


Prevalence and risk factors of scabies among children living in Madrasahs (Islamic religious boarding schools) of Bangladesh: a cross-sectional study

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ABSTRACT

Introduction To determine the prevalence and associated factors of scabies among the children living in the Madrasahs (Islamic religious educational institution) of Bangladesh was the objective of the study.

Methods This cross-sectional study was conducted in eight selected Madrasahs from May to October 2023 among male and female children aged between 3 and 18 years. Children were screened for scabies according to criteria developed by the International Alliance for the Control of Scabies.

Results It was found that overall prevalence of scabies among the children living in Madrasahs was almost 34% (mild 73.5%, moderate 24.9% and severe 1.6%). Prevalence of scabies among male was higher than female (39.4% vs 28.4%). Male gender (aOR 2.09, 95% CI 1.27 to 3.47, p=0.004) and age (aOR 0.95, 95% CI 0.91 to 0.99, p=0.017) were two significant predictors of scabies among children. Besides, living in Madrasahs having more boarders (aOR 1.37, 95% CI 1.06 to 1.69, p=0.025), shared bedding, clothes or toilet stuffs with other children (aOR 1.46, 95% CI 1.03 to 2.09, p=0.036) and history of pruritus in the close entourage (aOR 4.19, 95% CI 3.07 to 5.73, p<0.001) were associated with a higher chance of being infected by scabies.

Conclusion Almost one-third of the children living in the Islamic boarding schools in Bangladesh are suffering from scabies, more prevalence in male and younger children. Accommodation of higher number of boarders, sharing personal staffs and pruritus in close contacts increase the risk of scabies in these children.

INTRODUCTION

Scabies is one of the major neglected tropical diseases, mostly prevalent lower-income and middle-income countries of sub-Saharan African and South-East Asian region. This disease affects more than 565 million people worldwide annually, predominantly children.¹ It has a significant impact in terms of cost of treatment, absence at work or school and psychological repercussions.² This disease is attributable to almost 4.84 million disability-adjusted life-years.¹

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Scabies is more prevalent among children from low-income and middle-income countries.
- ⇒ Children from boarding schools are more vulnerable to scabies.
- ⇒ Poor and crowded living condition and inadequate personal hygiene increase the risk of scabies.

WHAT THIS STUDY ADDS

- ⇒ Almost one-third of the children in Madrasahs (Islamic boarding schools) of Bangladesh are infected with scabies.
- ⇒ Scabies is more prevalent among male and younger children.
- ⇒ Overcrowded Madrasahs, sharing personal commodities and history of pruritus in the close entourage increase the risk of scabies.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Help guide prevention programmes and policy against scabies in children in boarding schools in low-income and lower-middle-income countries.



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Aetiologically, scabies is a contagious skin disease caused by *Sarcoptes scabiei* var. *hominis*. This disease is transmitted through direct and prolonged contact with an infected skin or by using contaminated personal objects.³ The predominant clinical manifestation includes debilitating itching and scratching, which in turn is followed by the breakdown of the barrier function of the skin and complications due to bacterial infection, ranging from impetigo, abscesses and cellulitis.⁴

Transmission of scabies is influenced by social attitudes, migration, access to healthcare services, housing conditions, hygiene conditions and crowding. It is reported that overcrowded living conditions, sleeping together, sharing of clothes, sharing of towels, poor hygiene practices, malnutrition and travel to scabies outbreak areas are common risk factors

for scabies.^{5 6} Children from lower socioeconomic index, especially those who live in unhygienic and crowded areas such as urban slums and boarding schools, are the most common victims of scabies. In these children, the infestation often spreads quite rapidly, owing to their close contact and overcrowding within their residence.^{6 7} Treatment for these groups is also hard because of lack of easy access to healthcare, delayed diagnosis, inadequate treatment adherence, malnutrition, associated allergic and bacterial infections and inadequate follow-up.⁸

Despite the high burden, scabies remains one of the major under-recognised global health concerns, especially in the lower-income and middle-income countries. For example, in Bangladesh, the last report in hand showed that almost 77% of the children have experienced scabies.⁹ Although the country is passing through an epidemiology transition and the burden of non-communicable diseases is rising, the overall prevalence of scabies remains almost the same in a few specialised group of people like in urban slums and residential religious schools.¹⁰

