ORIGINAL ARTICLE

Prevalences of Allergic Disorders in Children with Terra Firma-Forme Dermatosis

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Abstract

Background: Terra firma-forme dermatosis (TFFD) is a clinical condition that may be defined as a dirty appearance of skin. Although it has been defined for many years, its clinical value is not well known. **Objective:** We aimed to determine the prevalence of allergic disorders (asthma, allergic rhinitis, and eczema) to investigate if this clinical condition is associated with allergic disorders in children with TFFD. **Materials and Methods:** A questionnaire descriptive of allergic disorders [International Study of Asthma and Allergies in Children (ISAAC)] was applied to all children diagnosed with TFFD at the pediatric clinics during a 6-month period specified for the study. The results were compared with the two ISAAC studies that have been previously conducted in our region. **Results:** The prevalence of TFFD among 1695 children examined at our outpatient clinic was found to be 3.18% (n = 54). The youngest of the children was 6 months old and the oldest 13 years, with an average age of 6.08 ± 2.69 years. Our study group had significantly greater rates and intensities of lifetime wheezing, wheezing in the last 12 months (current wheezing), lifetime allergic rhinitis, allergic rhinitis in the last 12 months; and the rate of physician-diagnosed allergic rhinitis compared to the comparator groups (P < 0.005). **Conclusions:** The results support the view that TFFD may be a sign of associated asthma and allergic rhinitis.

Key Words: *Allergic rhinitis, asthma, eczema, ISAAC, prevalence, terra firma-forme dermatosis*

Introduction

Terra firma-forme dermatosis (TFFD) is a clinical condition that may be defined as a dirty appearance of skin. It was first described by Duncan in 1987.[1] It is characterized by dirty, brownish asymptomatic plaques that develop secondary to idiopathic hyperkeratosis. It is distinguished from dermatitis neglecta by normal hygiene of patients. Affected patients describe that their lesions persist despite scrubbing them with soap.[2] Lesions fading upon scrubbing with 70% ethyl alcohol are required for confirmation of the diagnosis and for administering therapy [Figures 1 and 2].[1] Acanthosis nigricans should be considered in the differential diagnosis if it persists despite rubbing with alcohol.[3]

Lesions may occur in trunk, neck, arms, legs, chest, or abdomen. Lesions may be solitary or multiple and distributed symmetrically over arms and legs or in more than one region. In children, they are usually detected during systemic examination.

The lesions disappearing upon scrubbing with 70% alcohol are sufficient for making the diagnosis.[1] Dermoscopy may also be used for supporting the diagnosis. Using dermoscopy technique, a brown, tile-like appearance resembling a multigonal plaque intersected by lines can be observed.[4] These appearances disappear when scrubbed 30 with alcohol [Figures 3 and 4; images were acquired with 31 DermLite DL1, 3Gen Inc-USA].

A biopsy is not necessary for making the diagnosis; biopsy sampling has demonstrated hyperkeratotic stratum corneum.[5]

Prior studies on TFFD have reported that it was accompanied by allergic rhinitis.[6] Berk *et al.* reported the presence of atopic dermatitis in 12 patients.[2] Another study linked it to emollients and urea-containing preparations and reported that one of the cases was using these preparations for xerosis and the other for atopic dermatitis.[1] To date, no epidemiological or prevalence study of TFFD exists.

Asthma, allergic rhinitis, and eczema are common allergic disorders among children.[7] They are more

Access this article online

Quick Response Code:

Website: www.e-ijd.org

DOI: 10.4103/ijd.IJD_324_19

How to cite this article: Akçay G, Topal Y, Aydın O. Prevalences of allergic disorders in children with terra firma-forme dermatosis. Indian J Dermatol 2021;66:49-54.

Received: May, 2019. **Accepted:** February, 2020.

