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Self reported prevalence of eczema and associated risk factors among under five children in Northern Saudi Arabia: A population based cross sectional study

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ABSTRACT

Introduction: Eczema is a very common dermatological disorder that affects children at a high rate and this condition can alter the quality of life by disturbing the sleep activity, cause anxiety, and depressive manifestations. The present survey aimed to assess the self reported prevalence of eczema and its associated factors among the under five aged children. *Methodology:* This is a cross sectional study conducted at the northern regions of Saudi Arabia (KSA). By using consecutive sampling method, 578 randomly selected participants from the northern KSA completed the pretested data collection. We have applied logistic regression analysis to identify the predictors for the self reported eczema. *Results:* The results revealed that Eczema among the children was significantly related to mother's education (OR [95% CI] = 1.91 [1.23 – 2.57], p = 0.008), family history of bronchial asthma (OR [95% CI] = 0.71 [0.58 – 0.93], p = 0.013), and family history of eczema (OR [95% CI] = 4.32 [2.61 – 6.96], p= 0.001). Regarding environmental factors, eczema was significantly related to presence of pet animals in the house (OR [95% CI] = 1.68 [1.32 – 2.71], p = 0.001) and history of food allergy (OR [95% CI] = 3.71 [2.33 – 5.83], p<0.001). *Conclusion:* The present survey's results recommend that the concerned authorities to plan focused health awareness raising campaigns for the public regarding eczema and predisposing factors. Furthermore, exploratory research is warranted to identify the region specific requirements for health education programs.

Keywords: Eczema, Risk Factors, Saudi Arabia, Prevalence

1. INTRODUCTION

On a worldwide level, the allergic disorders have been noticed to be on escalation (Moreno López et al., 2021). Moreover, those allergic disorders are

most commonly in the affluent countries which are considerably developed from the economic aspect. Despite the high number of affected cases, the precise etiology behind the disorders remains unknown. However, an exposure to the factors contributing to the etiology can possibly arise starting from a very early age, as in utero (Hadi et al., 2021). "Eczema" is a very common dermatological disorder that affects children in a high rate and is featured by the skin pruritis and further eruption. Furtherly, this condition can alter the quality of life by disturbing the sleep activity, cause anxiety, and depressive manifestations (Lee et al., 2017). Many avoidable and non avoidable risk factors can potentiate the development of eczema. Smoking, family history, age, the use of paracetamol, and IgE levels that are considerably high are all possible risk triggers (Moreno López et al., 2021; Lee et al., 2017; Alruwaili et al., 2021). There is lack of data regarding preventable and modifiable risk factors among under five children in Saudi Arabia. The burden of eczema among children has a toll on family health and it affects the well being of whole family. The current study could help determine the burden of eczema and associated risk factors. The prevalence of associated risk factors varies from region to region. An insight can help us develop preventive strategies to cater eczema among children.

Atopic dermatitis, commonly termed as "eczema" is the topmost dermatological disorder falling under the umbrella of dermatitis. Eczema most commonly affects the pediatric population; however, it can affect any age group. Individuals affected by eczema often manifest with dry skin that is itchy and is highly susceptible to infection development. Moreover, these patients suffer of skin dehydration due to the dysfunctional skin barrier ultimately occurring as a consequence of the disease pathogenesis (Nemeth & Evans, 2021). Eczema has an overall prevalence of 15%-30% in the pediatric population and 2%-10% in the adult age group. Furthermore, more than half of the topic dermatitis cases (60%) will manifest the signs and symptoms of the disease during the first year of infancy. In addition, it is significant to recognize that eczema most cost commonly occurs in individuals residing in the rural areas when compared to those living in the urbans (Katoh et al., 2019). During the process of our study investigation, the authors compared the prevalence of eczema between infants living in Skaka city and the prevalence established elsewhere in the published studies.

The exact factors contributing to the etiology of eczema are unknown yet (Moreno López et al., 2021). However, medical research has acknowledged the genetic influence in the development of eczema. One of the known mutations found to be of an influence in the gene Filaggrin; this gene is extremely vital for the process of maturity undergone by the cells building the skin layers. Moreover, Filaggrin is responsible to create the protective layer of the skin which is highly packed with corneocytes. In individuals suffering of eczema and a simultaneous mutation in the gene Filaggrin, a skin barrier that is described as "leaky" and dysfunctional will develop. Additional to the water loss allowed by the leaky skin barrier in eczema, individuals with eczema lack a huge number of the beta-defensins; necessary peptides that defend the skin and have a vital role in protecting the skin from the colonization of bacteria such as the *staph aureus* for instance (Tsakok et al., 2019; Clausen et al., 2017). In the acute phase of eczema, the accompanied rash will be excoriating forming erythematous papules that are extremely pruritic. As the affected individual continues to rub the skin viscously, the skin will furtherly thicken and the process of lichenification will take place. Regarding the rash distribution in eczema, a variation in the pattern exists. Precisely in infants, the rash tends to be spread and wide in distribution with predominance in the face and the cheeks. However, as the child grows further, the rash will tend to be more localized in a specific area (Mevorah et al., 1988). The ultimate management of topic dermatitis is hydration. Moreover, topical anti-inflammatory medications are used during the periods of flare ups. However, the priority in treating these patients focus on the process of skin moisturizing on a daily basis by utilizing ointments that are extremely fragrance free (Kamińska, 2018). The present research was conducted to estimate the self reported prevalence of Eczema among the under five aged and its associated sociodemographic, maternal and environmental factor.

