

## Epidemiological Study of Scabies in Primary Schools, Fayoum Governorate- Egypt

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### Abstract

**Background:** Scabies is a worldwide contagious skin disease. The highest global rates of scabies are observed in countries with hot, tropical climates. School environment makes pupils vulnerable to cross-transmission of communicable skin diseases.

**Aim:** This study aims to estimate the prevalence of scabies amongst primary school pupils in Fayoum governorate, and to determine the predisposing factors of scabies infestation in public and private schools.

**Subjects and Methods:** This was a cross-sectional descriptive study, conducted in two main districts of Fayoum governorate with variable socioeconomic status. The sampling method utilised was multistage cluster systematic random sampling. Pupils were selected from different grades with a total of 5186.

**Results:** Scabies prevalence was 3.8% in the study group. The prevalence was higher in public schools than private schools and in boys more than girls. There were socio-economic factors that had a direct impact on infection, such as parents' education, housing conditions, number of rooms and personal hygiene.

**Conclusion:** Scabies remains a significant public health problem; it affects populations from different social classes. It is essential to take further measures at schools for eradicating this disease. Regular screenings and periodic health education programs for students and their parents promoting health awareness and attitudes are of prime importance.

**Keywords:** School pupils; Scabies; Prevalence, Predisposing factors

### Introduction

Scabies is a contagious skin infestation that spreads by direct and indirect contact, affecting several million people, causing an increase in new cases each year [1]. It is a global disease that can occur in both genders, at all ages, in all ethnic groups, and at all socioeconomic levels [2,3].

It is a condition that affects families, particularly young children as they are one of the most vulnerable group, followed by older children and young adults [4]. The primary contributing factors to contracting scabies appear to be poor living conditions, coupled with bad hygiene with a complex relationship between these factors [5]. A person's nutritional status has been reported as a significant risk factor in a scabies outbreak, and malnutrition may predispose individuals to crusted scabies [6].

A WHO report, which collated data from 18 prevalence studies conducted between 1971 and 2001, reported scabies prevalence ranging from 0.2% to 24% with cyclical epidemics occurring at intervals of 10 to 15 years [7]. The highest global rates of scabies were seen in countries with hot, tropical climates (71.4%) [8,9] however, scabies is not restricted to these regions [2]. In industrialised countries, scabies is observed primarily in sporadic individual cases and institutional outbreaks with a seasonal variation [10].

Skin disorders are the most frequently diagnosed condition in school pupils, in both developing and industrialised countries. The school environment makes pupils vulnerable to cross-transmission of communicable skin diseases, which can then be passed on to family members [11,12].

A series of studies on epidemiologic skin diseases among school pupils in Egypt's Kafr el-Sheikh's schools showed that the prevalence of scabies in their latest study was 4.4% [13].

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The WHO estimated in 2010 that the direct impact of scabies infestation on the skin alone resulted in more than 1.5 million ylwtd (years lived with disability); whereas the indirect outcomes of renal and cardiovascular complications imposed a major cost on health-care systems [14].

This study aimed to evaluate the prevalence of scabies amongst primary school pupils in two main districts of Fayoum governorate, conducted in order to determine the predisposing factors of scabies infestation in both public and private primary schools.

## Methods

It was a descriptive cross-sectional multi-stage study, conducted in two main districts (Fayoum and Sinuris) of Fayoum governorate which is one of the 29 governorates of Egypt (North Upper Egypt) with variable socioeconomic status. We chose Fayoum district as it is one of the largest representatives with 27.7% of the total population with urban characteristics. Sinuris is the third district in Fayoum governorate with a population of 17.2% of the total Fayoum governorate and it represents the rural population [15]. The sample was multistage cluster systematic random sampling; first two districts were chosen from six districts. Second schools were selected according to their geographical distribution to cover all districts (rural and urban); public and private primary schools (6 schools in Fayoum district, 3 public and 3 private; three schools in Sinuris district, 2 public and 1 private schools). In the third stage, all pupils in the selected schools were enrolled from different grades, with a total of 5186 pupils; 3149 pupils in Fayoum schools and 2037 pupils in Sinuris schools represented during the academic year.

A structured Arabic interview questionnaire with closed ended questions was prepared, made up of the following sections:

- Socioeconomic data, which included: age, gender, number of family members sharing the same room, level of education and the occupation of both parents.
- Predisposing factors, such as the presence of a water pipe in the house, frequency of weekly baths, provision of a separate towel for each person, number of people sharing a bed and the frequency of linen changes.
- Clinical diagnosis via general examination, history taking and clinical local examination for signs of scabies.

