Prevalence and Determinants of Pityriasis Alba Among Elementary School Students in an Egyptian Village

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Abstract

Objectives: This study was conducted to assess the prevalence of Pityriasis Alba (PA) and its determinant among the elementary school students.

Methods: A school-based cross sectional study was conducted during the scholastic year 2017-2018 on primary school students in one of the Egyptian villages. A self-reported questionnaire, history with clinical examination sheet and laboratory investigation sheet were used to collect data.

Results: The overall prevalence of PA accounted for 19.8%. Age of 10-11 years, sun exposure, personal history of atopy, past history and siblings history of PA and parasitic infestation were significant determinants of current lesions in children (P =0.04, 0.03, 0.046, 0.001, 0.01 and 0.011 respectively). Having past history of PA was the only single significant risk factor for the current lesions (P< 0.001, AOR= 6.99 and CI= 2.5-19.7)

Conclusions: PA affected nearly one fifth of elementary school students. Although, the 5th graders, sun exposure, personal history of atopy, past history of PA, siblings history of PA and parasitic infestation were significant determinants among school children, the past history of affection with PA was the only single significant risk factor for the current lesions. Health education on sound personal hygiene, balanced diet, clean environment, healthy living status is recommended.

Keywords: Pityriasis Alba; prevalence; determinants; elementary school; Egyptian village.

INTRODUCTION

Skin diseases are among the most frequent ailments of school children in both developing and industrialized countries [1]. Pityriasis Alba (PA) is a common skin disorder found all over the world and occurs predominantly in children with the peak incidence is between the ages of 6-12 years [2]. PA is described as a long-term, multistage disease with frequent, spontaneous remissions. Erythematous clearly defined lesions that subside, leaving areas of skin depigmentation with scaling edges, are the predominant clinical presentation of PA [3].

The cause of PA is still unknown [4] however PA

disease in children are more influenced by socio-economic status, sun exposure, dietary habits and external environment [2]. Recent studies have found direct relations between the incidence of PA disease and atopy, the amount of the sun exposure, the lack of sunscreen use, and frequency of bathing [5]. It affects over 90% of children of poor socioeconomic condition [2] Some authors consider PA as a low grade eczematous dermatitis and a minor feature of atopic dermatitis. Possible comorbid disorders in association with PA are nutritional deficiency, anemia and parasitic infestation however; these are exclusively observed in children of poor socioeconomic conditions [4].

The prevalence of PA is differed from one country to another affecting about 5% of pediatric population worldwide [6]. Although PA is frequently encountered in dermatological practice, available studies on its prevalence in Egypt are few [7] in addition to the aesthetic aspects of the disease since it usually attacks the face, presents therapeutic difficulties with higher rates in young children [8]. Thus, this study was conducted aiming to assess the prevalence and determinants of PA among the elementary school children in an Egyptian village.

SUBJECTS AND METHODS

Study Location

This study was conducted in Kafr El-Shaikh Ateya village, Sherbin district, Dakahlia governorate, Egypt. It is about 7 kilometers north east of Sherbin City on the west Bank of Damietta branch of Nile River. Kafr El-Shaikh Ateya has an accredited family medicine unit and only one elementary school named "Al-Shahid Ahmed Mohamed Khalil Primary School". The school includes 12 classes (2 classes for every grade) with total of 413 students (207 males and 206 females).

Study Design

This is a school-based cross sectional study with analytical component that was conducted during the scholastic year 2017-2018 on primary school students in Kafr El-Shaikh Ateya village, Egypt.

Ethical Consideration

This study was approved by the Institution Research Board (IRB) of Mansoura Faculty of Medicine. Approvals were also taken from the school authority and the family medicine unit in Kafr El-Shaikh Ateya village after explaining the nature and aims of study.

Informed consent was obtained from each student' parents/guardians who accept to join the study. Confidentiality and personal privacy were respected in all levels of the study.

Study Population

The study population was a sample of school students who join the village primary school. The eligible students were children aged 6-13 years of both sex and their parents accepted sharing in the study.