Education system in Bangladesh is run in three ways: (1) general education which includes provision of education in Bangla and English language, (2) Madrasah and (3) technical education.¹¹ The primary focus of Madrasahs education system is to provide Islamic education, which is considered as the education of Shariah. Various types of Madrasahs exist in Bangladesh: Maktab, Hafizia, Qawmi and Alia. Currently, total numbers of Madrasahs are not known but there is an estimate that more than 1.5 million children are accommodated in over 8000 Madrasahs (Islamic boarding schools) all over the country.¹²⁻¹⁴ According to World Bank survey (2008) showed that Madrasahs (aliyah, qawmie and others) account for 14% of all rural primary enrolment and 22% of all rural secondary enrolment, with 87% of qawmi and 19% of aliyah Madrasahs offering at least some residential facilities.¹⁴ Living status of the majority of these facilities is below standard with overcrowded and unhygienic residence making the residents vulnerable to scabies. A recent study reported that almost 61% of the children living in Madrasahs facilities are affected by scabies.¹³ Despite this huge burden of disease, scabies often remains underdiagnosed and untreated in these resource-poor communities. Understanding the epidemiology and risk factors of scabies infection among this larger population group might guide development of further prevention strategies.

Therefore, to determine the prevalence and its associated factors of scabies among the children living in the Islamic religious boarding schools of Bangladesh was the objective of the present study.

METHODS

Study design and setting

This was an institution-based cross-sectional study conducted in eight selected Madrasahs (Islamic boarding schools) of Dhaka city, capital of Bangladesh from May

to October 2023. The selection criteria of the Madrasahs were accommodation of at least 50 children of all-male or all-female during the study period. All Madrasahs were residential and located in two zones of Dhaka Metropolitan Area: Dhaka city corporation north and west. Four madrasahs were randomly selected from Dhaka City Corporation north and rest four was selected from Dhaka City Corporation south.

Participants

All the children aged between 3 and 18 years residing in the selected Madrasahs were considered as the study population. Sample size was calculated using the single population proportion formula: $n = z^2 p(1-p)/d^2$, where, $z=1.96$ for 95% confidence level, p =estimated prevalence of scabies and d =margin of error. For the present study, the following assumptions were considered: estimated prevalence of scabies at 61% reported by a previous study from Bangladesh,¹³ margin of error at 5%, non-response rate of 10%. The formula provided that a sample size of 406 would be enough for the present study. However, a total of 935 children, who were screened for scabies at the selected madrasahs, all were included in the study.

Consecutive sampling technique was used for inclusion of the participants in the present study. Inclusion criteria for the participants in the study were both male and female children aged between 3 and 18 years residing in the Madrasahs for at least 6 months.

Data collection

An official written permission was obtained from the authority of the Madrasahs after explaining the objectives and procedure of the study. As the study population was from minor age group (age <18 years), this permission was considered as the assent for including the children, as the Madrasahs authorities were the legal guardian of the children. Moreover, informed written consent was also obtained from the children aged >12 years. Afterwards, all participants were interviewed by trained research assistants and examined by a registered physician. Male physicians interviewed and examined the male students and female doctors examined the students from all-female Madrasahs as gender issue is particularly sensitive to the Madrasahs. Suspected cases of scabies those were not confirmed by the physician and were reviewed by a specialist dermatologist. A semistructured case record form comprising sociodemographic information, hygiene practice-related information and clinical information was used for data collection. Examination of the skin primarily focused on the most commonly affected regions by scabies. However, examination of sensitive areas such as the groin, buttocks, breasts and torso was skipped as it was not practical in the field setting. All participants who had clinical manifestations of scabies were asked whether they had similar lesions in these regions.¹⁵ Evidence suggests that such a limited examination of common areas (hands, feet and lower legs) is able to detect about 90% of scabies cases.¹⁶ All the diagnosed

cases of scabies received standard management for free of cost from the research team.