School classes from 1st to 6th grade were examined in suitable areas with good lighting, and were prepared through the mutual cooperation of the principals of each respective school. The class teacher helped the dermatologist reassure the pupils. A thorough history taken accompanied by full clinical examination of the whole body including the breasts and the genital area was conducted for the detection of skin rash. The positive cases were asked for the onset, duration of the disease; diagnosis of other family members and any cutaneous signs or abnormalities were recorded and documented by a digital camera for specialist confirmation by an expert dermatological consultant. A pupil was considered to have scabies, if two of the following requirements were fulfilled: pruritus which intensified at night, presence of the lesions for >2 weeks, and at least one more family member with similar lesions.

Information about the disease and instruction on the simplest

ways to guard against the infection itself was given to the school pupils. All patients were treated with topical ectomethrin and were re-examined after a month to assess the improvement of their clinical condition using a severity score with a range from 0 to 10 points. It was calculated by adding the intensity of itching, presence of superinfection, and the number of topographic areas affected.

## Data Entry and Statistical Analysis

Data was collected, coded and analysed using SPSS software (Version 18) on Windows 7, and a simple descriptive analysis in the form of means and standard deviations was calculated for numerical data. Qualitative data was described using numbers and percent distribution. Inferential statistic test (chi square test for qualitative data and t-test for quantitative data) was used to detect differences between categories, with a significant level of less than 0.05.

## Results

The age of pupils examined ranged from 6 to 12 year olds with the mean age of  $9.2 \pm 1.90$  years in Fayoum and  $8.9 \pm 1.80$  years in Sinuris. The total number of the study group was 5186 pupils; with a total prevalence rate of scabies was 3.8%. The infestation was greater in Fayoum public schools, than in private schools in contrast to Sinuris private schools were higher than public schools. The prevalence was higher amongst boys in Fayoum and girls in Sinuris as shown in Table 1.

The prevalence of scabies infestation was affected by socio-economic factors such as the housing condition of students; the mean number of rooms per house was lower in pupils who have scabies ( $1.98 \pm 0.58$ ) than for pupils who do not have scabies ( $2.34 \pm 0.58$ ). On the other hand, the mean number of family members sharing the same bed was higher in pupils who have scabies ( $2.60 \pm 0.66$ ) than for pupils who do not have scabies ( $2.20 \pm 0.71$ ) with a highly statistically significant difference between them ( $P < 0.0001$ ). Scabies was more common in school pupils with a large family ( $\geq 7$  members) (10.6%) as opposed to a family of 5-6 members (4.9%), and 3-4 members (3.8%) with a highly statistically significant association between prevalence of scabies and household size ( $P < 0.0001$ ). Regarding other parameters such as safe water supply, proper sewage disposal and the presence of a washing machine for proper washing and cleaning of clothes, all school pupils reported that these were available.

In relation to parents' education: for nearly two thirds of

Demography	Fayoum		Sinuris		Total	
	N	%	N	%	N	%
School pupils	3149	60.7	2037	39.3	5186	100
Public Schools	2010	63.8	1287	63.2	3297	63.6
Private Schools	1139	36.2	750	36.8	1889	36.4
Gender of Positive cases						
Boys	51	3.1	53	5.4	104	40.2
Girls	33	2.1	61	5.8	94	36.2
Total	84	2.6	114	5.6	198	3.8
Type of school						
Public	69	3.4	55	4.3	128	3.8
Private	15	1.3	59	7.9	70	3.7

Table 1: School pupil's distribution regarding public and private schools.

Variables	Fayoum		Siuris	
	N=84	%	N=114	%
<b>Father Education</b>				
Illiterate	29	34.5	22	19.3
Primary	32	38.1	44	38.6
Secondary	16	19.1	43	37.7
University	7	8.3	5	4.4
<b>Father Occupation</b>				
Not working	31	36.9	3	2.6
Worker	24	28.6	67	58.8
Clerk	20	23.8	36	31.6
Others	9	10.7	8	7.0
<b>Mother Education</b>				
Illiterate	27	32.1	36	31.6
Primary	31	36.9	32	28.1
Secondary	20	23.8	41	35.9
University	6	7.2	5	4.4
<b>Mother Occupation</b>				
Housewife	79	94.0	78	68.4
Working	5	6.0	36	31.6

Table 2: Parents Education and Occupation for Positive Cases.

