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Original Research Article

The prevalence of atopic dermatitis and the effect of breastfeeding on atopic dermatitis among Saudi infants aged up to six months in the Al Madinah region

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ABSTRACT

Background: Atopic dermatitis (AD) is a common skin condition in infants, and breastfeeding has been proposed as a potential protective factor. The study aims to investigate the prevalence of AD in infants based on guardians' reports and the impact of exclusive breastfeeding (EBF) and formula feeding on the incidence of AD among Saudi infants in the Al Madinah region.
Methods: A cross-sectional survey of 200 mothers with infants was conducted using a structured questionnaire. Data collected included demographics, breastfeeding practices, infant characteristics, allergies, and AD diagnosis. Statistical analysis employed chi-square.
Results: There were a total of 200 infants, out of which 145 (72.5%) had AD, as confirmed by pediatricians. Gender was significantly associated with the prevalence of AD. Based on their nutritional source, 62 (42.8%) were on EBF, and 83 (57.2%) were non-EBF. Infant nutrition was found to be significantly associated with the hospitalization time of infants because of AD. Other AD risk factors, such as parental allergies, feeding frequencies, and frequency of AD episodes, were not significantly associated with the type of feeding.
Conclusions: This study found that AD is quite prevalent in the Al Madinah region of Saudi Arabia. AD was more prevalent in male infants than in females. It suggests that EBF may be a protective factor against hospitalization of Saudi infants because of AD.

Keywords: Allergy, Formula-fed, Infants, Breastfeeding, AD

INTRODUCTION

Atopic dermatitis (AD) is a common inflammatory skin condition that affects infants and children worldwide, including in Saudi Arabia. The prevalence of AD has been increasing worldwide, including in Saudi Arabia, where it is estimated to affect up to 20% of children under the age of six years old. The prevalence of AD has been reported to be higher in formula-fed infants than in breastfed infants, suggesting that breastfeeding may have a protective effect against the development of AD.[1] The aetiology of AD is multifactorial, involving genetic, environmental, and immunological factors. The prevalence of AD is higher in developed countries, suggesting that lifestyle factors may contribute to its development.[2]

Breastfeeding has many benefits for the mother and infant, including optimal nutrition and immune protection.[3] The world health organization recommends EBF for the first six months to promote optimal growth and development and reduce the risk of infectious diseases and other health conditions. Breast milk also contains cytokines and growth factors, which contribute to developing the infant's immune system.[4,5]

Several studies have investigated the association between breastfeeding and AD, but the evidence needs to be more consistent. A meta-analysis of 21 studies found that EBF for at least four months was associated with a reduced risk of AD (odds ratio [OR] 0.68; 95% confidence interval [CI] 0.62-0.75).[6] However, some studies have reported no significant association between breastfeeding and AD.[5]

Few studies have examined the association between breastfeeding and AD among Saudi infants. A study found that EBF for at least six months was associated with a lower risk of AD (OR 0.14; 95% CI 0.03-0.67).[7] Another study conducted in Jeddah, Saudi Arabia, found that EBF for at least six months was associated with a lower risk of eczema (OR 0.44; 95% CI 0.21-0.94).[6]

The immunological properties of breast milk are thought to play a role in reducing the risk of AD. Breast milk contains immunoglobulin A (IgA), which protects against infections and allergens. IgA also modulates the gut microbiota, which is thought to be involved in the development of AD.[8] However, the evidence for this association is inconsistent, and few studies have examined this association among Saudi infants.

The duration of EBF may also be necessary in reducing the risk of AD. A study conducted in the United States found that longer EBF was associated with a lower risk of AD (OR 0.89 per month; 95% CI 0.82-0.97).[8] A study conducted in Japan found that EBF for at least six months was associated with a lower risk of AD (OR 0.70; 95% CI 0.52-0.93).[9]

While the protective effect of breastfeeding against AD has been reported in many studies, there is limited research on this topic in Saudi Arabia, particularly in the Al Madinah region (AL-Hijaz area of Western Saudi Arabia). This is the desert region where the summers are harsh, and there is no humidity in the area. The temperature in summer reaches 49 degrees. Research has found that high temperatures with less humid air cause the early onset of eczema, leading to AD.[10] Therefore, this research proposal aims to investigate the effect of breastfeeding on the incidence of AD among Saudi infants up to 6 months old in the Al Madinah region.

