

Environmental factors associated with the severity of atopic dermatitis in Cotonou and Parakou, Benin, in 2020

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ABSTRACT

Background: Atopic dermatitis is an inflammatory chronic disease. The objective of the study was to assess the influence of environmental factors on the severity of atopic dermatitis. **Materials and Methods:** A cross-sectional prospective study was conducted at a pediatric department in Cotonou and Parakou among children aged 0–17 years with atopic dermatitis. The severity of atopic dermatitis was assessed using SCORAD. Data on environmental factors was collected on the fields or by asking questions to the parents. **Results:** Sixty-seven girls and forty boys were included using the United Kingdom Working Party criteria. The prevalence of atopic dermatitis was 5.1%. The mean age at the onset of disease was 36.06 ± 42.48 months. Pruritus was present in 97.2% of the cases and sleep disturbing in 25.2% of the cases. Common eczema was present in 44.8% of the cases and follicular eczema in 11.2%. Mild to severe atopic dermatitis were observed in 68.8%. Factors associated with the severity of atopic dermatitis were dry season, light wind's rate, some foods such as maize, sorghum, millet, eggs, okra, use of a cream called *Sinzaa*. Firewood, coal, domestic gas, pets (dogs, cats), garden, dust, mold, and the number of people in the room were not associated with the severity of atopic dermatitis. **Discussion:** Local foods were the environmental factors that had an influence on the severity of atopic dermatitis in our study. **Conclusion:** Some environmental factors had an influence on the severity of atopic dermatitis in Cotonou and Parakou, Benin.

Key words: Atopic dermatitis severity, Environmental factors, Children, Beni

INTRODUCTION

Atopic dermatitis (AD) is a chronic inflammatory disease characterized by flares up and remissions. The disease results from the interaction between genetic factors and environmental factors. The prevalence of atopic dermatitis varies from continent to continent. Yet, all authors who have done work on atopic dermatitis report an increase in its prevalence throughout the world, particularly, in industrialized countries. According to the ISAAC phase III survey [1], the prevalence of atopic dermatitis varies from 0.9% to 22.5% in children aged 6 to 7 years and from 0.2% to 24.6% among adolescents aged 13 to 14 years. This prevalence is higher in urban areas than in rural areas [2].

Various studies have reported the influence of environmental factors, particularly climatic factors, on the prevalence and severity of atopic dermatitis [3].

The objective of our investigation was to study the environmental factors influencing the severity of atopic dermatitis in a pediatric population in Cotonou and Parakou, Benin.

MATERIALS AND METHODS

From December 1, 2019, to July 1, 2020, a prospective cross-sectional study was conducted in two dermatology hospital departments and two pediatric hospital

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departments in Cotonou and Parakou. The study population consisted of children and adolescents aged 0 to 17 years seen for consultation or hospitalization in these clinics. The patients included were those who met the diagnostic criteria for atopic dermatitis according to the United Kingdom Working Party [4]. All children were examined by dermatologists. The severity of atopic dermatitis was assessed with the scoring for atopic dermatitis (SCORAD) tool. The SCORAD form was completed by doctors trained for this purpose. The environmental factors studied required daily data collection from the national meteorological agency using the Météo-Benin internet application. A qualitative survey was conducted among the families to collect information on domestic environmental factors.

The data was recorded and analyzed using EPI-INFO 7.1 software. For statistical studies, qualitative variables were expressed as proportions, and comparisons were made with the Pearson chi-squared test. Quantitative variables were described by their means with standard deviations and comparisons made with the Student's t-test. The significance threshold for the results was 5%.

Ethics Statement

Consent from legal guardians or parents was required for participation in the survey.

RESULTS

Over the study period, 2094 children were examined, among whom 107 met the UKWP diagnostic criteria (Table 1). The hospital prevalence of atopic dermatitis in the pediatric population was 5.1%. Clinically, we observed specific forms such as follicular eczema (Fig. 1) and impetiginized forms (Fig. 2). Table 2 shows the environmental characteristics of the study population.