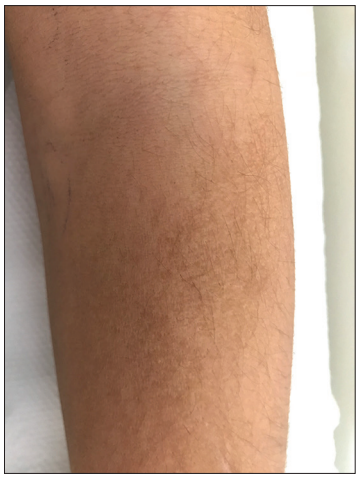

Figure 1: The arm lesion considered to be a TFFD lesion

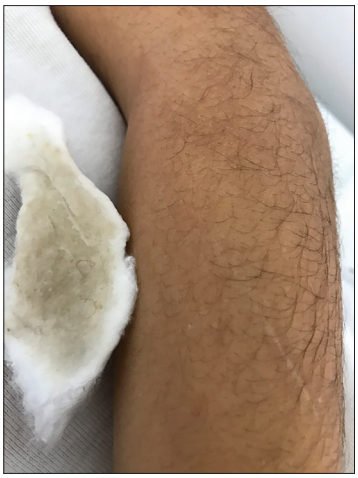

Figure 2: The lesion disappears by the application of 70% alcohol and the skin returns to its normal appearance

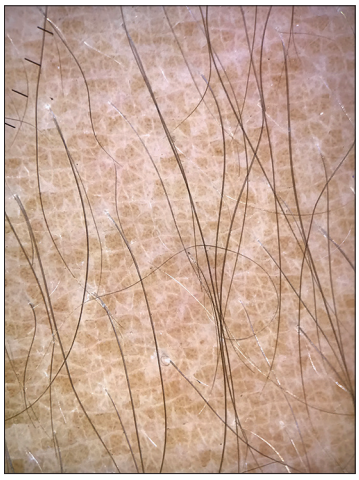

Figure 3: Dermoscopy-Before alcohol

Figure 4: Dermoscopy-After alcohol

prevalent, especially in developed countries.[8] As they lead to important morbidity, population-based prevalence studies have been done.[9] Standard tools have been developed for these prevalence studies. One of them is the International Study of Asthma and Allergies in Children (ISAAC) questionnaire.[7] The prevalence of allergic disorders among children belonging to the age groups of 6–7 years and 13–14 years in Denizli was determined using the ISAAC questionnaire.[10-12]

The aim of our study was to determine the prevalence of allergic disorders (asthma, allergic rhinitis, and eczema) using the ISAAC questionnaire among children with TFFD, and to compare it with the results of prevalence studies formerly conducted in a pediatric group in our province.

Materials and Methods

This study was approved by the Ethics Committee of Pamukkale University. We enrolled all children aged under 14 years (because of the highest age in the comparison group was 14 years) who presented to our pediatric clinics for any reason in the first 6 months of the calendar year 2017. The parents of the children who were diagnosed with TFFD during the examination by the physician were called for completing a questionnaire in July and August. Informed consent was obtained from the parents. The families were applied a phase 1 questionnaire translated into Turkish language that was in compliance with the ISAAC questionnaire at an outpatient clinic setting. The phase 1 questionnaire was designed to assess the prevalence and severity of allergic disorders in defined populations. The question titles were coded between A1 and A8 for asthma, R1 and R6 for allergic rhinitis, and E1 and E7 for eczema. Children/parents that were unwilling for participating in the study were excluded.

Statistical analysis

The prevalence was calculated by dividing the positively responded questions by a total number of questions. The study data were analyzed using IBM Statistical Package for Social Sciences (SPSS) for MacOS software package.

