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# Epidemiology and risk factors of atopic dermatitis among children in Basrah, Iraq

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**ABSTRACT**

Atopic dermatitis is a major public health problem, especially among children and has an economic burden at family and community levels. The present research aimed to study the frequency, distribution and determinants of atopic dermatitis in Basrah city, Iraq. A cross-sectional study was carried out between December 2020 and March 2021 at the dermatology outpatient clinic of Alfayhaa Hospital in Basrah, Iraq. The overall prevalence of the disease among children was 21.3 %. The age-specific prevalence rate among infantile, childhood and adolescent groups were 40.7%, 21.7%, and 12.1%, respectively. One hundred Four children who attended the dermatology outpatient clinic were diagnosed with Atopic dermatitis. The mean age of the patients was 6.6±2.8 years. In 87.5% of the cases, the onset of disease was before two years of age. Using objective scoring atopic dermatitis (SCORAD), the disease was classified into mild, moderate and severe with a percentage of 10.6, 83.6, and 5.8, respectively. There was no significant association between the severity of atopic dermatitis with early-onset, positive family history of atopy, nor a high body mass index (BMI). We recommend further large-scale and community-based studies to estimate the real burden of the disease with emphasis on preventive measures.



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## 1. INTRODUCTION

Atopic dermatitis (AD) is a chronic, pruritic inflammatory skin disease with exacerbations and remission. The onset is usually before the age of two years. AD is frequently seen associated with a personal or a family history of atopy [1]. AD is one of the commonest chronic inflammatory skin disorders affecting 10–20% of children and 1–3% of adults worldwide [2]. The prevalence is higher in developed nations. Over the past thirty years, the prevalence had increased by two to three folds in both developed and developing countries [3].

Knowledge about the epidemiology and the associated risk factors for AD among children in a Middle Eastern country with a hot climate, such as Iraq, is insufficient. Only one study in Basrah was published during the last decade that discussed the age-specific prevalence of AD [4]. AD can affect patients' functionality, mental well-being, and social interactions. The study aimed to investigate the clinico-epidemiological features of AD in Basrah city, Iraq. The study draws attention to modifiable risk factors to aid in disease prevention.

## 2. RESEARCH METHOD

A cross-sectional study was carried out to show the frequency, distribution and determinants of AD in Basrah city, Iraq. All the children aged less than 16 attended the dermatology outpatient clinic of Al-Alfayhaa

Teaching Hospital over the period extending from the 1st of December, 2020 to the 1st of March, 2021 and fulfilled the Hanifin and Rajka diagnostic criteria for AD were included in the study. A special questionnaire form developed for the purpose of the study was filled for each child included in the study through a direct interview with the parents of the children. The questionnaire included questions which cover the following aspects: the sociodemographic characteristics as the age, gender, age of onset of the disease, place of residence, family size, educational level of the mother and exposure to passive smoking status, in addition to the clinical characteristics as aggravating factors, seasonal variation of the symptoms, and family history of atopy. After completing the interview, each child was fully examined by the researcher herself to determine the stages whether (acute, subacute, or chronic AD).

Additionally, the severity of the diseases was determined by using the objective scoring atopic dermatitis (SCORAD) [5], accordingly, the severity was classified into mild, moderate and severe. A score less than 15 is considered mild. A score ranging from 15 to 40 is moderate severity, while a score more than 40 is regarded as severe AD [6]. The examination also involved measuring the weight and height (or length for under two years patients) and then calculating the body mass index (BMI). BMI scores were interpreted using "The World Health Organization charts of BMI for age Percentiles" [7].

The data were coded and analyzed using the statistical package for the social sciences (SPSS) version 25. Numeric variables were presented as mean ± standard deviation. Categorical data were formulated as frequencies and percentages (%). A p-value of 0.05 was considered statistically significant, and the Fisher's exact test was used to estimate the significance of the association.