The study aims to investigate the prevalence of AD among Saudi infants in the Al Madinah region, based on guardians' report and the impact of EBF and formula feeding on the prevalence of AD among Saudi infants in the Al Madinah region.

METHODS

It was a cross-sectional study where data was collected through convenience sampling. The Data was collected from 200 guardians of Saudi infants, girls and boys aged 0-6 months, living in the Al Madinah region. Based on the researchers ' convenience, data collection locations were the maternity, children's hospitals and primary health care centres in the Al Madinah region, Saudi Arabia. The study was carried out from January 2024 to April 2024.

A definite population did not determine the sample size because the AD population was not studied previously in the region. The age limit of EBF ranges from 4 to 6 months, according to world health organization and European recommendations. Data was collected using a well-structured, pre-designed, validated electronic questionnaire from a similar previous study.[10] The questionnaire consisted of three sections. In section one, questions related to demographics (such as gender, age of the infant, guardian education and residency) were asked, and section two contained questions related to feeding practices (exclusive or non-EBF). Lastly, section three consisted of questions about the onset of AD among infants and the risk factors. Pediatricians confirmed and diagnosed the positive cases of AD after receiving approval from the mothers. This study used the electronic questionnaire to collect data through one-to-one interviews with the participant's parents in the maternity and children's hospital and primary health care centres in the Al-Madinah region.

Data was analysed using the statistical package for social program (SPSS, V.21.0. IBM: Chicago). The demographic variables were analysed using descriptive analysis to calculate the mean, frequency and percentage. A chi-square and correlation test were performed to find the association of AD with gender and age. The association of risk factors of AD with feeding practices were also analysed using the chi-square test. A value of p less than 0.05 was considered significant.

Ethical approval for conducting the study was obtained from the Al-Rayan research ethics committee (registered with the national bioethics committee in KACST, Saudi Arabia). The study ID was HA-03-M-122-073, dated January 29, 2024. Online consent from the participants was obtained. Questions were asked, and approval was taken in Arabic. They were independent in deciding whether they wanted to fill out the form. The personal data of participants was kept confidential.

RESULTS

In this study, 200 infants were taken as a sample, and data was collected from their guardians. Based on the guardian

details, 86 (48%) mothers were aged 26-35. There were 88 (44%) parents with kinship relations and 163 (81.5%) parents who lived in Al Madinah City. Based on the educational level, 180 (65%) guardians had studied for a bachelor's degree (Table 1).

There were 120 (60%) male infants and 80 (40%) were females, 127 (68.5%) of infants were aged 5-6 months, 49 (24.5%) were 4-8 months, and 24 (12%) were only 1-2 months old. As per the prevalence of eczema, 145 (72.5%) infants were diagnosed with AD based on guardians' perceptions. The age of the infant at the time of diagnosis was 4-8 months for 78 (37%) infants, 5-6 months for 44 (22%) infants and 1-2 months for 28 (14%) infants (Table 2).

Further, the question was asked if the infant was ever diagnosed with AD. Responses reported that 145 (72.5%) were diagnosed with AD, and 55 (27.5%) were not diagnosed with AD by the dermatologist. Out of 55 infants, there were 31 (15.5%) were females and 24 (12.0%) were male infants, and among the 145 AD cases, there were 49 (24.5%) females and 96 (48.0%) males with a $p<0.05$ reporting significant difference of AD onset among both genders. As per the age distribution for 4-6 months old age group, 40 (20%) of infants didn't have eczema, and 87 (43.5%) had eczema, but no significant difference was found between the age group and AD prevalence (Figure 1 and Table 3).

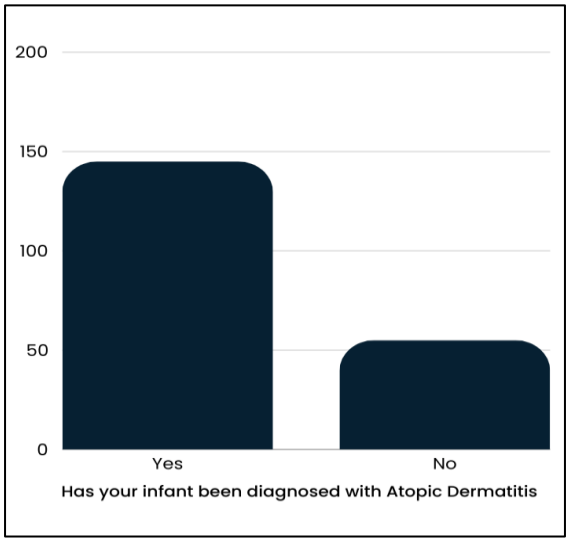

Figure 1: Prevalence of AD in Saudi Infants.