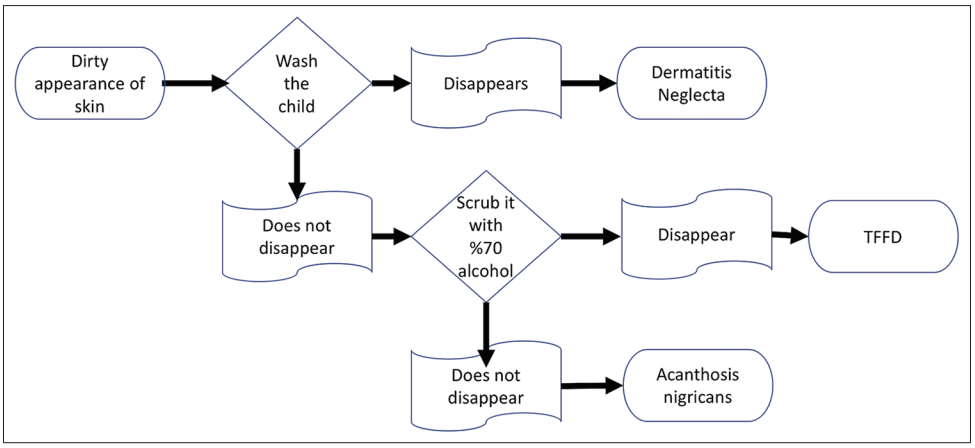

Figure 5: Terra Firma-forme Dermatosis diagnosis flow chart

The comparison of the questionnaire responses with the results of former studies was performed with the sample proportion test. A *P* value of less than 0.05 was considered statistically significant for all comparisons. The questionnaire results were compared with those obtained by the results of the ISAAC studies conducted in our province in 2006[11] and 2007.[12]

Results

A total of 4722 examinations were performed during the study period. The total number of children examined was 1695. Of these, 52% (*n* = 883) were male and 48% (*n* = 812) were female. The prevalence of TFFD was found to be 3.18% (*n* = 54). All 54 children/families enrolled in the study and participated in the questionnaire. All questionnaires were completed by his/her family. The youngest child was 6 month old and the oldest was 13 years old, with a mean age of 6.08 ± 2.69 years. The sex distribution of the study group was as 52% (*n* = 28) male and 48% (*n* = 26) female. The distribution percentage of the responses to questionnaire questions and the comparison with previous studies performed in our province are presented in Table 1.

As seen from Table 1, the study group had significantly higher scores for lifetime wheezing (A1), wheezing in the last 12 months (current wheezing) (A2), 1–3 and 4–12 wheezing attacks in the last 12 months (A3), sleep disturbance due to wheezing for more than one or more nights in the last 12 months (A4), lifetime allergic rhinitis (R1), allergic rhinitis in the last 12 months (R2), rhinoconjunctivitis in the last 12 months (R3), slight impaired daily activity due to allergic rhinitis (R5), and physician-diagnosed allergic rhinitis (R6) compared to the comparator groups ($P < 0.005$). In the Physician-diagnosed asthma (A6) questionnaire, on the other hand, only the comparison with the 13–14 year age group was found statistically significant ($P < 0.005$). The question *in which of the last 12 months did this nose problem occur? (R4)* could not be compared with previous studies since it was absent in them, with only numerical values being reported. Signs of allergic rhinitis were most prevalent in November and May. Both lifetime wheezing (A1) and lifetime allergic rhinitis (R1) had a prevalence of 53.70% (*n* = 29).

Discussion

Our study is the first to assess the prevalence of allergic conditions in TFFD using the ISAAC questionnaire. It is already known that the prevalence of allergic conditions shows regional variability. Genetic factors rather than environmental factors have been implicated in this occurrence.[11] Our main advantage was to have access to previously performed studies on the prevalence of pediatric allergic disorders in our region.[11,12] The presence of lifetime wheezing (A1) was higher compared to those reported in the other two previously conducted studies. In a study involving 14 countries from the Asia-Pacific region, the mean lifetime wheezing prevalence was 12.6% in the 13–14 year age group and 11.4% in the 6–7 year age group.[13]

The positive responses to the question related to the presence of wheezing in the last 12 months (A2) were higher compared to that in the two other studies from our province.

Previous studies have reported the lowest pediatric wheezing prevalence in the last 12 months in the 6–7 year age group in Lithuania (4.3%) and the highest in Costa Rica (32.1%).[14] In the 13–14 year age group, on the other hand, the lowest prevalence was in Albania (2.6%) and the highest in Great Britain (32.0%).[14] In a study from the Asia-Pacific region, the prevalence of wheezing in the last 12 months was 8.8% in 13–14 year age group and 8.9% in the 6–7 year age group.[13] As one can see, our prevalence for wheezing in the last 12 months was two times higher than those reported from the other two studies in our province, as well as it was higher than those obtained from population-based ISAAC studies worldwide.