## 3. RESULTS AND DISCUSSION

### 3.1. Results

A total of 488 children under 16 years who attended the dermatology outpatient clinic in Alfayhaa Teaching Hospital in Basrah. Of them, those who satisfied the Hanifin and Rajka diagnostic criteria of AD were one-hundred-four. The overall prevalence of AD among children during the three months was 21.3%, see Figure 1. The age-specific prevalence rates among infantile (<2years), children (2–10 years) and adolescents (11–15 years) were 40.7, 21.1, and 12.1 per 100 population, respectively. Figure 1 shows the time trend of AD prevalence in Iraq according to previous studies in the past decades along with our study result [8]–[10]. This figure reveals the fluctuating prevalence of AD in Iraq with a markedly increased prevalence from 5.8% in 1997 to 21.3% in the present study.

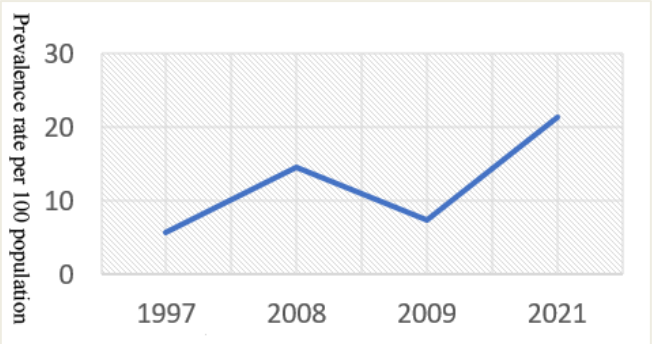


Figure 1. The time trend of AD prevalence in Iraq

The mean age of patients with AD was 6.7±2.8 years. Most of the participants lived in Basrah city center 71(68.3%). Family size was regarded as large if six or more individuals were found to live in the same house. In this study, 78(75.0%) had large household members. Only 38(36.5%) of the mother had completed 12 years or more of education. The feeding pattern during infancy was as follows: 44(42.3%) were breastfed, 39(37.5%) were formula-fed and 21(20.2%) had mixed feeding. The majority of the patients were exposed to environmental tobacco smoke 76(73.1%). Moreover, 95(91.3%) of them had a positive family history of atopy (asthma, allergic rhinitis or AD). The BMI was interpreted as normal in 82(78.9%), overweight in 7(6.7%) and obese in 15(14.4%). This result is showen in Table 1.

Table 1. The sociodemographic features of patients

| Variables | N (%) | Variables | N (%) |
|---|---|---|---|
| Gender | | Type of feeding | |
| Male | 55(52.9) | Breastfed | 44(42.3) |
| Female | 49(47.1) | Formula-fed | 39(37.5) |
| Place of residence | | Mixed | 21(20.2) |
| City center | 71(68.3) | Exposure to passive smoking | |
| Periphery | 33(31.7) | Exposed | 76(73.1) |
| Family size | | Not exposed | 28(26.9) |
| ≥6 | 78(75.00) | Family history of atopy | |
| <6 | 26(25.00) | Positive | 95(91.3) |
| Maternal Education | | Negative | 9(8.7) |
| ≥12 years | 23(22.1) | BMI | |
| <12 years | 81(77.9) | Normal | 82(78.9) |
| | | Overweight | 7(6.7) |
| | | Obese | 15(14.4) |

Among 87.50% of the patients the onset of disease was before the age of two years. The mean duration of AD symptoms was 23.9±21.01days (range from 3 to 60) days. Among 56(53.9%) of the patients had exacerbations during winter and autumn. The present study reveals that a combination of more than one provocative factor was seen in 75(72.1%) patients such as physical irritation by wool, use of soap and detergents, sweating and certain types of food as eggs, chicken, eggplants, tomato. None-of the patients reported an exacerbation following vaccination. Acute lesions were seen in 64(61.5%). Lesions were subacute in 40(38.5%). The severity varied from mild in 11(10.6%), moderate 87(83.6%) and severe in 6(5.8%) of the subjects, see Table 2. The relationship between the severity and some of the sociodemographic and clinical parameters of the study group was investigated. There was no significant association between the severity of AD with the early-onset of disease, gender, a positive family history of atopy, type of feeding, smoking exposure nor a high BMI. The data tabulated in Table 3.