Sample Size and Sampling Technique

By using Daniel formula [9]: N= Z^2 P $(1-P)/d^2$ where Z= 1.96 (at 95% confidence level), P= 0.103 (the expected prevalence) and d= 0.05 (the margin of error) and based on 10.3 % as a previously reported prevalence of PA among the Egyptian school students of the same age group [7], the calculated sample size of the study was at least 163 students of both sexes (after adding 15% of the sample size to overcome the attrition). "Al-Shahid Ahmed Khalil Primary School" in Kafr El-Shaikh Ateya village was included in the study to obtain the estimated sample size. A stratified cluster sampling technique was used. Each class in the school was considered as a cluster. One class (cluster) was randomly selected to represent each grade, with total of 6 classes. All students in the selected clusters were targeted with a final total of 182 students were responded in the selected clusters (response rate was 89%). Students were briefed about the study and were encouraged to participate. The questionnaire was meant to be filled in by students' parents/guardians at home and returned back on the next day. None participation was due to lack of interest in the study, absence during the study period and incomplete questionnaires according to the following flowchart:
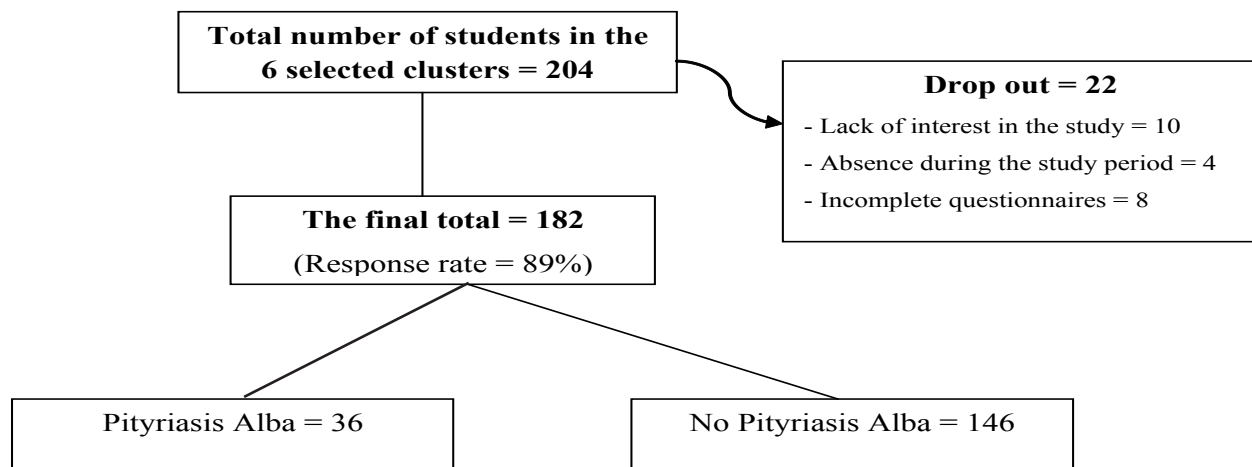
Study Tools

Data was collected using package of 3 tools: **the 1st one was a self-administered semi structured questionnaire** that was designed by reviewing the literature and distributed to all students asking for general characteristics the students including socio-demographic features, living and environmental status as well as the personal hygiene (number of shower/week). The questionnaire was developed first in English and was translated into Arabic by a bilingual Egyptian researcher. Then it was back-translated into English by another translator who has no knowledge about the English version whereas similar translation was obtained. The content validity of questionnaires was assessed by a gory of 10 experts in the field of dermatology and public health whereas finally the Arabic version of the questionnaire was pilot tested on a group of 10 students (they were excluded from the full-scale study), then modifications were done accordingly. The Cronbach's alpha internal consistency was calculated to be 0.73. The questionnaire was meant to be filled in by students' parents/guardians at home and returned back on the next day. **The second tool was history & clinical examination sheet** for diagnosis of current PA disease among students and its relevant risk factors as atopy. Diagnosis of PA disease was performed according to Sujatha et al., whereas the diagnostic criteria were asymptomatic superficial hypo-pigmented macules with slight overlying scaling located usually on the face, neck and shoulders [10]. History taking and clinical examination was done by a well trained family physician researcher. **The third tool was laboratory investigation sheet** of CBC for anaemia and stool analysis for parasitic infestation among school children by the help of the outreach health workers of Kafr El-Shaikh Ateya family medicine unit and tested in its laboratory.

Data Management

The collected data were coded, processed and analyzed using Statistical Package of Social Science (SPSS) program for windows (version 21). The normality of data was first tested with one-sample Kolmogorov-Smirnov test. Family crowding index was classified according to Fahmy and El-Sherbini scale [11].

