

Severe Childhood Atopic Dermatitis : Epidemiological and Clinical Features, and Associated Factors in Brazzaville (Congo)

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Research article

Volume 4 Issue 4

Received Date: October 14, 2019

Published Date: November 15, 2019

DOI: 10.23880/cdoaj-16000193

Abstract

Introduction: Atopic dermatitis (AD) is an pruritic inflammatory skin disease, responsible in its severe forms, of psychological disorders and familial stress. The objectives of study were to describe epidemiological and clinical aspects and to determine the factors associated with the severity of atopic dermatitis.

Patients and methods: Descriptive and analytic cross-sectional study, conducted from January 2016 to December 2018 in Brazzaville (Congo) in two health facilities. Children aged between 1 month and 15 years, received for an atopic dermatitis were included. The variables studied were demographic data, clinical data (history of atopy, age at the onset of symptoms, degree of severity appreciated by the SCORAD index, complications) and serum total-IgE level. The processing of data used Epi Info software and the Khi-2 test with Fisher correction or Yates correction as appropriate. The p-value was significant under than 0.05.

Results: Of the 75 cases of AD included, 25 were severe, representing a frequency of 33.3%. There were 17 girls (68.0%) and 8 boys (32.0%), mean age 4.6 years (SD = 3.54). All the children came from an urban area. The average duration of disease progression was 39.76 months (SD = 20.7). A family history of atopy was noted in 17 cases (68.0%). Atopic comorbidity was found in 14 children (56.0%). The lesions were located on flexure folds in 52% of case, on face and diffuse in 24% of cases respectively. Secondary infection was found in 76.0% of cases (n=19). Total-IgE serum level was elevated in 18 out of 21 children tested (85.7%). Infectious complications (p <0.001) and high serum total-IgE level (p <0.001) were associated with severe AD.

Conclusion: This study reveals the high frequency of severe form of atopic dermatitis in childhood. It identifies secondary infection and elevated total-IgE serum as factors associated with the severity of the disease. This suggests preventive actions against infection in children with AD.

Keywords: Atopic Dermatitis; Eczema; Severity; Childhood

Abbreviations: AD: Atopic Dermatitis; *S. aureus*: *Staphylococcus Aureus*.

Introduction

Atopic dermatitis (or atopic eczema) is the commonest inflammatory skin disease that is characterised by intense pruritis and recurrent eczematous lesions [1,2]. The overall prevalence of atopic dermatitis (AD) in children ranges from 10% to 20% across studies with a wide geographic variety [3,4]. Prevalence and incidence of AD varies from country to country and geographically within a country [5]. The disease manifests during the first year of life, but it can start at any age. The diagnosis relies exclusively on clinical features. No specific laboratory or histological findings have been reported for its diagnosis [1].

The impact of AD on quality of life is similar to that caused by other chronic diseases such as asthma and diabetes [6]. In its moderate and severe forms, AD causes psychological disorders, anxiety, depression, low self-esteem, sleep disorders with repercussions on school performance and familial stress [2,7].

Few data is available concerning epidemiology and the factors involved in severe AD. This gap remains a field of research [8]. In order to improve the quality of life of children with AD, the objectives of our study were to describe epidemiological and clinical aspects and to determine the factors associated with the severity of AD.

Patients and Methods

This was a bicentric, descriptive and analytic cross-sectional study conducted from January 2016 to December 2018 in Brazzaville (Congo) in two health facilities: Talangaï Reference Hospital in Dermatology and infectious diseases Department and Cogemo private Hospital.

The medical records of children aged between 1 month and 15 years, received for an atopic dermatitis,

were collected. Incomplete medical records have been excluded. The diagnosis of atopic dermatitis was based on the criteria of the United Kingdom Working Party [9].

The data was collected on a standardized form. The variables studied were demographic data (age, sex, environment of residence), clinical data (atopic history and comorbidity, age at the onset of symptoms, degree of severity, existence and type of complications) and biological data (serum total-IgE level). The degree of severity was appreciated by the SCORAD index [10]. The AD was classified as mild for a score of less than 15, as moderate for a score between 15-40 and as severe for a score above 40.

The data was processed using Epi Info7® software. Qualitative variables were expressed in numbers and percentages. Quantitative variables were expressed as mean and standard deviation (SD). The khi-two test with Fisher correction and Yates correction for small numbers was used for statistical analysis. The *p*-value was significant when it was less than 0.05.

Results

Characteristics of the Study Population

Seventy-five children were included in the study, whose 34 (45.33%) from a public hospital and 41 (54.67%) a private hospital. They were 49 girls (65.33%) and 26 boys (34.67%), mean age 4.3 years (9 months-12 years).

Epidemiological and Clinical Features of Severe Atopic Dermatitis

Of the 75 AD cases included, 25 were severe cases. The frequency of severe AD was 33.3%. There were 17 girls (68.0%) and 8 boys (32.0%), sex ratio 0.47. Mean age was 4.6 years (SD = 3.54). Thirteen children (52.0%) were seen in a public hospital and 12 (48.0%) in a private hospital. All the children came from an urban area. The average duration of disease progression was 39.76 months (SD = 20.7). The disease started before the age of

2 years in 22 cases (88.0%), and between 2 and 5 years in 3 cases (12.0%). A family history of atopy was noted in 17 cases (68.0%). Atopic comorbidity was found in 14 children (56.0%). Asthma, allergic conjunctivitis and allergic rhinitis were found in 7 (28.0%), 5 (20.0%) and 7 (28.0%) cases, respectively.



