# Risk factors for scabies among male soldiers in Pakistan: case–control study

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## عوامل الخطر للإصابة بالجرب بين الجنود في باكستان: دراسة للحالات والشواهد

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**الخلاصة:** يمكن للمكافحة الجيدة للجرب أن تتحقق من خلال التعرف على عوامل الخطر، فالجرب مرض يمكن التوقّي منه. وخلال فترة 3 شهورٍ بين شباط/ فبراير ونيسان/ أبريل 2006 أجرى الباحثون دراسة للحالات والشواهد شملت 200 مريضاً بالجرب و200 من الشواهد للتعرف على عوامل الخطر للإصابة بالجرب بين الجنود في باكستان. وباستخدام تحليل التحوُّف اللوجستي توصل الباحثون إلى أن عوامل الخطر الرئيسية للإصابة بالجرب تشمل الحكة لدى الأسرة والزملاء المقيمين في عنابر مشتركة، وندرة الاستحمام، وندرة تغيير الملابس، وضعف مستوى التعليم، والتشارك في المضاجع، فيما لم تشتمل عوامل الخطر على أي من الازدحام، وكبر حجم العائلة، والتشارك في المناشف، ودخول المستشفى.

ABSTRACT Being a preventable disease, good control of scabies can be achieved by identification of risk factors. During the 3-month period February 2006–April 2006 we carried out a case–control study on 200 patients with scabies and 200 controls to identify risk factors for scabies among male soldiers in Pakistan. We identified risk factors for the infestation using logisitic regression analysis. Itching in family/dormitory mates, infrequent bathing, infrequent changing of clothes, low education, sharing beds and being away from the barracks were identified as significant risk factors for scabies, while over-crowding, large family size and sharing of towels and hospitalisation were not.

**Facteurs de risque de gale chez les soldats de sexe masculin au Pakistan : étude cas-témoins**

RÉSUMÉ La gale étant une maladie évitable, il est possible de la combattre efficacement en identifiant ses facteurs de risque. Pendant une période de trois mois (février-avril 2006), nous avons réalisé une étude cas-témoins sur 200 patients atteints de gale et sur 200 témoins, afin de déterminer les facteurs de risque d'infestation par cette maladie chez les soldats de sexe masculin au Pakistan. Pour cela, nous avons eu recours à l'analyse de régression logistique. Le prurit chez les membres de la famille ou les compagnons de chambrée, la mauvaise hygiène corporelle, la mauvaise hygiène vestimentaire, le faible niveau d'instruction, le partage de lits et les séjours hors de la caserne ont été recensés comme des facteurs de risque de gale importants ; ce qui n'était pas le cas, en revanche, pour le surpeuplement, la famille nombreuse, le partage des serviettes de toilette et l'hospitalisation.

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## Introduction

Scabies is a neglected parasitic disease that is a major public health problem worldwide, and particularly in resource-poor regions. It affects people of all age groups, races and socioeconomic levels. Approximately 300 million cases are reported worldwide each year [*1*]. Scabies causes substantial morbidity because of unbearable itch, secondary infection, post-infective complications such as glomerulonephritis [*2–4*], and the high risk of spreading the infestation to close contacts.

Scabies is caused by *Sarcoptes scabiei* var. hominis. The characteristic clinical feature is intense nocturnal pruritus [*5*]. Diagnosis is made clinically, based on patient history and physical examination. It is confirmed by the demonstration of mites, eggs, or scybala (black or brown football-shaped masses of scabies faeces) on microscopic examination [*6*]. Treatment includes topical or oral administration of a scabicidal agent, an antipruritic agent such as an antihistamine, and an appropriate antimicrobial agent if secondarily infected.

Multiple factors like overcrowding, poor public health education [*1*], sleeping habits, overcrowded sleeping space, sharing of clothes, sharing of towels [*7*], incorrect hygiene practices [*8*] and travel [*9*] have frequently been cited as risk factors for scabies throughout the world.