The Qualitative data were presented as number (N) and percent (%). Association between categorical variables was tested using Chi-square test. Continuous variables were presented as mean ±SD (standard deviation) for parametric data and median for non-parametric data. The two groups were compared with Student *t*-test. P value ≤ 0.05 was considered to be significant and highly significant when the P value ≤ 0.001. Odds Ratio (OR) was used for comparison between groups with a Confidence Interval (CI) of 95%. Significant predictors in univariate analysis were entered into logistic regression model using Forward Wald method whereas Adjusted Odds Ratio (AOR) was calculated to predict the independent predictors of current PA affection.

RESULTS

In this study, the overall prevalence of the current affection with PA accounted for 19.8% (36 cases) out of all studied elementary school students (182). The clinical characteristics of the diagnosed lesions of PA revealed that their median number was 3 and they were commonly small in size (63.9%) with no scales (80.6%). Three fourth (75%) of the currently affected students reported that they didn't undergo previous treatment and nearly 39% of lesions were recurrent (**Table 1**).

Table1. *Prevalence and Clinical characteristics of the current PA lesion among the studied students*

Overall prevalence	No	%
	Total group (n=182)	
Current PA affection	36	19.8
Clinical characteristics	Total group (n=36)	
Lesion Size (cm) - Small <1cm - Medium 1-3 cm - Large >3 cm	23 4 9	63.9 11.1 25.0
Lesion Number - Median - Min-max	3 1.0-8.0	
Presence of Scales	7	19.4
Previous treatment	9	25.0
Recurrence	14	38.9

The socio-demographic characteristics of the studied elementary school students revealed that the mean age of students in years was 8.82±1.71. More than half (50.5%) of them were females while second graders were the most frequent group forming 19.2%. Unfortunately, most of our students' parents were of low education (72.5% of fathers and 61% of mothers) with unsatisfactory family income (0.67%). The majority of the children' mothers (73.1%) were

non working while it was only that for 15.4% of their fathers. The prevalence of PA affection showed that it was only significantly higher (p-value =0.04) among those of 5th graders with 10-11 years old (**Table 2)**.

Table2. *Distribution of PA by socio-demographic characteristics of the studied school children*

Characteristics	Total (n=182) N (%)	PA (n=36) N (%)	No PA (n=146) N (%)	χ^2 (p-value)	OR (95%CI)
Age Mean ± SD Min-Max	8.82±1.71 6.0-12.0	8.88±1.56 6.00-12.00	8.73±1.86 1.00-12.00	t=0.44 0.66	------
Sex - Female - Male	92 (50.5) 90 (49.5)	15 (16.3) 21 (23.3)	77 (83.7) 69 (76.7)	------ 0.23	1 (r) 1.6 (0.74-3.2)
Grade - 1st grade - 2nd grade - 3rd grade - 4th grade - 5th grade - 6th grade	29 (15.9) 35 (19.2) 25 (13.7) 29 (15.9) 31 (17.0) 33 (18.1)	3 (10.3) 7 (20.0) 7 (28.0) 5 (17.2) 10 (32.3) 4 (12.1)	26 (89.7) 28 (80.0) 18 (72.0) 24 (82.8) 21 (67.7) 29 (87.9)	------ 0.28 0.10 0.44 0.04* 0.82	1 (r) 2.1 (0.51-9.3) 3.4 (0.7-14.8) 1.8 (0.4-8.4) 4.1 (1.1-16.9) 1.2 (0.24-5.8)
Father education - Low education - High education	132 (72.5) 50 (27.5)	26 (19.7) 10 (20.0)	106 (80.3) 40 (80.0)	------ 0.96	1 (r) 1.01 (0.5-2.3)
Mother education - Low education - High education	111 (61.0) 71 (39.0)	24 (21.6) 12 (16.9)	87 (78.4) 59 (83.1)	------- 0.43	1 (r) 0.73 (0.34-1.6)
Father occupation - Non working - Working	28 (15.4) 154 (84.6)	7 (25.0) 29 (18.8)	21(75.0) 125 (81.2)	------ 0.45	1 (r) 0.61 (0.2-1.7)
Mother occupation - Non working - Working	133 (73.1) 49 (26.9)	23 (17.3) 13 (26.5)	110 (82.7) 36 (73.5)	------ 0.17	1 (r) 1.9 (0.8-4.1)
Family income - Satisfactory - Unsatisfactory	60 (33.0) 122 (67.0)	11 (18.3) 25 (20.5)	49 (81.7) 97 (79.5)	------ 0.73	1 (r) 1.1 (0.5-2.5)

(r): reference group, χ2: chi square test, t: student t-test, OR: Odds ratio, CI: confidence interval, *Significant level: p-value ≤ 0.05

Living, environmental and personal hygiene characteristics of the studied students showed that the majority were going school on foot (97.8%), more than half (50.5%) reported exposure to sun during walking to school or practicing sports. Child labor was reported by only 1.1% of them while taking balanced diet and practicing sport were mentioned by nearly 46% and 72% respectively. Most of the children were taking shower less than 3 times per week (70.9%), having no insects (89.6%) or animal and poultry (70.3%) at home with nearly 96% having crowded household index. The prevalence of PA affection among children showed that it was only significantly higher (p-value =0.03) among those exposed to sun (**Table 3)**.