2. MATERIALS AND METHODS

Study Design

The study design is a cross sectional analytical study design.

Population & Settings

Our population includes the mothers of children under 5 living in Aljouf region. The Aljouf province is in the Northern KSA with the four administrative regions. Settings of the research project are department of community and family medicine/ Department of dermatology, Jouf University College of medicine.

Study duration

January 2022 to April 2022.

Sample Size and sampling

Using WHO sample size calculator, calculated sample size for measuring prevalence of eczema is 386 rounded off to 400 taking its prevalence 50% at 95% confidence level, 5% margin of error. Since we have conducted population based study with consecutive sample size, we have taken 30% extra sample to increase the power. Hence, the total sample size was 578.

Sampling technique

Consecutive non probability sampling technique was used.

Inclusion Criterion

All mothers with at least one child of either gender less than five years visiting the Maternal and Child health or General hospital in Aljouf cities (Sakaka, Qurriyat, Domatul Jandal, Tabarjal) during the data collection period were included after their informed consent. Chronic Eczema is defined as present if a physician or dermatologist have diagnosed it or two of three following essential characteristics are present Pruritis (Chronic itching) especially in evening. Distribution: Face, neck, and extensor extremities in infants and young children along with Sparing of groin and axillae. Chronic & relapsing (recurrence or more than 6 weeks).

Ethical approval

The present study was ethically cleared by the ministry of health, Qurrayat ethics committee (Approval no: 117). After getting informed consent from the parent or legal guardian the data was collected

Data Collection Tool

The first section of the questionnaire revolved around the socio demographic information of the participants' child including the gender, age in months, number of children under five, and birth time. The second part was designed to assess the present risk factors whether modifiable or non modifiable. These risk factors are extracted from the open source published data (Moreno López et al., 2021). This includes the mode of delivery, household and its environment, the nutritional status of the infant. Moreover, the questionnaire was questions that evaluate other manifestations that could accompany the allergic diseases.

Statistical Analysis

All of the statistical analyses were conducted with the utility of IBM SPSS Statistics for Mac, Version 28.0 (IBM Corp., Armonk, NY, USA). The descriptive statistics were utilized in order to describe and investigate the study variables. Chi square ($\chi 2$) test will be carried out to investigate the associations between the study variables, while student t-test was implemented to compare means and standard deviations for parametric data. The variables with a p-value that is less than (0.05) are considered statistically significant, and the goodness of fit and the differing from randomness is assessed using the Chi square.

3. RESULTS

The present study participants' sociodemographic characteristics, family history related to eczema, and maternal factors are presented in Table 1. Of the studied population, 52.95% are females with a mean ± SD age of 3.81±1.23 years. Nearly two-thirds (67.97%) of the kids had a family history of asthma, and 22.67% had a family history of eczema. More than half (54.15%) used some form of cosmetics for the kids, and 41.35% had a history of indoor smoking and/or smoking inside the car.

Table 1 Socio demographic, family and maternal factors of the children (n = 578)

Characteristics	Frequency	Proportion
Age (mean ± SD)	3.81±1.23	
Gender		
Male	272	47.05
Female	306	52.95
Mother's education		
University level	461	79.76
High school and below	117	20.24
Working women		
No	289	50.0

Yes	289	50.0
Family history of asthma		
No	162	28.03
Yes	416	67.97
Family history of eczema		
No	447	77.33
Yes	131	22.67
Mode of delivery		
Vaginal	424	73.36
Cesarian	154	26.64
Type of feeding in first six month		
Breast feeding	178	30.79
Both	135	23.36
Artificial feeding	265	45.85
Pregnancy duration		
Full term	491	84.95
Preterm	87	15.05
Cosmetic use for the kids		
No	265	45.85
Yes	313	54.15
Cigarette smoking inside home/car		
No	339	58.65
Yes	239	41.35
Pets at home		
No	476	82.35
Yes	102	17.65
History of food allergy		
No	452	78.20
Yes	126	21.80

Table 2 Univariate analysis of sociodemographic and maternal factors with the prevalence of Eczema (n=578).