Guardians were asked about the mean of infant nutrition. 62 (42.8%) infants were on EBF, and 83 (67.2%) infants were non-EBF (Figure 2).

A chi-square test was performed to find the association of infant nutrition with the risk factors for AD. Multiple factors were studied, such as mother vitamin intake, allergies in parents and infants other than AD, frequency of allergic reactions, hospitalisation and number of feeds. Results presented a significant relation between infant nutrition, such as EBF, and non-EBF intake with hospitalisation of infants because of AD. Other factors were not significantly associated (Table 4).

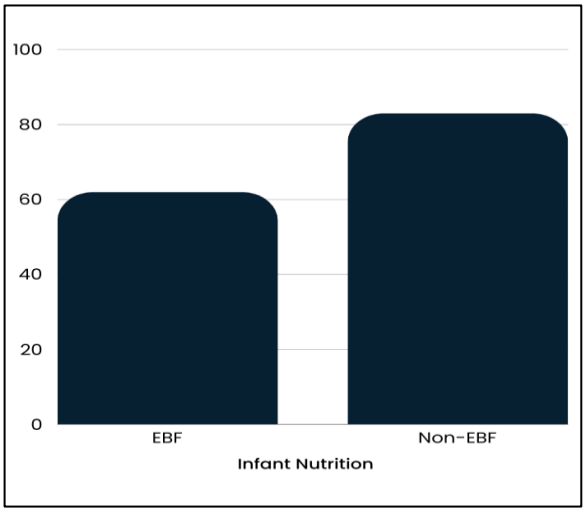

Figure 2: Distribution of infants based on infant nutrition.

Table 1: Demographic details of guardians (n=200).

Characteristics	N	Percentages (%)
Mothers' age (in years)		
19-25	35	17.5
26-35	86	43.0
36-40	54	27.0
41-45	16	8.0
Older than 45	9	4.5
Is there a kinship relationship between parents?		
Yes	88	44.0
No	112	56.0
Place of living		
Inside Al Madinah	163	81.5
Outside Al Madinah	37	18.5
The guardian's educational level		
Secondary school	40	20.0
Bachelor's	130	65.0
Master's	24	12.0
Ph.D.	6	3.0

Table 2: Demographic data of infants.

Variables	N	Percentages (%)
Baby's gender		
Male	120	60.0
Female	80	40.0
Baby's age (in months)		
1-2	24	12.0
3-4	49	24.5
5-6	127	63.5

Table 3: The gender and age distribution of infants based on AD diagnosis.

Variables	Eczema, N (%)		Chi-square*	P value*
Gender	**Yes**	**No**		
Female	31 (15.5)	49 (24.5)	8.46	0.003
Male	24 (12)	96 (48)		
Age (in months)				
1-2	3 (1.5)	21 (10.5)	3.98	0.139
3-4	12 (6)	37 (18.5)		
5-6	40 (20)	87 (43.5)		

*Chi-square and p value (p<0.05 was taken as significant).

Table 4: Association of infant nutrition with risk factors of AD.

Variables	Breast fed infants (n=62)	Formula fed infants (n=83)	Chi-square value	P value
Vitamin intake during pregnancy				
No	12	8	2.81	0.076
Yes	50	75		
Parental allergy history				
No	39	62	2.33	0.089
Yes	23	21		
Other allergies in parents				
Allergic rhinitis	6	14	6.61	0.085
asthma	8	2		
Eczema	9	22		
nothing	39	45		
Frequency of feed				
3-4 times times	5	4	1.40	0.70
5-6 times times	19	32		
7-8 times times	25	32		
More than 8 times	13	15		
Other allergies in infants				
No	38	57	0.85	0.22
Yes	24	26		
Atopic in past months				
No	6	3	0.87	0.22
Yes	56	80		
Frequency of eczema				
1-2 times times	15	23	4.65	0.19
3-4 times times	24	38		
5-6 times times	6	11		
More than 6 times	17	11		
Hospitalization because of eczema				
1-2 times times	7	23	67.9	0.00
3-4 times times	3	0		
5-6 times times	2	2		
More than 6 times	50	57		
Dermatological consultation				
No	9	9	0.44	0.33
Yes	53	74		

*Chi-square and p value (p<0.05 was taken as significant).