DISCUSSION

This hospital survey, conducted at the pediatric and dermatology hospital departments of Cotonou and Parakou, concerned only a small part of the pediatric population in 2020. In fact, children taken for vaccination were not included. The diagnosis of atopic dermatitis was made using the United Kingdom Working Party (UKWP) criteria. However, the use of SCORAD to assess the severity of atopic dermatitis

Table 1: General characteristics of the study population

Characteristic	Number of cases	Proportion
Mean age (months)	92.72 ±	- 73.09
Sex		
Males	40	37.4
Females	67	62.6
Educational level		
Unschooling	31	29.0
Primary school	51	47.7
Secondary school	24	22.4
Higher education	1	0.9
Clinical aspects		
Mean age at onset of AD (months)	36.0 ±	-42.48
Pruritus	104	97.2
Sleep disturbance	27	25.7
Common eczema	47	44.8
Follicular eczema	18	16.2
Besnier's prurigo	15	14.0
Main location		
Head and neck	26.52	
Lower members	24.72	
Trunk	17.12	
Upper members	15.88	
Antecubital and popliteal fossa	15.76	
Atopic dermatitis severity score		
Mild	31	29.9
Moderate	57	53.3
Severe	16	15.0
Type of delivery		
Vaginal delivery	83	77.5
Cesarean section	24	22.4
Mean pregnancy	2.64 ±	- 1.31
Mean parity	2.63 ±	- 1.12
Twin pregnancy	7	
Vaccination coverage		
Full	42	39.1%
partial	65	60.7%
Breastfeeding		
Exclusive	8	7.4%
Mixed	7	6.6 %
Family food	92	85.9%

posed some difficulties because the determination of erythema on black skin was not easy. Likewise for the determination of environmental factors, it was not possible for us to determine individually for each participant the factors to which the latter was exposed. Thus, we were unable to measure the ambient temperature of the rooms where the children slept, nor to determine the precise composition of the house dust. We used global data found on the Internet and that provided by Météo-Benin. These data corresponded to daily averages or averages over the given periods.

However, the results we reached seemed interesting to share with the scientific community.

We observed a hospital prevalence of atopic dermatitis of 5.1% in this pediatric population. It is comparable

Table 2: Environmental characteristics of the study population

Environmental characteristic	Number of cases	Proportion
Place of residence		
Swampy	66	61.7
Non swampy	41	38.3
Housing		
Moderne type	5	95.3%
Traditional type	102	4.7%
Cooking mode		
Domestic gas	92	85.9
Coal	83	77.6
Firewood	16	14.9
Pets		
dog	39	36.4
Cat	32	29.9
Mold	60	56.1
Domestic dust	91	85.0
Climatic parameters		
Mean temperature minimum	26.0+	-1.83 °C
Mean temperature maximum	31.78+	-1.78 °C
Mean humidity	80.18+	-9.06°
Mean wind speed	68.95+	-50.09 km/h

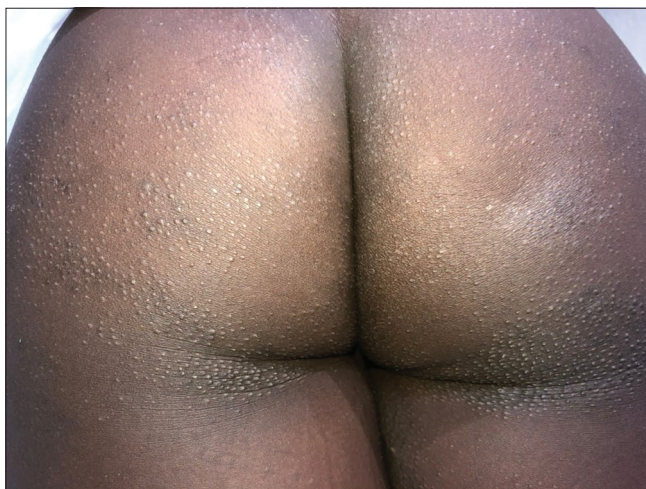


Figure 1: Follicular eczema on the buttocks of a girl.



Figure 2: Crusted and impetiginized eczema of the hands in a boy.

to the prevalence of pediatric atopic dermatitis observed in some African countries such as Nigeria and Madagascar [5,6] and western countries [7]. This prevalence is low compared to that observed by Teclessou et al. in Togo [8]. In last study, the methods were different because the entry points into the study were only the pediatric departments and vaccination centers, the dermatology and pneumo-allergology departments were excluded from the study. However, the prevalence of 31.3% reported by the authors seemed very high to us.

