#### The Distribution and Determinants of Pityriasis Alba among Elementary School Students in Ismailia City

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Abstract: Background: Pityriasis alba (PA) is a localized hypopigmented disorder of childhood with many existing clinical variants. It is more often detected in individuals with a darker complexion but may occur in individuals of all skin types. Atopy, xerosis, and mineral deficiencies are potential risk factors. Sun exposure exacerbates the contrast between normal and lesional skin, making lesions more visible and patients more likely to seek medical attention. Poor cutaneous hydration appears to be a common theme for most risk factors and may help elucidate the pathogenesis of this disorder. The end result of this mechanism is inappropriate melanosis manifesting as hypopigmentation. Aim: to determine the prevalence of pityriasis alba among elementary school children in Ismailia City and to determine its possible predisposing factors. Methods: a clinical survey was carried out on 1697 students in three elementary schools selected randomly in Ismailia city. Data was collected through sociodemographic and risk factors history; clinical examination of all children, and stool and blood examination for patients. Results: of the 56 PA patients, 10 (18%) had a previous history of atopic dermatitis and 9 (16%) had a solitary lesion. Histopathological study revealed markedly reduced pigment in the epidermis of lesional skin, but no significant difference in melanocyte count was found between lesional and normal skin. Ultrastructurally, degenerative changes in melanocytes and a reduced number of melanosomes within keratinocytes were seen. Conclusion: alleviation of the various risk factors via patient education on proper skin care and hygiene, use of lubricants and emollients, topical corticosteroid therapy in the presence of inflammation, and the novel administration of topical anti-inflammatory drugs such as calcineurin inhibitors can play a crucial role in promoting remission or resolution.

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### 1. Introduction

Pityriasis alba is a common benign condition in children. Its etiology and pathogenesis are still poorly understood. Recent studies have found direct correlations between the incidence of pityriasis alba and atopy, amount of sun exposure, lack of sun screen use, and frequency of bathing. <sup>(1)</sup>

Pityriasis alba is considered a low grade eczematous dermatitis and a minor feature of atopic dermatitis. Possible comorbid disorders in association with pityriasis alba are nutritional deficiency, anemia and parasitic infestation however, these are exclusively observed in children of poor socioeconomic conditions. In the past, a pathogenic implication of several microorganisms in particular gram positive bacteria has repeatedly been proposed and never confirmed.<sup>(2)</sup>

The hypopigmentation of pityriasis alba is formally categorized as post inflammatory but the actual pathogenetic events are not clear. Ultrastructurally, the number of melanocytes is reduced as are the melanosomes within both melanocytes and keratinocytes. <sup>(3)</sup>

Pityriasis alba occurs predominantly in children between the ages of 3 and 16 years. Both sexes are equally susceptible.  $^{(4)}$ 

It is much more conspicuous in patients with darkly pigmented skin and clearly is the most common disorder of hypopigmentation in children. It has a significant association with atopy.<sup>(3)</sup> Studies had shown different prevalence rates in Egypt as 13.49% <sup>(5)</sup>

Pityriasis alba was found to be more prevalent in males and in individuals with higher phototype categories. In those with inadequate personal hygiene and sun exposure habits the disease is more accentuated demonstrating that the xerosis presenting in individuals with atopic diathesis is an important element in the development of the disease. <sup>(6)</sup>

The course of the disease is extremely variable. Most cases 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. <sup>(4)</sup>

The most commonly used remedies (emollients and topical steroid) appear to have limited efficacy. <sup>(1)</sup>

As the patches of pityriasis alba don't darken normally in sun light effective sun protection helps minimize the discrepancy in colouration against the surrounding normal skin. Cosmetic camouflage may be required. Tacrolimus have been reported as a speeding resolution.<sup>(7)</sup> In exceptionally severe cases psoralen and ultraviolet A light (PUVA) therapy may be considered. (8)

Although pityriais alba is frequently encountered in dermatological practice, available studies on its prevalence in Egypt are few and were concentrating on prevalence of skin diseases as a whole not on pityriasis alba specifically e.g. a study for prevalence of skin diseases in rural areas of Assiut governorate. <sup>(5)</sup> and an epidemiological study of dermatosis among school children in Qalyoubia governorate. <sup>(9)</sup>

The aetiology of pityriasis alba is still unknown. That is why this study was conducted to elaborate more on the predisposing factors and epidemiologic characteristics of pityriasis alba.

Despite the fact that it is not a clinically serious condition, the aesthetic aspects of the disease are important since it usually attacks the face, presents therapeutic difficulties and has high incidence in young children. <sup>(10)</sup>

This work aims to determine the prevalence of pityriasis alba among elementary school children in Ismailia City and to determine its possible predisposing factors.