Operational definition

Diagnosis of scabies

Scabies was diagnosed in the present study based on criteria for scabies diagnosis developed by the International Alliance for the Control of Scabies (IACS, 2020) consensus criteria.¹⁵

A	Confirmed scabies meets at least one of the following criteria:
A1	mites, eggs or faeces on light microscopy of skin samples
A2	mites, eggs or faeces visualised on an individual using a high-powered imaging device
A3	mite visualised on an individual using dermoscopy
B	Clinical scabies meets at least one of the following criteria:
B1	scabies burrows
B2	typical lesions affecting male genitalia
B3	typical lesions in a typical distribution and two history features
C	Suspected scabies meets one of the following criteria:
C1	typical lesions in a typical distribution and one history feature
C2	atypical lesions or atypical distribution and two history features

In the present study, we used the subcategory of B (clinical scabies) and C (suspected scabies) for diagnosing scabies.

Severity of scabies

The severity of scabies was defined based on the number of lesions counted as mild (1–10 lesions), moderate (11–49 lesions) and severe scabies (>50 lesions).¹⁷

Statistical analysis

The prevalence of scabies was determined among the participants according to the 2020 IACS criteria as mild, moderate and severe scabies.¹⁵ A multinomial logistic regression model was used to determine the factors associated with mild and moderate to severe scabies in reference to no scabies. The potential variables for inclusion in the model were selected empirically from the existing evidence regarding the risk factors of scabies.^{5–7} Variance inflation factors (VIFs) were calculated to assess multicollinearity among the predictor variables in the regression model with a VIF threshold of 5 used to identify problematic multicollinearity. The results indicated that the VIF values of the included variables ranged between 1.03 and 2.93, suggesting no significant multicollinearity in the model. Moreover, the nonlinear multilevel model suggested that there was no non-independent error and the madrassahs were homogenous except for the number of children in the madrassahs. A $p < 0.05$ using a 95% CI

in multivariable logistic regressions defined a statistically significance level.

STATA V.17.0 was used for statistical analysis.

RESULTS

Sociodemographic characteristics

A total of 935 children were included in the study with a mean (SD) age of 12 (3.7) years. Almost half of the children were female. Regarding hygiene practice, almost all the children resided in shared rooms and used shared toilet. Moreover, more than half of the children (54%) reported that they shared their bedding, clothes or toilet stuffs with other children. Around 44% of them slept on floor. The majority of the children reported taking baths regularly and using soap. Finally, almost 40% of the children reported pruritus in their close entourage (table 1).

Prevalence and characteristics of scabies

Overall, almost 34% of the children living in Madrasahs were suffering from scabies. According to the IACS criteria, clinical scabies (B1/B2/B3) was diagnosed in 27.4% of them and suspected scabies (C1/C2) was diagnosed in 72.6% of them. Clinically, the majority of the children had mild degree of scabies (73.5%) followed by moderate (24.9%) and severe (1.6%) scabies. Upper extremities (hands, wrist, elbow and interdigital spaces) were most commonly affected area among the children followed by abdomen and genito-inguinal region (table 2).

Factors associated with scabies

In logistic regression, the odds of having severe scabies were about twice among male children compared with females (adjusted odds ratio (aOR) 2.09, 95% CI 1.27 to 3.47, $p = 0.004$). Besides, children who lived in Madrasahs having more boarders had a higher chance of having mild scabies (aOR 1.02, 95% CI 1.01 to 1.03, $p = 0.028$) while those who shared bedding, clothes or toilet stuffs with other children had a higher chance of having moderate to severe scabies (aOR 1.51, 95% CI 1.08 to 2.17, $p = 0.016$). A history of pruritus in the close entourage increased the risk of having both mild and moderate to severe scabies (aOR 38.19, 95% CI 17.57 to 82.97, $p < 0.001$ for mild scabies and aOR 29.46, 95% CI 9.09 to 95.43, $p < 0.001$ for moderate to severe scabies) (table 3).

DISCUSSION

Scabies is a disease of poverty affecting predominantly children from low socioeconomic condition. The Madrasahs (Islamic boarding schools) of Bangladesh might be the vulnerable place for scabies endemic due to overcrowding and poor living circumstances. The present study attempted to determine the prevalence of scabies and its associated factors among children living in madrasahs in Dhaka city of Bangladesh.