Variables	Fayoum		Sinuris		Total	
	N	%	N	%	N	%
<b>Family History</b>						
Positive	58	69.0	100	87.7	158	79.8
Negative	26	31.0	14	12.3	40	20.2
<b>Secondary infection</b>						
Presence	79	94.0	16	14.0	95	48.0
Absent	5	6.0	98	86.0	103	52.0

Table 3: School pupil's distribution regarding family history & complication.

the pupils having scabies, the parents were either illiterate or had primary education, with a highly statistically significant association between prevalence of scabies amongst pupils and the low educational status of their parents ( $P < 0.001$ ). Regarding parents' occupation: the prevalence rate in pupils whose fathers were not working was higher than pupils whose fathers were employed as skilled workers, clerks and in other professional occupations; the prevalence rate was also higher with mothers who were house-wives. There was therefore, a significant statistical association between parents' occupation and the prevalence of scabies ( $P < 0.001$ ) (Table 2).

Regarding factors related to personal hygiene, it showed a highly statistically significant association ( $P = 0.0001$ ) with scabies prevalence; the prevalence of scabies was higher amongst pupils who bathed once every two weeks (8.6%), followed by those who took a bath once a week (4.9%), and in comparison to those who bathed twice weekly (4.0%). However, the prevalence of scabies was almost the same regarding the frequency of nail clipping and bed linen change, with no statistically significant association ( $P = 0.943$ ,  $P = 0.961$ ) respectively.

There was a positive family history of scabies in more than three quarters of Sinuris pupils (87.7%) and 69% of Fayoum pupils; 92.1% of them reported that it was related to seasonal variation. Additionally, 94.0% of Fayoum pupils experience secondary infection and other skin problems, with the mean interval time from a previous attack being  $2.6 \pm 3.8$  (Table 3).

The multivariate logistic regression analysis showed factors significantly associated with scabies prevalence amongst pupils,

Factors	Significance	Estimate relative risk (95 % CI)
School (private vs. public)	0.12	
Age	0.65	
Gender (male vs. female)	0.69	
Residence (rural vs. urban)	0.01	3.158 (1.358-7.342)
Rooms per house	0.78	
Member per bed	0.755	
Household family size ( $\geq 7$ vs. $< 7$ )	0.01	3.115 (1.256-7.727)
Mother education (not educated vs. educated)	0.85	
Father education (not educated vs. educated)	0.54	
Mother occupation (Housewife vs. Working)	0.71	
Father occupation (Not working vs. Working)	0.16	
Taking shower (one time per two weeks vs. at least one time weekly)	0.04	2.534 (1.044-6.148)
Nail cutting (monthly vs. weekly)	0.59	
Change bed linen (monthly vs. weekly)	0.66	
Personal fomites (no vs. yes)	0.43	
Family history (positive vs. negative)	<0.0001	562.598 (272.641-1160.930)

Table 4: Multiple Logistic Regression showed factors related to "scabies".

which were: living in a rural area, large family size, infrequent baths, and a positive family history. On the other hand, all other studied factors showed no statistical association (Table 4).

## Discussion

Skin diseases were evaluated in 187 countries from a period of 1990-2010 by the Global Burden of Disease (GBD) study which reported variations between the 2nd and the 11th leading causes of years lived with disability and the 4th leading cause of nonfatal disease burden [16]. Scabies is thus a globally neglected public health problem in spite of its huge burden from secondary complication, in the most susceptible vulnerable group, children [17].

Our results revealed that the prevalence of scabies in Fayoum governorate was 3.8%; lower in Fayoum district, higher in Sinuris district. This result is explained by the fact that Fayoum district had a high percentage of urban communities whereas Sinuris district had more rural areas than urban. The socioeconomic level in Sinuris is lower than in Fayoum. This may be due to large family sizes, especially in extended families living in the same house, which is a part of the culture in rural areas, leading to overcrowding and poverty; meanwhile, the absence of safe water supply in some houses also led to poor health habits [11]. Comparable findings reported by [13] showed the prevalence in Egyptian primary schools (Kafr el-Sheikh) was 4.4% and likewise for Sohag [18]. A high prevalence rate of 10.16% was reported amongst Indian children, which may also be the result of a high density overcrowded population [19].