# 2. Methods

This is a cross-sectional study, carried out in three randomly selected elementary schools representing different geographic areas in Ismailia City, and included 1697 students, aged 6-13 years. All students were examined to determine prevalence of pityriasis alba according to different factors as age, gender, etc.

# **Data Collection:**

A questionnaire was distributed to all students to be filled in by their parents/guardians at home and returned back on the next day. The questionnaire was designed to explore students' health habits, the sociodemographic data and data regarding personal hygiene. It included questions to identify socio-economic status of the students and to identify the presence of various predisposing factors of pityriasis alba.

After institutional permission, a trained research assistant has conducted the clinical examination for the students. Clinical examination was performed to diagnose pityriasis alba according to Sujatha *et al.*, (asymptomatic superficial hypo-pigmented macules with slight overlying scaling located usually on the face, neck and shoulders).<sup>(11)</sup> Clinical data included number of lesions, site of the lesions, skin phototype of the students, diagnosis of atopic dermatitis in patients with pityriasis alba according to Hanifin and Rajka.<sup>(12)</sup> On finding pityriasis alba lesions, an examination sheet was filled out and the patient student became eligible for hemoglobin testing and stool examinations. **Statistical analysis:** 

Data analysis was conducted using SPSS 17 statistical package for Windows. Statistical significance was considered at P-value <0.05.

# 3. Results

A total of 1697 students were recruited from three elementary schools in Ismailia city. All students answered a questionnaire by the help of their parents (100% response rate) and were examined clinically. The age of the studied children ranged from 6 to 13 years with a mean age of 9.37  $\pm$ 1.88 years, 879 (51.8%) were boys and 818 (48.2%) were girls. (Table 1).

Table (1) shows that the most affected age group among students was 10 to 11 years old (44.8%). Among those affected by pityriasis alba males (51.8%) were significantly (P<0.05) more affected than females. There was a statistical significant relation (P<0.05) between pityriasis alba and both age and sex distribution of the students.

Table (2) shows no significant relation between pityriasis alba and factors that may reflects low socioeconomic status of the students (parent's education and occupation, number of house rooms and nutrition).

Table (3) shows increased pityriasis alba among students with sun exposure. Going to school on foot, helping parents in work and the type of work had no statistical significant effect on occurrence of pityriasis alba. So this study showed no significant relation between pityriasis alba and factors that may reflect degree of sun exposure.

In table (4) personal history of atopy was found in 66 (37.9%) patients [24 (36.4%) of them had a history of skin atopy] while family history of atopy was found in 40 (23%) patients.

Table (5) presents the skin examination of the students. 174 (10.3%) of the students were affected by pityriasis alba. The prevalence of pityriasis alba was 10.3%. Pitvriasis alba was found to occur more in the face (99.4%) in comparison to other body sites. The majority of the patients presented with lesions only over the face. Number of lesions varied greatly among patients, with the majority of patients having more than one lesion (64.6%). History of seasonal exacerbation was reported in 71 patients (40.8%), 67 (94.4%) of them had winter exacerbation whereas 4 (5.6%) had summer exacerbation. 15 patients (8.6%) were diagnosed to be atopic according to Hanifin and Rajka<sup>(12)</sup> as they had three major criteria (pruritus, typical morphology and distribution and personal history of atopy) and three minor criteria (pityriasis alba, dry skin and hand or foot dermatitis or keratosis pilaris or Dennie-Morgan fold) as in table (6). The prevalence of pityriasis alba was found to be more prevalent in individuals with darker skin and higher phototype categories (74.8% of patients with types 4 and 5).

From the investigations (haemoglobin and stool examination) that were done to pityriasis alba patients in the study group, it was found that 30 patients (17.2%) were anaemic and 25 patients (14.3%)

suffered from intestinal helminthes (*Entamoeba histolytica* in 13 patients, *Giardia lamblia* in 10 patients, *Ascaris* in 1 patients and *Oxyuris* in 1 patients).

Table (1): Socio-demographic data for the study group

	Pityriasis alba			Total			
	Present Absent (N=174) (N=1523)		(N=1697)		P - V a l u e		
	No	%	No	%	N	0 %	
Age (yrs)	_		-		_		
6-7	26	7.3	330	92.7	356	21.0	0.054
8-9	46	9.9	418	90.1	464	27.3	
10-11	78	12.7	538	87.3	616	36.3	
12-13	24	9.2	237	90.8	261	15.4	
Gender	_		_		_		
Male	115	13.1	764	86.9	879	51.8	0.001*
Female	59	7.2	759	92.8	818	48.2	
Number of siblings	_		_		_		
No	5	17.9	23	82.1	28	1.6	0.536
1-2	96	10.5	815	89.5	911	53.7	
3-4	62	9.6	586	90.4	648	38.2	
$\geq 5$	11	10	99	90.0	110	6.5	
Household members							
≤4	19	7.6	232	92.4	251	14.8	0.236
5	92	11.7	696	88.3	788	46.4	
6	46	9.9	417	90.1	463	27.3	
≥7	17	8.7	178	91.3	195	11.5	
Father education							•
-Illiterate	15	9.9	136	90.1	151	8.9	0.086
-Elementary	26	15.1	146	84.9	172	10.1	
-Preparatory through	108	10.5	924	89.5	1032	60.8	
-University	25	7.3	317	92.7	342	20.2	

