

Birth Month And Prevalence Of Atopic Dermatitis In Children Under 3 Years In Antananarivo, Madagascar

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Research

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Abstract

BACKGROUND: Several studies have been done to evaluate the relationship between month of birth and atopic diseases but the results are contradictory. So, we aim to evaluate the correlation between the month of birth and the prevalence of AD in Malagasy children less than 3 years.

METHODS: A case-control study was conducted based on patients' data of the department of Dermatology in the University Hospital Joseph Raseta Befelatanana (UH/JRB) Antananarivo. It included 354 children less than 3 years seen in this department between January 2010 and December 2018. For each AD patient, two age and sex-matched controls without a history of AD were selected from the same period.

RESULTS: This study included 118 AD cases and 236 non-AD controls. Our case-control study found that there are no statistically significant correlation between birth month and risk of AD in Malagasy children < 3 years. However, the fewest children with AD were born in February (17.86%, OR: 0.40, CI 95%: 0.11-1.14), and the most were born in August (45.16%, OR: 1,73; CI 95%: 0,75-3,88). Asthma, allergic rhinitis and allergic conjunctivitis were significantly correlated with AD in our patients.

CONCLUSION: Our case-control study found that there are no statistically significant correlation between birth month and risk of AD in children < 3 years. However, the high frequency of AD in children born in August (dry season) compared to non-AD controls was not negligible (p-value =0,05 and X² 3,27).

I- Background

Atopic dermatitis (AD) is a chronic or recurrent inflammatory skin disease characterized by xerotic and pruritic skin. The etiology of AD is multifactorial with interaction between genetics, immune and environmental factors [1]. As in industrialized countries, the incidence of AD in patients < 15 years increased from 1,02% in 1999 to 5,6% in 2019 in Madagascar [2, 3].

Some studies conducted in white population showed an association between birth season and AD [4, 5, 6]. In our knowledge, no data concerning the correlation between birth season and AD was reported in black population. So, we aim to evaluate the correlation between the month of birth and the prevalence of AD in Malagasy children less than 3 years.

I I- Methods

A case-control study was conducted based on patients' data of the department of Dermatology in the University Hospital Joseph Raseta Befelatanana (UH/JRB) Antananarivo which is a unique hospital reference center in the capital of Madagascar. We included children less than 3 years seen in the department of Dermatology in the UH/JRB Antananarivo between January 2010 and December 2018.

We included 354 children aged 3 years and younger. For each AD patient, two age and sex-matched controls without a history of AD were selected from the same period.

ETHICAL APPROVAL

All study procedures were performed in accordance with the Ethics Committee of University Hospital Joseph Raseta Befelatanana Antananarivo, Madagascar.

STATISTICAL ANALYSIS

Statistical analysis was conducted using STATA software version 12. All data were analyzed using a Chi-squared (χ^2) test for differences in the prevalence of related AD. ORs and 95% confidence intervals (CIs) were computed with the logistic regression analysis after taking the confounding variables into account. Significance was set at $p < 0,05$.

III- Results

354 children ≤ 3 years were included: 118 AD cases and 236 non-AD controls. The baseline characteristics of children included was shown in Table I.

The 2 groups were matched by gender and age. The fewest children with AD were born in February (17.86%, OR: 0.40, CI 95%: 0.11-1.14), and the most were born in August (45.16%, OR: 1,73; CI 95%: 0,75-3,88). Moreover, no significant association was found between the prevalence of AD and the month of birth. The correlation between month birth and incidence of AD was shown in Table II.

Compared with children without AD, those with AD had a higher proportion of asthma (14,4% vs 2,12%; OR 7.27, 95% CI: 2,47-25,72; p 0.000006), allergic rhinitis (16,95% vs 6,78%; OR 2.80, 95% ; CI: 1,31-6,04; p 0.0032) and allergic conjonctivitis (8,48% vs 2,54%; OR :3.54, CI 95% : 1,13-12,15; p 0.01). Family atopy (OR 5.65, CI 95% : 3,03-10,68; p 0.00000001) was also associated with the AD risk. The correlation between other medical conditions and AD was shown in Table III.

IV- Discussion

Our case-control study found that there are no statistically significant correlation between birth month and risk of AD. However, compared with children born in February (rainy season), those born in August (dry season) had the highest risk of AD. In Madagascar, the month with the highest relative humidity is february (81,5%), the average rainfall is 278,9 mm. The average humidity in august is 74,5% with an average rainfall at 10,4 mm. Several studies have been done to clarify a relationship between month of birth and atopic diseases but the results are contradictory. Our result was consistent with other studies in Germany [5] and in Danemark [7] which found that manifestation of atopy is not related to patient's month of birth. However, a population-based study in Taiwan find that patients born in December, October and November (dry season) have high risk of developing AD, this study hypothesize that the skin

condition is affected by the climate in early infancy [4]. A Japanese study reported also that children born in autumn (October, November and December) had higher risk to develop AD compared to those born in spring (April, May and June) [6]. One study in Armenian pediatric patients in 2018 showed that being born in winter was associated with a lower risk of developing severe AD when compared to spring. It may be explained by the exposition to grass pollen which was the most significant allergen in Armenia [8]. Several arguments may explain the variability of these results. In our study, even though the result was not statistically significant, children born in dry season had high risk of AD. So the lack of humidity during the dry season may affect the skin condition of those.