Variables	Total	Eczema			
		Yes	No	Unadjusted OR (95% CI of OR) *	p-value**
Age	3.81±1.23			1.23 (0.76 – 2.22)	0.089
Gender					
Male	272	66	206	Ref	
Female	306	72	234	0.96 (0.65 – 1.41)	0.845
Mother's education					
University level	461	89	372	Ref	
High school and below	117	49	68	3.01 (1.95 – 4.65)	0.001
Working women					
No	289	77	212	Ref	
Yes	289	61	228	0.74 (0.50 – 1.08)	0.143
Family history of asthma					
No	162	69	93	Ref	<0.001
Yes	416	69	347	0.26 (0.18 – 0.40)	

Family history of eczema				Ref	
No	447	67	380	6.71 (4.36 –	<0.001
Yes	131	71	60	10.32))	
Mode of delivery					
Vaginal	424	90	334	Ref	
Cesarian	154	48	106	1.68 (1.11 – 2.54)	0.015
Type of feeding in first six month					
Breast feeding	178	48	130	Ref	
Both	135	25	110	0.62 (0.36 – 1.06)	0.104
Artificial feeding	265	65	200	0.75 (0.63 – 1.57)	0.579
Pregnancy duration					
Full term	491	110	381	Ref	
Preterm	87	28	59	1.64 (0.99 – 2.70)	0.056

* Univariate analysis without adjusted with other co variables. ** Significant value at 0.05.

Table 3 Multivariate analysis of sociodemographic and maternal factors with the prevalence of Eczema (n=578).

Variables	Total	Eczema			
		Yes	No	Exp B (95% CI of Exp B) *	p-value**
Age	3.81±1.23			1.23 (0.76 – 2.22)	0.089
Gender					
Male	272	66	206	Ref	
Female	306	72	234	0.84 (0.71 – 1.04)	0.601
Mother's education					
University level	461	89	372	Ref	
High school and below	117	49	68	1.91 (1.23 – 2.57)	0.008
Working women					
No	289	77	212	Ref	
Yes	289	61	228	0.84 (0.73 – 1.48)	0.263
Family history of asthma					
No	162	69	93	Ref	0.013
Yes	416	69	347	0.71 (0.58 – 0.93)	
Family history of eczema					
No	447	67	380	Ref	0.001
Yes	131	71	60	4.32 (2.61 – 6.96)	
Mode of delivery					
Vaginal	424	90	334	Ref	
Cesarian	154	48	106	0.98 (0.94 – 1.41)	0.061
Type of feeding in first six month					
Breast feeding	178	48	130	Ref	
Both	135	25	110	0.79 (0.56 – 1.46)	0.231
Artificial feeding	265	65	200	0.94 (0.76 – 2.66)	0.327
Pregnancy duration					
Full term	491	110	381	Ref	
Preterm	87	28	59	1.76 (0.89 – 1.67)	0.074

* Binomial logistic regression analysis adjusted with other co variables. ** Significant value at 0.05.

Initially we have done the univariate analysis using SPSS among the all the variables, followed by the multivariate statistics that adjusted the odds ratio with the other characteristics used in the study. After the multivariate analysis, the results revealed that Eczema among the children was significantly related to mother's education (OR [95% CI] = 1.91 [1.23 – 2.57], p = 0.008), family history of bronchial asthma (OR [95% CI] = 0.71 [0.58 – 0.93], p = 0.013), and family history of eczema (OR [95% CI] = 4.32 [2.61 – 6.96], p= 0.001).

Table 4 Univariate analysis of environmental factors with the prevalence of Eczema (n=578).

Variables	Total	Eczema			
		Yes	No	Unadjusted OR (95% CI of OR)*	p-value **
Cosmetic use for the kids					
No	265	65	200	Ref	
Yes	313	73	240	0.94 (0.64 – 1.37)	0.806
Cigarette smoking inside home/car					
No	339	76	263	Ref	
Yes	239	62	177	1.21 (0.82 – 1.78)	0.373
Pets at home					
No	476	98	378	Ref	
Yes	102	40	62	2.49 (1.57 – 3.92)	<0.001
History of food allergy					
No	452	78	374	Ref	<0.001
Yes	126	60	66	4.36 (2.85 – 6.67)	

* Univariate analysis without adjusted with other co variables. ** Significant value at 0.05.

Table 5 Multivariate analysis of environmental factors with the prevalence of Eczema (n=578).