# Table (2): Socio-demographic parameters for the study group

	Pityriasis alba				Total		
	Present		Absent		(N-1607)		P voluo
	(N=174)		(N=1523)		(N-1097)		<b>P</b> -value
	No	%	No	%	No	%	
Father's occupation							
Not working	13	9.6	123	90.4	136	8.0	0.870
Clerk	65	10.6	547	89.4	612	36.1	
Skillful	74	10.7	620	89.3	694	40.9	
Professional	3	6.7	42	93.3	45	2.7	
Others	19	9	191	91	210	12.4	
Mother's occupation							
Not working	137	1.3	1151	98.7	1288	75.9	0.370
Clerk	35	9.9	318	90.1	353	20.8	
Skillful	1	2.5	39	97.5	40	2.4	
Professional	0	0	10	100	10	0.6	
Others	1	16.7	5	83.3	6	0.4	
Number of house rooms							
One	13	13.4	84	86.6	97	5.7	0.307
Two	72	9	725	91	797	47.0	
Three	81	10.8	666	89.2	747	44.0	
≥four	8	14.3	48	85.7	56	3.3	
Nutritional status							
Good	121	10.1	1076	89.9	1197	70.5	0.761
Bad	53	10.6	447	89.4	500	29.5	
Frequency of bathing/wk							
One	8	5.8	129	94.2	137	8.1	0.141
Two	93	11.6	708	88.4	801	47.8	
Three	50	10.3	437	89.7	487	28.7	
≥Four	23	8.5	249	91.5	272	16.0	

### Table (3): Outdoor activity and sun exposure for the study group

	Pityriasis all	ba		Total			
	Present (N=174)		Absent (N=1523)		(N=1697)		<i>P</i> - v a l u e
	No	%	No	%	No	%	
Going school on foot							
Yes	27	7.7	322	92.3	349	20.6	0.082
No	147	10.9	1201	89.1	1348	79.4	
Working status							
Yes	5	11.9	37	88.1	42	2.5	0.612
No	169	11.8	1486	88.2	1655	97.5	
Nature of work							
Sun exposure	4	19	17	81	21	50.0	0.343
No sun exposure	1	4.8	20	95.2	21	50.0	

#### Table (4): History of atopy among the study group

		Pityri	asis alba		Tat		
	Pre (N=	sent 174)	Absent (N=1523)		(N=1697)		<i>P</i> -value
	No	%	No	%	No	%	
Personal history of atopy							
Yes	66	10.6	559	89.4	625	36.8	0.751
No	108	10.1	964	89.9	1072	63.2	
Family history of atopy							
Yes	40	9.3	389	90.7	429	25.3	0.463
No	134	10.6	1134	89.4	1268	74.7	

 Table (5): Some clinical data for pityriasis alba patients among the study gro

	Number	%
Pityriasis Alba		
Present	174	10.3
Absent	1523	89.7
Site		
Face	173	99.4
Neck	3	1.7
Hand	6	3.4
Number of lesions		
1	62	35.4
2	65	37.1
3	26	14.9
≥4	21	12.0
Duration of disease		
<6 Months	125	71.8
≥6 Months	49	28.2
History of topical application		
Present	19	10.9
Absent	155	89.1
Itching		
Present	40	23.0
Absent	134	77.0
Seasonal variation		
Present	71	40.8
Absent	103	59.2
Season		
Winter	67	94.4
Summer	4	5.6
Diagnosis of atopy		
Atopic	15	8.6
Non atopic	159	91.4
Skin phototype		
3	44	25.2
4	102	58.6
5	28	16.2

 Table (6): Diagnostic criteria for atopic dermatitis in atopic pityriasis alba patients among the study group

	Number	%
Pruritus	15	100
Flexural lichenification	5	33.3
Face and extensor dermatitis	10	66.7
Dry skin	15	100
Hand dermatitis	6	40
Foot dermatitis	4	26.7
Keratosis pilaris	3	20
Dennie-Morgan fold	2	13.3
Personal history of atopy	15	100

### 4. Discussion

The aetiopathogenesis of pityriasis alba is still unknown. This stimulates researchers for further explanations of the role of various predisposing factors on occurrence of pityriasis alba. In the literature most of the studies that dealt with the prevalence of pityriasis alba in children were hospital-based, therefore did not necessarily represent the prevalence in the community.