Table 2. The clinical characteristics of patients

| Variables | N (%) | Variables | N (%) |
|---|---|---|---|
| Age of onset | | Stage of dermatitis | |
| ≤2 years age | 91(87.5) | Acute | 64(61.5) |
| >2 years | 13(12.5) | Subacute | 40(38.5) |
| Seasonal variation of symptoms | | Chronic | 0(0.00) |
| Winter, autumn | 56(53.9) | Severity | |
| Spring, summer | 4(3.9) | Mild | 11(10.6) |
| No variation | 44(42.3) | Moderate | 87(83.6) |
| Aggravating factors | | Severe | 6(5.8) |
| Not recognized | 1(0.9) | | |
| One factor | 28(26.9) | | |
| Combination of >one | 75(72.2) | | |

Table 3. The association of disease severity with some clinical parameters

| Variables | Severity of AD N (%) | | | p-value |
|---|---|---|---|---|
| | Mild | Moderate | Severe | |
| Age of onset | | | | |
| ≤2 years | 10(11.0) | 75(82.4) | 6(6.6) | 0.58 |
| >2 years | 1(7.7) | 12(92.3) | 0(0.0) | |
| Gender | | | | |
| Male | 4(7.3) | 47(85.4) | 4(7.3) | 0.43 |
| Female | 7(14.3) | 40(81.6) | 2(4.1) | |
| Family history of atopy | | | | |
| Positive | 10(10.5) | 79(83.2) | 6(6.3) | 0.74 |
| Negative | 1(11.1) | 8(88.9) | 0(0.0) | |
| BMI | | | | |
| Normal | 9(11.0) | 70(85.4) | 3(3.6) | 0.48 |
| Overweight | 1(14.3) | 5(71.4) | 1(14.3) | |
| Obese | 1(6.7) | 12(80.0) | 2(13.3) | |
| Type of feeding | | | | |
| Breastfeeding | 6(13.6) | 33(75.0) | 5(11.4) | 0.19 |
| Formula-fed | 3(7.7) | 36(92.3) | 0(0.0) | |
| Mixed | 2(9.5) | 18(85.7) | 1(4.8) | |
| Exposure to passive smoking | | | | |
| Present | 7(9.2) | 65(85.5) | 4(5.3) | 0.69 |
| Absent | 4(14.3) | 22(78.6) | 2(7.1) | |

### 3.2. Discussion

Atopic dermatitis is a chronic relapsing inflammatory skin disorder and is considered as a significant health issue especially in children. It is a highly prevalent disease and has an impact on the quality of life [11]. Epidemiological studies concerning AD have provided valuable knowledge that helped in understanding the disease. However, studies about the prevalence of AD in Iraq are generally limited.

There is a trend of increased prevalence of AD which goes in line with International Study of Asthma and Allergies (ISAAC) phase III results that displayed an increase in AD prevalence in developing countries [12]. This might be explained by rapid urbanization, increasing exposure to allergens, more frequent bathing and more use of detergents and adopting western lifestyle. Some of this increase might be attributable to the improved recognition of the disease both by parents and physicians.

In 2015, a cross-sectional study in Jeddah, Saudi Arabia showed a similar reported prevalence of 21.6% among children with comparable ages (neonate–15 years) [13]. This resemblance to our study in the overall prevalence (21.312%) can be related to similarity in the targeted age group, racial factors and the quietly comparable climatic circumstances. This study also revealed that the prevalence of AD among infantile age group was 40.74% which was comparable to a previous hospital-based study in Basrah on 2013 which showed that infantile AD prevalence was 34.7% [4].

Among children aged 2–10 years, our study showed that the prevalence was 21.07% which was relatively higher than the prevalence in Basrah 2005 where the prevalence was 17.8 in a comparable age group [4]. This goes in line with our findings that the prevalence of AD is increasing in the country. For the adolescent group, the prevalence was 12.12% which is similar to some extent to the prevalence in Saudi Arabia (11.4%) with comparable age group (10–15 years) [14]. The prevalence was higher in Korea, Qatar with 22.6% and 22.5% prevalence rates, respectively [15], [16]. This could be attributed to the higher living standards and socioeconomic development in these countries in addition to genetic and racial factors.