Table 1 Sociodemographic characteristics, institutional characteristics and hygiene practice of the orphanage children (n=935)

Variables	Overall, n (%)	Scabies		P value
		Yes, n (%)	No, n (%)	
Gender				
Female	468 (50.1)	133 (28.4)	335 (71.6)	<0.001
Male	467 (49.9)	184 (39.4)	283 (60.6)	
Age (years), mean (SD)	12.06 (3.7)	11.87 (3.2)	12.15 (4.0)	0.501
Number of children in the Madrasahs, mean (SD)	209.10 (97.0)	214.71 (93.6)	206.22 (98.6)	0.039
Number of children sharing same toilet, mean (SD)	12.46 (6.6)	13.88 (6.1)	11.74 (6.7)	<0.001
Number of children per room, mean (SD)	30.56 (16.8)	33.92 (36.5)	28.84 (36.8)	<0.001
Sleeping place				
On bed	521 (55.7)	144 (27.6)	377 (72.4)	<0.001
On floor	414 (44.3)	173 (41.8)	241 (58.2)	
Number of baths				
At least once daily	814 (87.1)	259 (31.8)	555 (68.2)	<0.001
Less than once daily	121 (12.9)	58 (47.9)	63 (52.1)	
Sleep with others				
No	174 (18.6)	47 (27.0)	127 (73.0)	0.033
Yes	761 (81.4)	270 (35.5)	491 (64.5)	
Share bedding, clothes or toilet stuffs				
No	434 (46.4)	134 (30.9)	300 (69.1)	0.069
Yes	501 (53.6)	183 (36.5)	318 (63.5)	
Use soap for baths				
No	26 (2.8)	10 (38.4)	16 (61.6)	0.602
Yes	909 (97.2)	307 (33.8)	602 (66.2)	
Fingernail always cut short				
No	201 (21.5)	56 (27.8)	145 (72.2)	0.041
Yes	734 (78.5)	261 (35.6)	473 (64.4)	
Iron clothes and beddings				
No	621 (66.4)	191 (30.7)	430 (69.3)	0.004
Yes	314 (33.6)	126 (40.1)	188 (59.9)	
Pruritus in the close entourage				
No	565 (60.4)	117 (20.7)	448 (79.3)	<0.001
Yes	370 (39.5)	200 (54.1)	170 (45.9)	

Our study found that the overall prevalence of scabies among children living in Madrasahs was almost 34%, majority being mild to moderate degree of disease. Till present date, there are very few studies reporting the prevalence of scabies among children of Bangladesh. A study conducted among children from residential

Table 2 Prevalence and characteristics of scabies among the Madrasahs children

Variables	n	%
Overall prevalence	317	33.9
Female	133	28.4
Male	184	39.4
IACS criteria		
Clinical scabies (B1/B2/B3)	87	27.4
Suspected scabies (C1/C2)	230	72.6
Severity		
Mild	233	73.5
Moderate	79	24.9
Severe	5	1.6
Site of lesions		
Interdigital spaces	246	77.6
Hands	255	80.4
Wrists	205	64.7
Arms	161	50.8
Elbows	121	38.2
Axillae	85	26.8
Legs	160	50.5
Feet	128	40.4
Abdomen	152	47.9
Thorax	108	34.1
Mamilla and perimamillar area	69	21.8
Back	116	36.6
Buttock	100	31.5
Genital and inguinal area	138	43.5
Head, scalp, neck and face	68	21.4

IACS, International Alliance for the Control of Scabies.

religious schools (madrasahs) reported that almost 61% of the children were infected by scabies in these institutions which was much higher compared with our findings.¹⁴ The difference in living condition and hygiene practice among children from different institutions might cause the difference. The prevalence found in our study, however, remained one of the highest among the developing countries. Few countries such as Pakistan reported a higher prevalence of scabies among adolescent children (almost 57%).¹⁸ In neighbouring India, the prevalence of scabies among school children ranged from 20% to 39% in different studies.^{19,20} In Nepal, another country from south Asian region, the prevalence was reported as 32%, similar to our finding.²¹ By contrast, the majority of the other lower-income and middle-income countries reported a lower prevalence of scabies such as Ethiopia (19%),²² Cameroon (18%),⁶ Nigeria (13%),²³ Iran (3%).⁷ These discrepancies among studies might be influenced by several personal and environmental factors including socioeconomic condition, personal hygiene as