DISCUSSION

Our study explored the prevalence and predictors of AD in Saudi infants (residing in the Al-Madinah region) up to 6 months old, with a particular focus on the potential protective effect of EBF. The findings provide valuable insights into this population and contribute to the ongoing discussion on breastfeeding and AD prevention. The prevalence of AD in our study was 72.5%, consistent with reports from other regions.

A similar study was conducted in the Makkah region of Saudi Arabia, where the data was collected from 200 infants aged up to 6 months. According to their results,

the overall prevalence of AD was 53%, making 106 positive cases, out of which 43 were on EBF and 63 were on non-EBF. This study found a significant difference in the onset of AD based on infant feeding practices.[11] Results from the current study support the findings of the previous studies, whereas the overall prevalence in the current study was 83%, and out of 145 cases, 62 were on EBF, and 83 were non-EBF. These findings underscore the importance of promoting and supporting sustained EBF during the early months of life. The precise mechanisms by which breastfeeding might protect against AD are still under investigation. Potential explanations include the transfer of maternal antibodies and immune modulators.

Furthermore, this study focused on the risk factors of AD, early age as infancy, parental history of allergies, frequency of feedings, frequency of AD episodes and the frequency of hospitalisation because of AD studied among both infants who were on EBF and non-EBF. It was seen that non-EBF infants had more hospitalisation time than EBF infants. This concluded that EBF can reduce the severe cases of AD. A multinational survey study was conducted where the data from Europe and North America revealed that parental history of asthma and other allergies can result in the onset of AD in their offspring. In the current study, no such association was found.[12]

It has been seen that with age, the prevalence of AD decreases. As they get older, many children with AD may no longer experience their symptoms. Eventually, they may also acquire respiratory allergies such as asthma and rhino-conjunctivitis. Numerous cross-sectional and longitudinal investigations conducted in innumerable nations have substantiated the natural course of AD. In general, young children with AD tend to have more severe and persistent cases, especially if they have certain risk factors, such as genetics. However, in the current study, age was not significantly associated. This study only collected data from infants, so the variation in age groups can be studied in future research.

This study found that the onset of AD was significantly higher among Saudi male infants than female infants. A study conducted on 1005 infants in the US supports the findings of the current study as they also reported that the male gender is significantly associated with the onset of AD in the first six months of life.[13]

Given the potential protective effect of EBF observed in our study, several implications for public health interventions emerge. Promoting and supporting EBF practices, educational programs, lactation counselling, and community support groups can empower mothers to initiate and sustain EBF during the critical early months. Early identification and management of AD, implementing routine infant screening programs for AD risk factors and providing timely access to dermatological care can improve outcomes for affected infants. Tailoring interventions to specific populations: Our findings highlight the importance of culturally sensitive interventions that address local breastfeeding practices and the particular needs of the Saudi population.

Limitations

Recall bias is possible, and this study has a relatively small sample size. The data collection location can also limit the study, as in a hospital setting, mostly health-compromised infants are present. Future research with larger cohorts and longitudinal designs is needed to confirm the findings further and elucidate the underlying mechanisms of protection. Additionally, investigating the effectiveness of targeted interventions to promote EBF and prevent AD in this population would be of significant value.

CONCLUSION

This study highlights the uprising health problem of AD among Saudi infants and concludes that male infants are more prone to getting AD in the early six months of life. It provides compelling evidence for the potential protective effect of EBF against AD in Saudi infants. These findings encourage developing and implementing comprehensive public health strategies to promote optimal breastfeeding practices and potentially mitigate the burden of AD in this region. Further research is crucial to expand our understanding of this relationship and optimise interventions for mothers and infants.

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Ethical approval: The study was approved by the Institutional Ethics Committee HA-03-M-122-073 taken from Al-Rayan Research Ethics Committee (registered with the National Bioethics Committee in KACST, Saudi Arabia.

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