It is clear that the prevalence of AD was decreasing with increasing age. This goes in line with the well-established fact that the disease spontaneously improves at some point of age and that 60% of affected children would still have the disease by adolescent [1]. The relatively high percentage of patients living in city center could be related to the better living standards and more pollutant exposure, however this also can reflect the fact that this hospital provides services mainly to center of Basrah. This agrees with a study in Nigeria where no association was found between the prevalence of skin allergy and urban or rural residence [17].

A study in Korea found that duration of education of the mother has an inverse relationship with the prevalence of AD [15]. Contrary, a study in Central America found that higher maternal education was associated with more AD prevalence [11]. The present study reveals that the majority of the mothers had an education of less than 12 years probably reflecting an overall lower educational status of the mothers in the region. This study showed that a large proportion of patients (91.3%) had a positive family history of atopy among first-degree relative (father, mother or siblings). This agrees with a study in Saudi Arabia found more than 56% of patients had a positive family history of atopy [18]. Another previous study in Kuwait that found maternal and paternal history of atopy are independently strong predictors to have one or more allergic diseases [19].

A hospital-based study in India, 2012 found that percentage of breastfeeding, formula feeding, and mixed feeding were 30%, 7.77%, and 62.23%, respectively. This differs from feeding pattern in the current study where formula feeding is relatively higher. The exact influence of breastfeeding on AD risk is still a matter of debate. While exclusive breastfeeding for more than six months was associated with decreased incidence of AD [20]. On the other hand, a systematic review of 16 studies on 2019 concluded that breastfeeding may not have a protective effect against AD [21].

Two studies in Korea and Kuwait found a significant association between environmental tobacco smoke and AD [22], [23]. This is consistent with what we found in our study that percentage of exposed patients to passive smoking is relatively high (73.1%). A study on 2017 in Korea concluded that AD was associated with being obese or overweight [24]. This also was found in a case-control study in Basrah [25]. In our study 21.15% of the patients were overweight or obese.

A basic fact regarding AD is that the onset of the disease in nearly 80% of the patients is before the age of two years [1]. Our study had a corresponding figure as in 87.5% symptoms started below two years. This study revealed that winter/autumn seasons were the seasons of exacerbations of symptoms. These results agreed with two studies in Japan and Korea found that there were flare ups during winter season [26]. This winter exacerbation can be explained by lower humidity that affect skin barrier function and environmental influence as air pollutants.

A high percentage of the participants (72.1%) had more than one aggravator. Similarly, a study in Iran in 2014 found that climatic changes, sweating, food, and clothing were the most frequent aggravators. The Iranian study found that 3.8% had their disease triggered by vaccination [27]. In 2020, a cross-sectional study in Madagascar showed that acute, subacute and chronic lesions represent percentages of 78.1%, 8.6% and

6.6%, respectively [28]. This was comparable to some extent to our data in which the acute lesion are the most predominant ones. This can be attributed to the high prevalence of acute lesions among the infantile age group.

A cross-sectional study on 2014, Turkey had a pattern of severity distribution using objective SCORAD with 23.4% were mild, 59.1% moderate, and 17.8% severe AD [29]. This is a quiet similar pattern to our results which is probably due to the hospital-based design of the study as patients who experience more suffering tend to seek help while milder cases maybe neglected or passed unnoticed by the parents. This draws our attention to the burden of unrecognized milder cases that could be neglected or those who are treated with over-the-counter medications.

Similar to our study, the later Turkish study also found no significant association between severity of AD with onset of disease or family history of atopy [29]. This lack of association with family history was also seen in a five years cohort study from 2012–2017 in Denmark but, in that study patients with early onset had more severe disease [30]. Early-onset and more severe disease can be attributed to the genetic predisposition to have the disease. A case-control study in Italy found that there was no correlation between BMI and SCORAD score among children aged 1–11 years [31]. Another cohort study of infant in Norway concluded that no association between BMI and AD severity [32]. The current study shows similar figure.

## 4. CONCLUSION

The current study revealed that the prevalence of AD is increasing in Iraq. As a result of urbanization, improvement in hygienic standards and increased exposure to pollutants. From a genetic point of view, this high prevalence can be explained by high rates of consanguineous marriage in the region. The true prevalence of the disease maybe underestimated as milder cases may not seek medical advice or treated with over-the-counter treatments and some are treated at primary health care centers or private sectors. Further large-scale and community-based studies are recommended.

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