The infestation in Fayoum was higher in public schools, in contrast to Sinuris where it was found to be higher in private schools. This result is clarified by the fact that the numbers of pupils in the private schools in Sinuris were distributed amongst only one school located in a rural area with overcrowded pupils in each class. These results were in agreement with [13] who

reported that the prevalence was higher amongst children in rural areas (5.2%) than in urban areas (3.2%).

Our study demonstrated, that there was an inverse proportion between prevalence of scabies and the pupils' parents' education and occupation. The prevalence was higher amongst school pupils whose parents were illiterate or who were only educated up to the primary level, and also among those not working or those doing only manual work. These results are almost on a par with [20], who reported that illiteracy of adult household members was a very good predictor for the presence of scabies in developing countries. [13] was in agreement with our results which showed that unemployed mothers with low levels of education had children that are vulnerable to scabies. Educated mothers were aware of the good health practices required to maintain their children's health, and were also able to understand the benefits of health education related to disease prevention.

With reference to the housing conditions of the pupils, the prevalence of scabies was more common in those who had a large family, with a highly statistically significant association. Fewer rooms and many people sharing the same bed heightened the predisposition to scabies infestation, mainly due to contact transmission of the disease. An increase in the number of families with small houses and minimal income typically led to poor living conditions and unhealthy practices. Our results demonstrated [21,22] that pupils sharing beds were more susceptible to severe and repeated infection due to the fundamental role of physical contact in disease transmission.

Regarding personal factors related to hygiene and scabies prevalence, there was a higher infection amongst pupils who bathe once every two weeks in comparison to pupils who bathe twice weekly with a highly statistically significant association. Our study reveals that personal hygiene plays an integral role in the development of scabies. This is documented by [23] results that show that pupils who do not bathe on a daily basis are more prone to developing scabies.

Our study demonstrated that there was a highly statistically significant association found between positive family history and the prevalence of scabies which was in concordance with the results of [20,24]. The presence of a history of itching in several family members over the same period is characteristics for scabies.

The results of our multivariate logistic regression analysis showed that residence in rural areas, large family size (>7), infrequent bathing, and positive family history were notably associated with scabies prevalence. The relationship grows more complicated, as a vicious circle develops between scabies and the relative levels of poverty and overcrowding [13].

## Conclusion and Recommendations

Scabies remains a significant public health problem; it is common in childhood and affects populations from different social levels. Although scabies is a common disease, its diagnosis could be challenging and difficult to establish. We concluded that specific measures need to be undertaken in order to eliminate this disease at various levels comprising of schools, parents and students. This important task can be accomplished through school health insurance program which includes:

- Regular screening of students by school doctors, especially during the seasonal spread of the disease and ensuring the availability of drugs for thorough treatment of all family members to ensure complete cure and recovery from the disease.
- Highlight the importance of proper cleaning with frequent bathing for complete cure and proper prevention of the disease.
- Environmental cleaning with specific disinfection of the classroom.
- Health education for teachers, social workers, and pupils alongside their parents on the modes of transmission for scabies, its predisposing factors.
- All these measures play a role in the prevention of the disease.

## Ethical Considerations

This study was reviewed and approved by the Faculty of Medicine (Research Ethical Committee) Fayoum University. An official approval was obtained from the Directorate of Health and Education, and principals of the schools. Written consent was secured from the parents of the school pupils. The study was conducted after explaining the aim of the study; confidentiality was expressed to the pupils. Verbal assent was procured from the pupils before examination. All pupils had the right to not participate in the study. The method of examination was explained to pupils in the presence of a class teacher. Treatment was prescribed when indicated and the method of use further explained.

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## Conflict of interest

There is no conflict of interest, as there is no commercial or financial relationship with any institution or organization that could be construed as a potential conflict and all expenses are therefore covered by the authors. There is no grant, financial support or equipment.

## Key Points

- This has become a topic of importance in recent times, as it has been nominated by WHO as one of the neglected tropical diseases.
- It is known to recur due to proliferation in both the developed and developing countries. Therefore, it is imperative to identify the factors that cause the disease while ensuring the dissemination of correct health behavioural practices for the successful and timely prevention of the disease.
- This study was the first of its kind in Fayoum, Egypt, involving a large number of students (risk group) and it detects the different epidemiological and behavioural factors that have a direct or indirect impact on the disease.

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