	N[a]	%[b]	OR[c] (95 % CI)[d]
Passive smoking in household			
No	833	9.4	1
Yes	2 210	13.6	**1.53 (1.17–1.98)**
Asthma Ever			
No	2 891	11.8	1
Yes	262	23.7	**2.31 (1.70–3.14)**
Rhinitis Ever			
No	1 727	10.2	1
Yes	1 426	16.0	**1.68 (1.36–2.07)**
Hay Fever Ever			
No	2 706	10.5	1
Yes	447	27.1	**3.18 (2.49–4.05)**

[a]Number, [b]Row percentage, [c]Adds ratio, [d]Confidence interval

a week) and those who live in a busy area (buses and trucks pass all day long) were almost l.5 times more likely to develop eczema than their counterparts. Smoking was also associated with eczema. Children of cigarette smoking fathers and nargileh smoking mothers reported ever having eczema 1.3 times more than children of nonsmoking parents. When the general smoking practices (cigarette and/or nargileh) for either parents was analyzed, the odds of eczema was 1.53 (95 % CI: 1.17–1.98). Finally, ever having other types of allergic diseases increased the likelihood of eczema prevalence.

All significant variables were considered for a stepwise regression model as reported in Table 2. Out of the fifteen significant variables, eight variables remained in the model. Similar to the unadjusted results, females, children of smoking parents and regular exercisers had higher odds of ever experiencing eczema. Residing in an area where buses and trucks pass all day long was also found to be a significant characteristic of eczema (OR = 1.48, 95 % CI: 1.11–1.97). Among all types of food categories, only egg, although not significant at a p-value of 0.05, remained in the final model. While adjusting for all the variables in the model, ever having asthma, rhinitis and hay fever were associated with eczema. The odds ratio of eczema among children with asthma, rhinitis and hay fever were 1.64 (95 % CI: 1.16–2.32), 1.35 (95 % CI: 1.07–1.70) and 2.77 (95 % CI: 2.12–3.62) respectively.

Discussion

This is the first study that looked at the characteristics of eczema in a Lebanese population. Among the 3 153 participating students the prevalence of ever having eczema was 12.8 %. Environmental factors were found to play an important role in the prevalence of eczema among adolescents. Females, passive smokers and regular exercisers experienced higher odds of eczema. Egg consumption and residing in a busy area were also found to be positively associated with eczema. A history of having any of the other allergic diseases (asthma, rhinitis and hay fever) increased the chances of having eczema, as well.

In the present study, prevalence of eczema was found to be 12.8 % among 13–14 year old students from five different provinces in Lebanon. The results are comparable with the two Lebanese studies conducted on the same age group. The prevalence of eczema in the capital city of Lebanon was 11 %[11] while it was 11.5 % across all the Lebanese provinces.[12] Studies from the Arab region also provided similar rates. Prevalence of eczema among 13–14 year old children in Sultanate of Oman[9] and in Kuwait[10] was 14.4 % and 11.3 % respectively. However, a study conducted in Qatar reported relatively higher rates (22.5 %) of eczema than the present study.[8] Turkey and Israel, countries in the same geographic region as Lebanon, have found markedly lower prevalence rates of eczema. It was 8.3 % in turkey,[3] while 7.8 % in Israel.[4]

According to the multivariable analysis, girls were at higher risk of ever having eczema. This finding is contradictory to the results of the studies in the Arab region. The Lebanese study in Beirut[11] and the Qatari study[8] both found that prevalence of eczema was more common in males. In the international literature, however, females have been reported to have higher rates than males.[5,18,19] A study on Dutch adolescents, for example, reported the odds ratio of eczema among females to

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Table 2. Stepwise regression model for the characteristics of ever having eczema (N = 2 893).

	Unadjusted odds ratio[a]	Adjusted odds ratio
	OR[b] (95 % CI)[c]	OR[b] (95 % CI)[c]
Sex		
Male	**1**	1
Female	1.26 (1.02-1.56)	1.43 (1.13-1.82)
Exercise regularly		
Never or rarely	1	1
Once or twice a week	1.61 (1.26-2.05)	1.46 (1.13-1.89)
Three or more times a week	**1.48 (1.10-2.00)**	1.34 (0.97-1.86)
Buses/Trucks pass by house		
Never or rarely	1	1
Continuously during daytime	1.24 (0.96-1.60)	1.19 (0.91-1.55)
All day long	**1.55 (1.18-2.04)**	**1.48 (1.11-1.97)**
Passive smoking in household		
No	1	1
Yes	1.53 (1.17-1.98)	1.46 (1.11-1.94)
Eggs (Frequent eating)		
No	1	1
Yes	**1.36 (1.07-1.75)**	1.26 (0.97-1.65)
Asthma Ever		
No	1	1
Yes	2.31 (1.70-3.14)	1.64 (1.16-2.32)
Rhinitis Ever		
No	1	1
Yes	1.68 (1.36-2.07)	1.35 (1.07-1.70)
Hay Fever Ever		
No	1	1
Yes	3.18 (2.49-4.05)	2.77 (2.12-3.62)