Table 1: ISAAC questionnaire and its comparison with other studies from our province

		Study group %	Akçay A. *et al*. (6-7 age)[12] %	One-sample test	Akçay A. *et al*. (13-14 age)[11] %	Sample proportion test
	Prevalence of asthma and its symptoms					
A1	Lifetime wheezing	70.37 (*n*=38)	22.30	*t*=-7.664, *P*=0.000	10.2	*t*=-9.593, *P*=0.000
A2	Wheezing in the last 12 months (*Current wheezing*)	46.30 (*n*=25)	9.90	*t*=-6.952, *P*=0.000	5	*t*=-7.595, *P*=0.000
A3	The number of wheezing attacks in the last 12 months					
	None	1.85 (*n*=1)	0.9	*t*=-0.750, *P*=0.461		
	1-3	25.92 (*n*=14)	6.7	*t*=-4.836, *P*=0.000	3.2	*t*=-5.211, *P*=0.000
	4-12	%18.51 (*n*=10)	1.3	*t*=-3.870, *P*=0.001	1.2	*t*=-3.880, *P*=0.001
	>12		0.8		0.6	
A4	Sleep disturbance due to wheezing in the last 12 months					
	No	7.40 (*n*=4)	4.3	*t*=-1.923, *P*=0.066	3	*t*=-2.082, *P*=0.048
	Less than 1 per week	11.11 (*n*=6)	2.2	*t*=-2.501, *P*=0.020	1.2	*t*=-2.615, *P*=0.015
	1 night or more per week	27.77 (*n*=15)	3.0	*t*=-5.231, *P*=0.000	0.8	*t*=-5.448, *P*=0.000
A5	Wheezing attack severe enough to limit speech in the last 12 months	9.26 (*n*=5)	2.4	*t*=-2.156, *P*=0.041	1.3	*t*=-2.352, *P*=0.027
A6	Physician-diagnosed asthma	20.37 (*n*=11)	17.30	*t*=-0.674, *P*=0.503	2.1	*t*=-3.332, *P*=0.002
A7	Post-exercise wheezing in the last 12 months	24.07 (*n*=17)	7.22	*t*=-2.904, P=0.005	9	*t*=-2.603, P=0.012
A8	Waking up by cough in the last 12 months	40.74 (*n*=22)	40.40	*t*=-0.050, P=0.960	22.9	*t*=-2.643, P=0.011
	Prevelances of allergic rhinitis and its symptoms					
R1	Lifetime allergic rhinitis	72.22 (*n*=39)	33.5	*t*=-6.294, *P*=0.000	34.2	*t*=-6.180, *P*=0.000
R2	Allergic rhinitis in the last 12 months	72.22 (*n*=39)	23.10	*t*=-20.058, *P*=0.000	23.5	*t*=-20.052, *P*=0.000
R3	Rhinoconjunctivitis in the last 12 months	42.59 (*n*=23)	8	*t*=-6.209, *P*=0.000	9.6	*t*=-6.188, *P*=0.000
R4	In which of the last 12 months did this nose problem occur?					
	January	*n*=4				
	February	*n*=4				
	March	*n*=6				
	April	*n*=11				
	May	*n*=15				
	June	*n*=4				
	July	*n*=1				
	August	*n*=3				
	September	*n*=8				
	October	*n*=14				
	November	*n*=16				
	December	*n*=10				
R5	Impaired daily activity due to allergic rhinitis					

Contd...

Table 1: Contd...