We observed that living in a swampy area was not a risk factor for severe atopic dermatitis since the difference between non-swampy areas and swampy areas was not statistically significant ($p=0.4$). However, swampy areas are often infested with midges, mosquitoes, and other biting insects that could contribute to the severity of atopic dermatitis.

A study conducted in Senegal [9] in a rural area demonstrated that children with symptoms of severe atopic dermatitis had a significantly high level of immunoglobulin E directed against antigens contained in mosquito saliva. We did not carry out additional explorations to identify, among the cases of severe atopic dermatitis in our patients, those who had developed immunoglobulins against the antigens of stinging insects.

Cases of severe atopic dermatitis were more numerous in the dry season than in the rainy season and the difference was statistically significant ($p < 0.001$). This could be explained by the worsening of skin dryness due to a dry and cold wind called the harmattan present in West Africa from November to March. In Madagascar, Sendrasoa et al. [6] observed that children born in March had a higher risk of having atopic dermatitis than others and that the number of consultations for atopic dermatitis increased from July to October ($p = 0.005$), a period corresponding to the cold season. The influence of the seasons on atopic dermatitis has been studied by other authors. Thus, in the U.S., Silverberg et al. [10] demonstrated that an increase in precipitation was associated with an increase in the prevalence of atopic dermatitis and a decrease when precipitation was low.

Sargen et al. [11] observed that atopic dermatitis flare-ups occurred at high temperatures ($p < 0.001$) and increased exposure to the sun ($p = 0.009$). On the

other hand, Kim et al. [12] in South Korea observed in their survey that an increase in outdoor temperature of 5°C was associated with a reduction in atopic dermatitis symptoms of 12.8%. These contrasting observations demonstrate the difficulties in studying the environmental factors associated with atopic dermatitis.

We found that the higher the average wind speed, the lower the atopic dermatitis severity score and the difference was statistically significant ($p < 0.001$). This beneficial effect of strong wind on the severity of atopic dermatitis could be explained by thermolysis by convection under the effect of the wind.

There were more cases of moderate to severe atopic dermatitis than cases of mild atopic dermatitis in children whose diet included corn, millet, sorghum, egg, and okra, and the difference was statistically significant ($p = 0.014$; $p = 0.017$; $p = 0.023$; $p = 0.009$; $p = 0.035$; respectively). The role of foods in the aggravation or perpetuation of certain cases of atopic dermatitis is often mentioned. The food sensitizations most suspected of being associated with flare-ups or worsening of atopic dermatitis are sensitizations to milk and eggs [13,14].

One particular observation from our investigation is that the local use of the cream Sinzaa was associated with severe atopic dermatitis ($p = 0.04$). Sinzaa cream is a mixture of several active ingredients including petroleum jelly and lanolin. This cream is particularly popular with mothers for the daily hygiene care of babies. It is possible that this cream induces contact sensitization which aggravates atopic dermatitis in already atopic children.

The duration of exclusive breastfeeding was not associated with the severity of atopic dermatitis in our study population ($p = 0.7$). For Sendrasoa et al. [6] in Madagascar, there was no association between the prevalence of atopic dermatitis and breastfeeding. On the other hand, Kelbore et al. [15] in Ethiopia observed that weaning at 4–6 months was statistically associated with the occurrence of atopic dermatitis in children (OR = 4.0; CI: 1.2–13.3).

The following environmental factors were not associated with severe atopic dermatitis: number of people per room and cooking method. For the method of cooking food (use of firewood, coal, domestic gas), an identical observation was made by Vicedo-Cabrera

et al. [7] in their study on a population of Spanish children.

CONCLUSION

Our study conducted in a pediatric population reported a low prevalence of atopic dermatitis in Cotonou and Parakou. It also showed that the severity of atopic dermatitis was associated with the dry season, a high average wind speed and the consumption of certain foods such as corn, millet, sorghum, okra, and eggs. On the other hand, it did not reveal any association between the severity of atopic dermatitis and environmental factors such as the energy used for the cooking method of food, the presence of domestic animals, mold, and the number of people in the room.

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Statement of Human and Animal Rights

All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the 2008 revision of the Declaration of Helsinki of 1975.

Statement of Informed Consent

Informed consent for participation in this study was obtained from all patients.

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