Scabies is an everyday diagnosis in almost any dermatology clinic in Pakistan [*10*]. However, no study has so far been carried out in Pakistan to identify risk factors for scabies. Moreover, published data on the clinical and epidemiological aspects of this preventable disease in Pakistan are scarce. The objective of this study therefore was to identify risk factors for scabies among male soldiers posted at Abbottabad, Kharian and Jhelum cantonments.

## Methods

This was a case–control study conducted simultaneously at 3 dermatology outpatient departments of the Combined Military Hospitals, located in Abbottabad, Kharian and Jehlum cantonments over a period of 3 months from February 2006 to April 2006.

Male soldiers reporting sick to the abovementioned hospitals with symptoms and signs clinically suggestive of scabies were interviewed in detail and examined thoroughly. Using non-probability purposive sampling, we selected 200 patients who had a history of nocturnal pruritus and burrows, papular or vesico-pustular lesions over finger webs and penis. Using a non-probability convenience sampling technique, 200 male soldiers reporting to dermatology outpatient departments of these hospitals with unrelated dermatological problems, for example vitiligo, herpes zoster, acne vulgaris, psoriasis, alopecia areata, or those accompanying a sick family member were included in the study simultaneously as controls. Controls were matched on sociodemographic characteristics (age and rank) to deal with confounding factors at the selection stage. Asymptomatic individuals accompanying the patients suffering from scabies were excluded from the study.

A single page questionnaire was prepared in consultation with all dermatologists at the hospitals where the study was conducted. The self-administered, closed-ended questionnaire was pre-tested before adopting the final version. It included demographic and personal data covering age, residence and education of the soldier. The remaining questions included possible risk factors in terms of personal hygiene, living habits, living conditions and family size. Questions regarding hospitalization, leave or temporary duties outside the place of permanent duty during the month prior to

the development of itching in the case of patients and during the preceding month in the case of controls were also included.

The ethical requirements for the study were fulfilled in accordance with the Helsinki declaration.

We used *SPSS*, version 10 to analyse the data. A descriptive analysis was performed for demographic features. The results were expressed as numbers, percentages and mean and standard deviation (SD). Risk factors were identified statistically by computing odds ratio and 95% confidence interval by univariate and multivariate (logistic regression) analysis.

## Results

Age of patients ranged from 17 to 49 [mean 29.17 (SD 7.13)] years and that of controls ranged from 17 to 50 [mean 29.19 (SD 7.27)] years. Level of education was matriculation (10 years of education) or lower in 173 (86.5%) patients and 133 (66.5%) controls (Table 1). Out of 200 patients, 180 (90.0%) were living in dormitories of the unit barracks; the corresponding number for controls was 149 (74.5%). We arbitrarily considered family size as large when the number of individuals living in a house or dormitory was > 10; 80 (40%) patients and 85 (42.5%) controls were from large families.

Univariate analysis showed that itching in the family, infrequent bathing, infrequent changing of clothes, low education, residing in unit barracks and going on leave or temporary duty away from place of permanent duty were factors significantly associated with having scabies (Table 1); sharing a bed was weakly associated.

Multivariate analysis showed that itching in the family, infrequent change of clothes, sharing bed, infrequent bathing, low education and going on leave or temporary duty away from permanent place

Table 1 **Factors associated with scabies identified by univariate analysis (*n* = 200 + 200 controls)**

| Variable | Patients | | Controls | | OR | 95% CI |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | | |
| Itching in family/colleagues[a] | 42 | 21.0 | 1 | 0.5 | 52.89 | 7.20–388.58 |
| Bathing < 1 time/day | 67 | 33.5 | 22 | 11.0 | 4.07 | 2.39–6.93 |
| Hospitalization[b] | 4 | 2.0 | 1 | 0.5 | 4.06 | 0.73–22.36 |
| Changing clothes < 2 times/week | 38 | 19.0 | 12 | 6.0 | 3.67 | 1.85–7.27 |
| Low education (≤ 10 years) | 173 | 86.5 | 133 | 66.5 | 3.22 | 1.95–5.32 |
| Residence in unit barracks | 180 | 90.0 | 149 | 74.5 | 3.08 | 1.75–5.39 |
| Leave/temporary duty[b] | 126 | 63.0 | 72 | 36.0 | 3.02 | 2.12–4.30 |
| Infrequent use of soap[c] | 2 | 1.0 | 1 | 0.5 | 2.10 | 0.18–22.34 |
| Sharing beds | 83 | 41.5 | 54 | 27.0 | 1.91 | 1.26–2.92 |
| Sharing clothes | 9 | 4.5 | 9 | 4.5 | 1.00 | 0.38–2.57 |
| Family size > 10 | 80 | 40.0 | 85 | 42.5 | 0.90 | 0.60–1.34 |
| Sharing towels | 32 | 16.0 | 39 | 19.5 | 0.78 | 0.47–1.31 |