Table3. *Distribution of PA by living, environmental and personal hygiene characteristics of the studied school children*

Characteristics	Total (n=182)	PA (n=36)	No PA (n=146)	χ² (p-value)	OR (95%CI)
	No (%)	No (%)	No (%)		
Way to school					
- Walking	178 (97.8)	35 (19.7)	143 (80.3)	0.55	0.48 (0.04-5.5)
- Car or Bicycle	4 (2.2)	1 (33.3)	2 (66.7)	------	1 (r)
Sun exposure					
- Yes	92 (50.5)	24 (24.0)	68 (73.9)	0.03*	2.3 (1.1-4.9)
- No	90 (49.5)	12 (13.3)	78 (86.7)	------	1 (r)
Working child					
- Yes	2 (1.1)	0 (0.0)	2 (100.0)	0.48	Undefined
- No	180 (98.9)	36 (20.0)	144 (80.0)	------	1 (r)
Practicing sports					
- Yes	83 (45.6)	20 (24.1)	63 (75.9)	0.18	1.6 (0.8-3.4)
- No	99 (54.4)	16 (16.2)	83 (83.8)	------	1 (r)
Diet style					
- Unbalanced[a]	51 (28.0)	9 (17.6)	42 (82.4)	0.65	0.82 (0.35-1.9)
- Balanced[b]	131 (72.0)	27 (20.6)	104 (79.4)	------	1 (r)
Animals & poultry at home					
- Yes	54 (29.7)	8 (14.8)	46 (85.2)	0.27	0.62 (0.26-1.5)
- No	128 (70.3)	28 (21.9)	100 (78.1)	------	1 (r)
Insects at home					
- Yes	19 (10.4)	2 (10.5)	17 (89.5)	0.28	0.44 (0.1-2.02)
- No	163 (89.6)	34 (20.9)	129 (79.1)	------	1 (r)
Crowding index[d]					
- Very crowded	5 (2.7)	3 (60.0)	2 (40.0)	1.0	3.0 (0.08-107.5)
- Crowded	175 (96.2)	33 (18.9)	142 (81.1)	0.47	2.72 (0.17-43.9)
- Uncrowded	2 (1.1)	0 (0.0)	2 (100.0)	-----	1 (r)
No of shower/week					
- < 3 times/week	126 (70.9)	28 (22.2)	98 (77.8)	0.21	1.7 (0.7-4.04)
- ≥ 3 times/week	53 (29.1)	8 (14.3)	48 (85.7)	------	1 (r)

Students were asked about eating the following types of foods during last 4 weeks

a (Unbalanced diet): Fast foods such as fried chicken, French fries, onion rings, hamburgers, Salty foods such as salted pretzels, chips, or pickles, and Sweets such as regular soda, candy bars.

b (Balanced diet): Fruits or vegetables, meat, chicken or fish that was not fried, skimmed milk, or yogurt, grains and cereals like whole-wheat bread, bran cereals, or beans.

c (Crowding index): Uncrowded ≤1person/room, **Crowded** 2-3 persons/room and **Very crowded** >3 persons/room.

(r): reference group, χ2: chi square test, OR: Odds ratio, CI: confidence interval, *Significant level: p-value ≤ 0.05

Table (4) displays medical history of the studied children which revealed that the majority had positive history to previous affection with PA (83.5%), family atopy (50.5%) and PA in sibling (85.7%), while negative history was the most frequent for student atopy (64.3%). The table shows also that the laboratory investigations of the examined students found most of them were anemic (63.2%) and had parasitic infestations (83.5%). The prevalence of PA affection among children showed that it was

significantly higher among those with parasitic infestations (p-value =0.011) as well as among those with personal history of atopy, sibling history of PA and past history of PA affection (p-value =0.046, 0.01 and <0.001 respectively).