Our study showed that allergic rhinitis, allergic conjunctivitis, urticaria and asthma were coexisting diseases associated with the AD risk. Our findings were consistent with previous investigations suggesting that asthma [9, 10, 11], allergic rhinitis [12, 13] and allergic conjunctivitis [14] were correlated with AD. This association may be explained by « atopic march » which refers to the natural history of allergic diseases as they develop over the course of infancy and childhood. It describes the progression of atopic disorders from AD in infants to allergic rhinitis and asthma in children [15].

Family atopy was also associated significantly with AD (OR: 5,65 ; CI 95% 3,03-10,68 ; p-value 0,000000001; X^2 9,65), in our study. It is consistent with previous studies. One study in South Korea found that family atopy was strongly correlated with AD occurrence (OR 2,3 ; CI 95% 1,09-4,9) [16]. Other studies in Germany and Taiwan reported also the correlation between family atopy and allergy-related illnesses [17, 18, 19]. As « atopy » refers to the genetic tendency to develop allergic diseases, it is typically associated with heightened immune responses to common allergens.

Our study has limitation; it was a retrospective study so it was a study of association but not direct causation. Prospective studies are still needed to validate the causal relationship between birth month and AD.

In conclusion, our case-control study found that there are no statistically significant correlation between birth month and risk of AD in children < 3 years. However, the high frequency of AD in children born in August (dry season) compared to non-AD controls was not negligible (p-value =0,05 and X^2 3,27). Our study shows that AD was associated with asthma, allergic rhinitis, allergic conjunctivitis and urticaria. Furthermore, family atopy was correlated with risk of AD.

Abbreviations

AD: Atopic dermatitis

UH/JRB: University Hospital Joseph Raseta Befelatanana

OR: Odds Ratio

CI : Confidence Intervalle

Declarations

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All study procedures were performed in accordance with the Ethics Committee of University Hospital Joseph Raseta Befelatanana Antananarivo, Madagascar. Study participants and their parents were informed about the study procedures and written informed consent was obtained.

CONSENT FOR PUBLICATION

Consent for publication was obtained from each participant.

AVAILABILITY OF DATA AND MATERIAL

The datasets used during this study are available from the corresponding author on reasonable request.

COMPETING INTERESTS

The authors declare that they have no competing interest in this work.

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AUTHOR'S CONTRIBUTION

FAS and VEM conceived this study and performed statistical analyses. All authors were involved in the writing of the manuscript or patient clinical care. LSR and FRR contributed to the critical revision of the manuscript. All authors read and approved the final manuscript.

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Tables

Tableau I: The characteristics of people with (AD cases) and without atopic dermatitis (Non-AD controls)

	AD cases N(%)	Non-AD controls N (%)
Gender		
Female	60 (50,85)	118 (50)
Male	58 (49,15)	118 (50)
Age (months)		
0-12		
13-24	76 (64,40%)	152 (64,40%)
25-36	35 (29,67%)	70 (29,67%)
	7 (5,93%)	14 (5,93%)

Table II : Correlation between month birth and incidence of AD

	AD Cases (N=118) N(%)	Non-AD controls (N=236) N(%)	OR	CI (95%)	p	χ^2
January	14 (36.84)	24 (63.16)	1,18	0,54-2,50	0,37	0,23
February	5 (17.86)	23 (82.14)	0,40	0,11-1,14	0,05	3,27
March	15 (39.47)	23 (60.50)	1,34	0,62-2,82	0,25	0,72
April	5 (23.81)	16 (76.19)	0,60	0,71-1,79	0,24	0,91
May	9 (25.71)	26 (74.29)	0,66	0,26-1,53	0,20	1,01
June	7 (24.14)	22 (75.86)	0,61	0,21-1,54	0,18	1,20
July	9 (39.13)	14 (60.87)	1,30	0,48-3,35	0,34	0,37
August	14 (45.16)	17 (54.84)	1,73	0,75-3,88	0,10	2,13
September	14 (40)	21 (60)	1,37	0,62-2,97	0,24	0,77
October	9 (31.03)	20 (68.97)	0,89	0,34-2,13	0,38	0,07
November	9 (42.86)	12 (57.14)	1,54	0,55-4,11	0,23	0,91
December	8 (30.77)	18 (69.23)	0,88	0,32-2,21	0,48	0,08

Tableau III: Coexisting medical conditions in people with and without AD

	AD cases	Non-AD controls	X ²	p	ORs	CI (95%)
Allergic rhinitis						
No	98(83,05%)	220(93,22%)	8,38	0,0032	2,80	1,31-6,04
Yes	20(16,95%)	16 (6,78%)				
Allergic conjunctivitis						
No	108(91,52%)	230(97,46%)	5,96	0,01	3,54	1,13-12,15
Yes	10(8,48%)	6(2,54%)				
Asthma						
No	101(85,60%)	231(97,88%)	19,11	0,000006	7,27	2,47-25,72
Yes	17(14,40%)	5(2,12%)				
Vitiligo						
No	118(100%)	221(93,64%)	-0,00	0.0020		
Yes	0(0%)	15(6,36%)				
Urticaria						
No	116(98,30%)	234(99,15%)	0.48	0.40	2,017	0,14-28,09
Yes	2 (1,70%)	2(0,85%)				
Family atopy						
No	76(60,40%)	215(91,10%)	36,22	0.00000001	5,65	3,03-10.68
Yes	42(35,60%)	21(8,9%)				
Other medical past history						
No	116(98,30%)	213(64,74%)	9,65	0.0027	0,15	0,18-0,66
Yes	2(1,70%)	23(9,75%)				