		Study group %	Akçay A. *et al*. (6-7 age)[12] %	One-sample test	Akçay A. *et al*. (13-14 age)[11] %	Sample proportion test
	None	16.66 (*n*=9)	8.0	*t*=-2.244, *P*=0.031	6.2	*t*=-2.502, *P*=0.017
	Slight	31.48 (*n*=17)	13.3	*t*=-3.846, *P*=0.000	10	*t*=-4.250, *P*=0.000
	Moderate	16.66 (*n*=9)	7.4	*t*=-2.330, *P*=0.025	5.4	*t*=-2.616, *P*=0.013
	Severe	5.55 (*n*=3)	1.9	*t*=-1.352, *P*=0.185	2	*t*=-1.330, *P*=0.192
R6	Physician-diagnosed allergic rhinitis	42.59 (*n*=23)	6.10	*t*=-5.426, P=0.000	4.3	*t*=-5.688, *P*=0.000
	The prevalences of eczema and its symptoms					
E1	Lifetime chronic itchy lesion	16.67 (*n*=9)	11.30	*t*=-1.091, *P*=0.280	20.8	*t*=733, P=0.467
E2	Chronic itchy lesion in the last 12 months	11.11 (*n*=6)	8.20	*t*=-3.172, P=0.011	15.4	*t*=-2.731, P=0.023
E3	Chronic itchy lesion with a location typical for eczema	16.67 (*n*=9)	5.40	*t*=-2.201, *P*=0.032	9.6	*t*=-1.370, P=0.173
E4	When did this itchy rash first develop?					
	Younger than 2 years of age	5.55 (*n*=3)				
	2-4 years age	7.40 (*n*=4)				
	5 years or older	3.70 (*n*=2)				
E5	Itchy lesion completely improved in the last 12 months	14.81 (*n*=8)	6.10	*t*=-7.451, P=0.000	11.1	*t*=-7.001, P=0.000
E6	Waking up by itching in the last 12 months	(*n*=9)				
	None	9.25 (*n*=5)		*t*=-1.442, P=0.187	9.3	
	Less than 1 night per week	1.85 (*n*=1)		*t*=-0.730, P=0.486	3	
	One night or more per week	5.55 (*n*=3)		*t*=-2.980, P=0.018	3.2	
E7	Physician-diagnosed eczema	11.11 (*n*=6)	2.8	*t*=-1.936, P=0.058	2.1	*t*=-2.099, *P*=0.041

There is a correlation between increased asthma prevalence and severity of symptoms and increased mortality.[14] In our study, a higher weekly number of attacks compared to the control groups suggests that mortality and morbidity rates may also be higher due to attacks in patients with TFFD.

Allergic rhinitis is among the most prevalent conditions worldwide, and it persists for life. It is reported that the prevalence of self-reported allergic rhinitis was 2%–25% in children and 1% and 40% in adults.[15] In an ISAAC study reported from England, the lifetime prevalence of getting allergic rhinitis (question no = R1) was 34.9% while the prevalence of signs of rhinitis was 37.9%.[16] The study from 14 countries in the Asia-Pacific region reported a mean prevalence of allergic rhinitis (question number R1) of 15.1% in the 13–14 year age group and 10.6% in the 6–7 year age group.[13] In addition to reporting higher figures compared to previously reported prevalence from our province, our study also reported higher prevalence figures than studies reported from other countries (72.22%). This may be explained by TFFD patients having an atopic body habitus.

It has been reported that asthma co-occurs with allergic rhinitis at a rate of 15% and 38% while symptoms of allergic rhinitis accompany asthma at a rate of 6% to 85%.[15] Our results are in accordance with the literature data in showing lifetime wheezing and allergic rhinitis occurring together in more than half of the patients.

Physician-diagnosed eczema is considered a major criterion by asthma prediction indexes.[17] Among children younger than 3 years who were on asthma treatment, the prevalence of physician-diagnosed eczema was reported to be 12%.[17] According to ISAAC questionnaire data obtained from 56 countries, the prevalence of eczema was 1% to 17% in the 13–14 year age group and 2% to 16% in the 6–7 year age group.[18] In our study, the prevalence of physician-diagnosed

eczema was found similar in TFFD patients and the comparator groups. In order not to miss TFFD, we recommend that a patient should be undressed and examined under adequate light. After observing a dirty appearance of skin, it would be appropriate to use a flow chart to facilitate making the diagnosis [Figure 5].

Conclusions

Our study showed that both the prevalence and the severity of signs and symptoms of asthma and allergic rhinitis were higher in children with TFFD. These findings support the idea that TFFD may be a condition with a possible link with asthma and allergic rhinitis and that it may have a common etiopathogenesis with these conditions. Future multicenter clinical and laboratory studies with a larger sample size would enable us to better understand the TFFD and its relationship with other clinical conditions.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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