Logistic regression analysis in **Table (5)** shows that only history of previous affection of students with PA was a predictor of PA disease whereas having past history of PA was the only significant risk factors (AOR=6.99) for the current affection.

Table4. *Distribution of PA by medical history and laboratory investigations of the studied school children*

History & laboratory investigations	Total (n=182) No (%)	PA (n=36) No (%)	No PA (n=146) No (%)	χ^2 (p-value)	OR (95%CI)
Personal history of atopy					
- Yes	65 (35.7)	19 (29.2)	46 (70.8)	0.046[*]	2.1 (1.01-4.4)
- No	117 (64.3)	17 (14.5)	100 (85.5)	------	1 (r)
Past history of PA					
- Yes	152 (83.5)	19 (12.5)	133 (87.5)	< 0.001[*]	9.2 (3.8-21.0)
- No	30 (16.5)	17 (56.7)	13 (43.3)	------	1 (r)
Family history of atopy					
- Yes	92 (50.5)	9 (14.1)	55 (85.9)	0.15	0.6 (0.24-1.25)
- No	90 (49.5)	27 (22.9)	91 (77.1)	------	1 (r)
Siblings history of PA					
- Yes	156 (85.7)	26 (16.7)	130 (83.3)	0.01[*]	3.1 (1.3-7.6)
- No	26 (14.3)	10 (38.5)	16 (61.5)	------	1 (r)
Hemoglobin level (gm/dl)					
- Anemic[a]	115 (63.2)	19 (16.5)	96 (83.5)	0.148	1.7 (0.8-3.5)
- Non anemic[b]	67 (36.8)	17 (25.4)	50 (74.6)	------	1 (r)
Stool analysis					
- Parasitic infestations	152 (83.5)	25 (16.4)	127 (83.6)	0.011[*]	2.9 (1.2-6.9)
- No parasitic infestations	30 (16.5)	11 (36.7)	19 (63.3)	------	1 (r)

a: hemoglobin < 11 gm/dl

b: hemoglobin > 11 gm/dl

(r): reference group, χ^2: chi square test, **OR:** Odds ratio, **CI:** confidence interval, ***Significant level:** p-value ≤ 0.05

Table5. *Logistic regression analysis of independent predictors of PA among the studied school children*

Predictor (s)	β	P-value	AOR (95 % CI)
Sun exposure	0.260	0.556	1.29 (0.5-3.1)
Personal history of atopy	0.474	0.262	1.61 (0.7-3.6)
Past history of PA	1.946	< 0.001[**]	6.99 (2.5-19.7)
Siblings history of PA	0.050	0.931	1.05 (0.33-3.2)
Parasitic infestations	0.815	0.099	2.26 (0.85-5.9)
Constant= 1.05 Model Chi-Square test =112.14 P=0.001[**] Percent predicted=78.6%			

AOR= adjusted odds ratio**, CI**= Confidence interval

***Significant level:** P-value ≤0.05, ****Highly significant:** P-value ≤0.001

Discussion

This study was conducted on elementary school students in an Egyptian village in response to reviewing the literature which found Skin diseases constitute a major health issue that reflect other morbidities in pediatric age group [1]. We focused on PA due to its importance as it is found to be a chronic long-term illness with usually remiss and relapse frequently and usually affects the face and if not properly treated it leaves behind areas of hypopigmentation [3]. In addition to the shortage of published data on its prevalence and determinants in Egypt [7], particularly in rural areas. Also, rural students are an important sector of Egyptian scholars who are characterizing by many features of special concern as socio-demographic and hygienic features as well as they are exposing to special living and environmental factors that making them more prone to certain diseases.

In this study the overall prevalence of PA was 19.8% and this was more or less similar to other studies conducted in Upper Egypt [12] and in North Sinai, Egypt [13] as well as in Saudi Arabia [14]. In contrary, the present rate of PA was much higher than that of other studies conducted in Egypt [7, 15, 16], in Libya [17], in Iraq [18], in Turkey [19], in India [20] and in Iran [21]. This difference could be explained by difference in population, duration of study, study locality, sample size and sampling technique.

The present study described the clinical characteristics of the diagnosed lesions of PA among school students whereas their median number was 3 and they were commonly small in size with no scales. Three fourth of cases denied previous treatment and more than one third were recurrent. Some literature described the disease as rounded, oval or irregular plaque with indistinct margins [22]. Other mentioned that PA lesions are asymptomatic hypo-pigmented patches on the face, neck, trunk and proximal extremities of children. The single lesion has sharply demarcated margins and is covered by a fine branny scale [4]. Moreover, it was reported that most lesions persist for some months and some may still show hypopigmentation for a year or more after all scaling subsides. Recurrent crops of new lesions may develop at intervals. The average duration of the common facial form in childhood is a year or more [23].