A study was conducted previously in Qalyobia governorate of Egypt and reported a prevalence (11.3%) of pityriasis alba very close to that detected in the current study <sup>(9)</sup>. The prevalence in this study was slightly lower than that reported in Assiut and North Sinai where it was reported to be 13.49% and 18.9% of examined school students respectively <sup>(5, 13)</sup> This may be due to different environment as these studies were conducted in rural areas as Hussein's study <sup>(5)</sup> was in Ber Al-Abd District of North Sinai and Abdel-Hafez's study was in rural areas of Assiut governorate while this study was in Ismailia city which considered an urban area. Children in rural areas may be more

exposed to sun during playing or helping their father's outdoors.

The prevalence in the current study was not far from that found in Libya  $(10.5\%)^{(14)}$  and Iran  $(9.4\%)^{(15)}$ , while it was slightly lower than that reported in Turkey  $(12\%)^{(16)}$  and Saudi Arabia  $(17.3\%)^{(17)}$  and it was higher than values reported from India  $(1.02\%)^{(18)}$  and Nepal  $(5.2\%)^{(19)}$ . Differences in prevalence in our study as compared to other studies could be attributed to the variations in environmental, climatic or other factors as the variations in the time and duration of such studies, the variations in the sample type or size.

Males were significantly more affected by pityriasis alba than females, and the mean age of greater affection was 9.6 years. This finding resemble that of Hussein <sup>(13)</sup> in North Sinai and Al-sayeed *et al.*<sup>(20)</sup> who found that the mean age of children with pityriasis alba was 9.2 years, which could be due to the increased outdoors' play and exposure to sun rays and dry air..

Lio<sup>(21)</sup> reported that pityriasis alba 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 pityriasis alba patients.<sup>(6)</sup> In the present study 15 patients with pityriasis alba (8.6%) were atopic. The personal history of atopy was found in 37.9% of patients which was not far from the results of a study in India <sup>(22)</sup> and another one in Turkey <sup>(23)</sup>. Family history of atopy was found in 23% of patients which was close to that reported by Vinod *et al.*<sup>(22)</sup> These figures suggests a role of atopy in the pathogenesis of pityriasis alba.

In this study there was no relation between pityriasis alba and the frequency of bathing, which is similar to that reported in Turkey. <sup>(23)</sup> On the contrary, it was reported that there was an increased incidence of pityriasis alba in individuals who bath excessively.<sup>(6, 15)</sup> This may be due to removal of normal epidermal defensins and other natural protective substances from the skin surface by frequent bathing making one more prone to have pityriasis alba. <sup>(6)</sup>

Although sun exposure was frequently described to be a risk factor for pityriasis alba this study showed no relation between pityriasis alba and factors that may reflect degree of sun exposure, this is similar to the results found in North Sinai <sup>(13)</sup> however in Turkey <sup>(23)</sup> and in Iran <sup>(15)</sup>, a relationship was found between the prevalence of pityriasis alba and frequency of sun exposure. This may be due to other factors in their population than sun exposure alone. This also may be due to different climates and environments.

Due to exposure to sun and dryness by winds, detergents and allergens, face was the most common site affected by pityriasis alba. <sup>(15, 22)</sup>

In the present study history of seasonal exacerbation was reported in 71 patients (40.8%), 67 (94.4%) of

them had winter exacerbation whereas 4 (5.6%) had summer exacerbation, this was not far from those found by Vinod *et al.* (2002). <sup>(22)</sup> Exacerbation of lesions during winter may be explained by more dryness of skin in winter which may be caused by cold winter winds or the decrease in the mass of intercellular lipids and altered ratios of fatty acids esterified to ceramide 1 in winter. <sup>(24)</sup>

It was reported that pityriasis alba was higher in individuals with darker skin. <sup>(6)</sup> Similarly in the present study the prevalence of pityriasis alba was found to be more prevalent in individuals with darker skin (74.8% of patients with types 4 and 5).

Because anemia and parasitic infestation were frequently described to be a risk factor for pityriasis alba, investigations were done to the cases and the results showed that anemia was found in 30 patients (17.2%) and helminthes was found in 25 patients (14.3%) which was found in other study. <sup>(22)</sup> This suggests that anemia and helminthes may be a risk factor for pityriasis alba in this study.

### Conclusion

Pityriasis alba is prevalent among primary school children of age 10 to 11 years old. There is a need for health education programs to limit exposure to sun and to improve personal hygiene. Also, there is a need for screening and treatment of school children for anemia and parasitic infestations that were frequent in patients with pityriasis alba.

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