Figure 1: Severe lichenoid atopic dermatitis in a 4 years-old child.

Figure 1 illustrates a severe lichenoid form of AD. Table 1 shows the distribution of severe eczema lesions according to their dominant location.

Location	Number	Percentage (%)
Face	6	24
Flexure fold	13	52
Diffus	6	24
Total	25	100

Table 1: Distribution of severe eczema lesions by dominant location in 25 children with atopic dermatitis.

The complications, found in 19 children (76.0%), consisted mainly of bacterial secondary infection. *Staphylococcus aureus* was identified in 12 bacteriological samples taken from the lesions. The total-IgE serum assay was performed in 21 out of 25 children and high total-IgE level was noted in 18 cases (85.7%).

Factors Associated with Severe Atopic Dermatitis

The factors associated with the severity of AD in children, shown in Table 2, were the existence of an infectious complication ($p < 0.001$) and high serum total-IgE level ($p < 0.001$).

Variable	Severe atopic dermatitis		p-value
	Yes	No	
Familiar history of AD	17	29	0.280
Atopic comorbidity	14	21	0.184
Oral antibiotic use before consultation	10	14	0.214
Local antibiotic use before consultation	11	15	0.172
Local antiseptic use before consultation	11	17	0.178
Local steroid use before consultation	11	19	0.399
Existence of an secondary infection	19	6	<0.001
High serum total-IgE level	18	7	<0.001

Table 2: Association of factors with atopic dermatitis.

Discussion

In order to describe the epidemiological and associated characteristics of severe AD, our selection of the study population was focused on children because childhood is the period of onset [11].

The small sample size was one of the limitations of this study. The severity of AD was assessed based on clinical criteria using the SCORAD index, which has been shown to be effective [12]. Indeed, there is currently no biomarker

for routine assessment of the severity of AD [2]. However, in clinical studies, the measurement of the serum marker CCL 17 showed a good correlation with the severity of the clinically appreciated disease [2]. The weakness of our medical platform did not make it possible to use this biomarker.

In our study, the frequency of severe AD (33.3%) was higher than that reported by other authors. In Ivory Coast, it accounts for 2.9% of cases of AD of childhood [13]. In Tunisia, the severe AD of childhood corresponds to a

hospital frequency of 0.085% [14]. Studies in the USA and United Kingdom have shown prevalence of severe AD 7% and 6% respectively [15].

Secondary infection complicated AD in 76% of our children. These were essentially bacterial. Bacterial infection with *Staphylococcus aureus* (*S. aureus*) is commonly described during AD [16,17]. It can cause bacteremia, endocarditis, septic arthritis, and osteomyelitis [18]. Herpes simplex virus secondary infection (eczema herpeticum) may also occur [16,17]. It is the most severe infectious complication. It was not observed in our study.

Our study reveals the association between severe AD and infectious complications mainly secondary bacterial infection. The microbiota is the set of microorganisms, saprophytes and pathogens that colonize human organs. It has an anti-inflammatory function and a defense function against infection by pathogenic germs [19,20]. The microbiota is disrupted during AD [20,21]. Disturbance is greater in the sites of predilection of lesions such as antecubital and popliteal fossa [21]. Indeed, the dryness and high pH of the skin as well as the deficit in antimicrobial peptides favor the selection of *S. aureus* within the microbiota [19]. *S. aureus* is present on the skin of more than 90% of AD patients in both healthy and affected skin [21]. Bacterial colonization exposes to the risk of secondary infection, particularly by *S. aureus*, which plays a role in inflammatory attacks [2,19,21]. The work of Kong, et al showed a correlation between the low diversity of the cutaneous microbiota and the severity of the AD measured by SCORAD objective [22]. The association between the severity of AD and infection is supported by several studies. Huang, et al showed that antibiotic treatments had curative efficacy on AD flares [23]. Hon, et al, evaluating colonization and infection of lesions during AD, reports that *S. aureus* colonized 31% of samples from the most severely affected lesions [24]. His study reveals a high risk of infection for: a SCORAD greater than 40, intense lesions (erythema, lichenification, excoriations) and in case of excess transepidermic water loss. Nomura's analysis further shows that the density of *S. aureus* on both regions correlates with the severity of AD [25].

Our work also shows the association between elevated total-IgE serum and the severity of the disease. This finding is the same for Holm Denmark in a cohort study that reveals severe AD was associated with increased blood eosinophil count as well as the existence of a high level of serum total-IgE [26]. IgE plays a minor role in the

pathogenesis of AD [27]. However, the work of Tolté [28], showing the association between IgE-specific against *Staphylococcus aureus* and severe AD of childhood, let us suggest a dependence between bacterial infection and IgE. This suggestion remains to be proven by subsequent works. Routine IgE assay may, however, be necessary to identify potentially severe cases early.

Conclusion

This study reveals the high frequency of severe form of atopic dermatitis in childhood and its infectious complications. It identifies secondary bacterial infection and elevated total-IgE serum as factors associated with the severity of the disease.

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