Table 3 Factors associated with scabies among the Madrasahs children

Variables	Mild scabies		Moderate to severe scabies	
	aOR (95% CI)	P value	aOR (95% CI)	P value
Age (years)	0.96 (0.91 to 1.02)	0.197	0.94 (0.87 to 1.02)	0.160
Gender (male vs female ^R)	1.36 (0.89 to 1.79)		2.09 (1.27 to 3.47)	0.004
Number of children in the Madrasahs	1.02 (1.01 to 1.03)	0.028	1.00 (0.99 to 1.01)	0.788
Number of children sharing same toilet	1.02 (0.98 to 1.05)	0.208	1.01 (0.96 to 1.06)	0.685
Number of children per room	0.99 (0.98 to 1.01)	0.087	1.00 (0.99 to 1.01)	0.962
Sleeping place (bed vs floor ^R)	0.67 (0.37 to 1.20)	0.180	0.22 (0.09 to 0.50)	0.000
Irregular bathing (yes vs no ^R)	0.82 (0.48 to 1.38)	0.451	0.79 (0.36 to 1.72)	0.555
Share bed with others (yes vs no ^R)	0.91 (0.54 to 1.51)	0.702	1.31 (0.61 to 2.81)	0.485
Share bedding, clothes or toilet stuffs (yes vs no ^R)	1.24 (0.82 to 1.86)	0.292	1.51 (1.08 to 2.17)	0.016
Use soap for baths (yes vs no ^R)	1.05 (0.40 to 2.74)	0.919	0.29 (0.03 to 2.50)	0.260
Fingernail always cut short (yes vs no ^R)	0.64 (0.42 to 0.98)	0.044	0.55 (0.27 to 1.08)	0.086
Iron clothes and beddings (yes vs no ^R)	0.91 (0.62 to 1.34)	0.641	0.93 (0.54 to 1.59)	0.801
Pruritus in the close entourage (yes vs no ^R)	38.19 (17.57 to 82.97)	<0.001	29.46 (9.09 to 95.43)	<0.001

aOR, adjusted odds ratio; R, Reference category.

well as climatic conditions. Furthermore, being a clinical diagnosis in majority of the studies, the subjective quality of the data collectors in the clinical diagnosis of scabies might be another possible reason for the difference between the present study and previous studies.

Among our participants, male and younger children were more vulnerable to scabies infestation compared with their counterparts. Similar phenomenon was found in previous studies from other countries.^{6 22 24} These male children usually spend most of their daytime at the field playing through touching each other and handling contaminated articles with the scabies mite from their peers, which might make them vulnerable to scabies. Besides, population from low socioeconomic background, living in unhygienic and overcrowded spaces are more commonly affected by scabies. This was also supported by our findings, as children from more crowded Madrasahs were more frequently infected by scabies. Personal hygiene is one of the major influencing factors of scabies among children.²⁵ In our study, it was observed that children who maintained less personal hygiene, shared personal stuffs had a higher odd of having scabies. Moreover, being a contagious disease, spread of scabies is exacerbated among peer groups of children having clinical manifestation in the close entourage which was also evidenced in our study.

Despite being one of the major tropical diseases contributing to deteriorated quality of life, scabies remained neglected in context of research and prevention policies. In Bangladesh, there is still lack of any national strategy for prevention of scabies at community level like other tropical diseases including tuberculosis, malaria and dengue. The present study provides baseline evidence regarding the prevalence of this diseases in a potentially high-burden setting (the Madrasahs), where children

reside in a substandard living condition. However, the present study has several limitations. First, the study was conducted in Madrasahs in Dhaka city, hence, it might not represent the overall situation of the country. Second, in the present study, we have used the clinical diagnostic criteria of the IACS Criteria for scabies. In this regard, subjective clinical skill and expertise of the examining physician might be an influencing factor of diagnosing scabies. Finally, we examined for scabies lesion on the limited body extremities. It could affect the diagnosis and categorisation of the severity of scabies properly which could underestimate the burden of scabies in terms of prevalence and severity.

CONCLUSIONS

Our study highlights the high prevalence of scabies among children living in Madrasahs (Islamic boarding schools) of Dhaka, Bangladesh. Factors such as male gender, early adolescence age, overcrowding, sharing personal stuffs, lack of proper hygiene and close contact with infected children were significantly associated with scabies. Improvement of the hygienic behaviour of children, adequate health education and reducing contact with scabies should be encouraged in these settings.

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authorship criteria and that no others meeting the criteria have been omitted. AI was used for the linguistic edition of the manuscript.

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