Variables	Total	Eczema			
		Yes	No	Exp B (95% CI of Exp B)	p-value
Cosmetic use for the kids					
No	265	65	200	Ref	
Yes	313	200	240	1.12 (0.97 – 2.01)	0.518
Cigarette smoking inside home/car					
No	339	76	263	Ref	
Yes	239	62	177	1.07 (0.91 – 1.63)	0.091
Pets at home					
No	476	98	378	Ref	
Yes	102	40	62	1.68 (1.32 – 2.71)	0.001
History of food allergy					
No	452	78	374	Ref	
Yes	126	60	66	3.71 (2.33 – 5.83)	<0.001

* Binomial logistic regression analysis adjusted with other co variables. ** Significant value at 0.05.

Similar to the socio demographic and maternal factors, we have completed the multivariate statistical analysis for environmental factor also and we have found that eczema was significantly related to presence of pet animals in the house (OR [95% CI] = 1.68 [1.32 – 2.71], p = 0.001) and history of food allergy (OR [95% CI] = 3.71 [2.33 – 5.83], p<0.001).

4. DISCUSSION

Chronic eczema is significantly impacting the quality of life among the affected people that including stigmatization (Wu & Cohen, 2019; Birdi et al., 2020). The present study estimated the self reported prevalence of eczema among the under five aged and its associated sociodemographic, maternal, and environmental factors. Paternal education, especially the mother's education, is an important predictor for managing childhood eczema and improving the outcome (Cheng et al., 2020). The present study explored that a mother's education is one of the important predictors identified through binomial logistic regression analysis (OR [95% CI] = 1.91 [1.23 – 2.57], p = 0.008). The current population based research finding is supported by a survey done by (Dom et al., 2009). In their study, they revealed that maternal education level is significantly correlated with several aspects of eczema and plays a major role in developing eczema in children. An interesting RCT conducted in China in 2020 by (Cheng et al., 2020) reported that paternal education through nurses could improve the management of atopic dermatitis among children. In contrast to this study, (Lopez et al., 2022) reported different findings.

Children with a family history of atopic sensitization, such as bronchial asthma, allergic rhinitis, and eczema, could be significant factors, and this will help the health care workers to provide focused health education. Our research reported that family history of bronchial asthma (OR [95% CI] = 0.71 [0.58 – 0.93], p = 0.013), and family history of eczema (OR [95% CI] = 4.32 [2.61 – 6.96], p= 0.001). Similarly, the PACT Study conducted by (Saunes et al., 2011) in Norway and (Young et al., 2019) also reported that family history was an important risk factor for childhood eczema. Our study did not find any significant association of second hand indoor smoking and presence of Eczema (OR [95% CI] = 1.07 [0.91 – 1.63], p = 0.091). Interestingly, recent research published by (Jing D et al., 2020) explored that passive smoking is one of the risk factors that can be modified to decrease atopic dermatitis. This most striking contrast is due to the inclusion of the study population. Our research explored self reported prevalence among under-five years of age children, while (Jing et al., 2020) conducted it among college students.

The current research team explored that eczema among children was higher among the children; with we have found that eczema was significantly related to the presence of pet animals in the house (OR [95% CI] = 1.68 [1.32 – 2.71], p = 0.001) and history of food allergy (OR [95% CI] = 3.71 [2.33 – 5.83], p<0.001). A study conducted in Kuwait also reported a higher proportion of children had eczema and had pets in their homes (Al Shatti et al., 2020). Identifying the association between food allergy and eczema is an essential component of any research related to eczema. Similar to our study, a review by (Graham & Eigenmann, 2020) also found that a significant frequency of children with eczema had an asymptomatic food allergy. Although we have completed the research with adequate participants and methods, the current major limitation is self reported prevalence, as it may not reflect the actual prevalence of eczema. Also, there is a probability of overreporting by the respondents.

5. CONCLUSION

Our population based cross sectional study explored that eczema is highly prevalent among the under five years aged children. We also revealed several possible predictors for eczema development. Furthermore, the present study identified the number of modifiable risk factors through the predictor analysis. Hence, our study findings recommend the respective authorities conduct health promotion and awareness campaigns in public regarding eczema and its risk factors. Furthermore, we suggest multicity research, including different parts of the KSA.

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Author Contributions

ZMA and MSA: Made substantial contribution in concepts and design of the study.

ZMA and MSA: Involved in acquisition of data.

MSA: Involved in data entry

ZMA and MSA: Involved in analysis of data and its interpretation.

ZMA*:* Involved in drafting the article and MSA involved in critically revising the manuscript

All authors approved the final version of manuscript to be published. All authors agreed to be accountable for all aspects of the work.

Ethical approval

The study was approved by the Medical Ethics Committee of ministry of health, Qurrayat, Saudi Arabia (Ethical approval code: 117).

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Conflict of interest

The authors declare that there is no conflict of interests

Data and materials availability

All data associated with this study are present in the paper.

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