Distribution of PA by socio-economic characteristics of school children in this study found that the prevalence of PA was only significantly higher among 5th graders with 10-11 years old. This was parallel with Elshafey et al., 2012, who reported that the highest prevalence (12.7%) was in the age group 10-11 years [7]. The present result disagreed with that of Al-Fatlawy study which found more prevalence among children of age group 6-8 years [18]. Difference in age distribution of PA may be due to differences in culture, ethnic group and external environment. Factors that reflect low socio-economic status of students as low parents' education, unsatisfactory family income were not significant determinants for the current PA affection. This was in agreeing with other studies [7, 24].

In this study, distribution of PA by living, environmental and personal hygiene characteristics of school children found that the prevalence of PA was only significantly higher among those who reported sun exposure per se by their direct asking them (yes/no), although surprisingly asking participants about factors that may reflect their sun exposure as going school by walking, working child and practicing sport were not significant determinants for their PA affection. Sun exposure was commonly described to be a risk factor for PA however, some studies showed no relation between the disease and factors that may reflect degree of sun exposure [7, 13]. Other studies found a relationship between prevalence of PA and frequency of sun exposure [21, 25, 26]. The differences in results may be due to different methods of assessment of sun exposure or different times of exposure or could be explained by difference in climates and environmental characteristics of different populations together with other contributing factors in these populations than sun exposure alone.

In our study, there was no significant relation between PA and students' personal hygiene assessed by asking them about the frequency of bathing which is similar to that reported in Turkey [25]. However, other studies found an increased incidence of PA among those with more frequent bathing [21, 26]. Furthermore the present study didn't found any significant relation between PA and factors may reflect poor living and housing status as crowded household index, breading animals or poultries at home, presence of domestic insects and unbalanced diet style. Although most of rural communities in Egypt are used to bread animals and poultries at home as well as they are suffering from domestic insects; thus they may be more exposed to allergic manifestations and parasitic diseases,

surprisingly the majority of our students reported no animals, poultries or insects at home.

PA has been widely considered as a mild form of atopic dermatitis. It was found that the presence of skin manifestations of atopy was more common in PA patients [26]. Our results found 19 and 9 out of 36 cases with PA were atopic and had family atopy respectively. Previous study reported higher rates of atopy [25, 27] and other reported lower rates of atopy [28]. The present work also showed that the prevalence of PA was significantly higher among those with past history of PA affection, sibling history of PA and personal history of atopy. Previous study reported significant relation between PA and manifestations of atopy [26] while other denied a significant relation between atopy and PA [7].

Furthermore, as a result of reporting anemia and parasitic infestation as frequent risk factors for PA affection, these investigations were done in our work revealing 19 and 25 out of 36 cases with PA had anemia and parasitic infestations respectively. Also, the present prevalence of PA among children showed that it was significantly higher among those with parasitic infestations only. In contrast, other studies reported lower frequencies with insignificant relations [7, 27].

The Logistic regression analysis in the present work revealed that students' past history of PA was the only significant risk factors for the current PA affection whereas positive past history increase the risk of PA among children by nearly 7 times. Other risk factors were reported in previous study as atopy, xerosis, mineral deficiencies, sun exposure and poor cutaneous hydration [7].

LIMITATIONS

This study carried some limitations, first was the self-reported by information provided by students therefore, there could be some potential for reporting bias. Another limitation was that the study took place at only one village; this could affect the generalization of its results to other Egyptian localities. Despite these limitations, this study could provide baseline data for further study in different localities of Egypt in order to design comprehensive intervention that could deal with the problem.

CONCLUSION

The study concluded that the current prevalence of PA was nearly one fifth of the studied elementary school children. The current lesions were mostly small in size and multiple in number whereas face was the most common site of affection. Although, the 5th graders (aged 10-11 years), sun exposure, personal history of atopy, past history of affection with PA, siblings history of PA and parasitic infestation were significant determinants of the disease among the studied children, past history of PA affection was the only single significant risk factor for the current lesions. Periodic survey of elementary schools with skin examination of children by family physician is of a high value and urgently required. Treatment of affected cases was necessary. Health education of students, parents, and teachers on sound personal hygiene, balanced diet, clean environment, healthy living status is recommended.

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