[a]Same values as reported in table 1, [b]Odds ratio, [c]Confidence interval

be 1.38 with 95 % CI: 1.25–1.51.[5] Similarly, the prevalence of lifetime eczema was higher among British girls of 13 to 14 years old.[19]

Passive smoking, including cigarette and nargileh, was found to be associated with eczema. Although association between passive smoking and respiratory allergies is well known, literature on its effect on eczema is not conclusive.[20] A number of studies have shown no association between parental smoking and prevalence of eczema.[21-23] A positive relationship, on the other hand, have been detected between environmental tobacco smoke and eczema[20] and between maternal smoking during pregnancy and childhood eczema.[24] A possible explanation for the presence of such relationship is that smoke might irritate and cause sensitization to the skin allowing for the penetration of possible allergens.[20]

Living in a busy area is also associated with increased odds of eczema among the study population. A study on Maltese school children (aged 13–15 years) has also revealed similar results, whereby the odds ratio for diagnosed eczema was 1.26 (95 % CI: 1.01–1.57).[23] Comparable results were also reported by a study conducted in Germany but with preschool children.[25] Pollutants from cars, trucks and buses might again cause irritation to skin and increase the likelihood of sensitization from allergens. Interestingly enough, the odds of ever having eczema increased among regular exercisers. This finding might be attributed to the fact that most Lebanese exercisers practice jogging and running on the main roads of the neighborhood and very few resort to health clubs for sports activities. Therefore, in the absence of policies to reduce the use of traffic-induced pollutants[26] and if air pollution proves to have a role in precipitating eczema, it is likely that Lebanese exercisers would be more prone to skin allergy. Further studies, however, need to investigate this association.

Among all types of food, only frequent eating of eggs had borderline significance with eczema at the multivariable analysis. A study among a Slovak birth cohort also reported that consumption of egg during the first year of life increased the likelihood of developing atopic eczema by almost two-folds

(OR: 1.92, 95 % CI: 1.2–3.2).[27] As concluded by the study authors, exposure to high level allergens increases the chances of allergic sensitization. Furthermore a randomized clinical trial was conducted to see the effect of a 4 week diet of egg exclusion among 55 children with diagnosed atopic eczema. Study findings revealed that eczema severity have decreased among those who did not consume egg diet.[28] It has also been documented that one out of 10 children develop aggravated eczema due to food allergy.[2]

While taking into account the three types of allergic diseases for the regression analysis, all three remained in the final model yielding a positive association with eczema. Although the three variables are assumed to be correlated, their presence in the final model signifies an independent effect on eczema. This finding is consistent with the literature. Eczema usually coincides with other allergic diseases like asthma and rhinitis.[1,2] It is even believed to be the first manifestation of atopic diseases.[2] Co-morbidity of eczema with rhinitis has been detected among 10 year old children in the United Kingdom.[6] Several studies, as well, have shown that eczema is a risk factor for asthma.[3,14,15] An interesting finding of this study is that hay fever was found to have the highest odds ratio with eczema in comparison to asthma and rhinitis. A recent trend analysis on allergic rhinitis and eczema in the United Kingdom showed that the healthcare usage for eczema and hay fever have increased substantially over the last three recent decades and long term trends were paralleled before reaching a stabilization and decline for both diseases.[29]

A major limitation of the study was the inability of selecting a random sample of schools from all the Lebanese provinces. As explained earlier, the country was undergoing political turmoil which made it difficult to recruit schools. However, the results of this convenient sample can be considered as a first step in understanding the epidemiology of eczema in Lebanon. Further studies using a representative sample is warranted. Another drawback of the study is not taking into account the play of genetics in determining the prevalence of eczema. In addition to the inability to assume causal relationships in cross-sectional studies, reverse causality is also a potential bias. The fact that whether the determinants precede the outcome and contribute to its onset or whether the outcome predicts the onset of the determinants can not be detected in this study.

Nevertheless, this study is among the rare studies in the region and the first in Lebanon that assessed the characteristics of eczema among children using the ISAAC questionnaire. The results demonstrate that environmental factors were found to play an important role in the prevalence of eczema among adolescents. Co-morbidity of eczema with other allergic diseases was clearly pronounced. Passive smoking and living in a busy area also builds up the risk of having eczema. Although the exact cause of eczema is not clear, interventional programs to educate parents about precipitating or aggravating factors that may include food allergens (most commonly, egg) or environmental allergens/irritants, climatic conditions, stress and genetic predisposition may be recommended and advised.

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