[a]*Living in the same dormitory.*
[b]*During month prior to onset of itching in patients or month prior to the study in controls.*
[c]*Not always used while taking a bath.*
*OR = odds ratio; CI = confidence interval.*

of duty were independent risk factors for contracting scabies among serving male soldiers (Table 2).

## Discussion

This is the first study from Pakistan to identify risk factors for scabies among a population group, i.e. male soldiers. Serving male soldiers of all ranks were included in the study. Although the study population is not representative of the general population, it provides important findings regarding risk factors for scabies in the population belonging to the military. Many regions of Pakistan were represented as soldiers come from all over the country; therefore, the results are still useful in the context of this study. Although sample size was not calculated exactly, keeping in mind frequency of the disease, all male serving soldiers fulfilling the inclusion criteria during the study period were included in the study.

The potential risk factors included in our study were those pertaining to personal hygiene practices, living conditions and travel or hospitalization. Low level of education was found in our study to be one of the risk factors contributing towards development of scabies. Less-educated individuals were more prone to having scabies. The reason is probably that less-educated people are less conscious of the importance of personal hygiene and the role of poor hygiene in the spread of communicable diseases. There is a need for public health programmes to educate the population to understand the preventive aspects of diseases like scabies.

In our study, those residing in the barracks dormitories were more prone to having scabies than those living at home. In a questionnaire survey of British dermatologists, it was estimated that approximately 30% of all cases of scabies they encountered occurred in institutional settings [*11*]. People living in dormitories come from different sociocultural backgrounds and have different social customs and habits with regard to personal hygiene and social attitudes. In community living, individual habits may adversely affect others, resulting in the spread of communicable diseases.

Family size, on the other hand, was not associated with the occurrence of scabies in our study. This finding conforms with many other studies from the same region. However, crowded living conditions, in particular overcrowding for sleeping space, and sleeping habits have been important contributory risk factors for scabies [*7,12*]. Transmission follows close personal contact; passing contact like handshaking is insufficient to pass on the mites [*13*]. A history of itching in the family or in the same dormitory was a significant risk factor. Previous studies also indicated that prevalence of the disease within a family is an important factor in scabies epidemiology [*14*]. The presence of mites in fomites coupled with their capability to survive outside the human body for a few days and host-seeking behaviour

Table 2 **Factors significantly associated with scabies identified by multivariate analysis (*n* = 200 + 200 controls)**

| Variable | OR | 95% CI |
|---|---|---|
| Itching in family/ colleagues[a] | 95.41 | 9.97–912.91 |
| Changing clothes < 2 times/week | 5.63 | 2.35–13.50 |
| Sharing beds | 4.44 | 2.19–9.01 |
| Bathing < 1 time/day | 4.32 | 2.25–8.29 |
| Low education | 3.37 | 1.82–6.25 |
| Leave/temporary duty[b] | 2.50 | 1.49–4.13 |

[a]*Living in the same dormitory.*
[b]*During month prior to onset of itching in patients or month prior to the study in controls.*
*P < 0.05 (all).*
*OR = odds ratio; CI = confidence interval.*

indicate that a person can be infested by dislodged mites in the environment [*15*].

Personal hygiene practices seem important in contributing towards acquiring scabies. Incorrect hygienic practices correlate with higher rates of apparent infestation [*8*]. Infrequent bathing and infrequent changing of clothes were significant risk factors in this study. It has often been suggested that fertilized female *S. scabiei* mites are responsible for scabies transmission but because of their relatively small number and inclination to remain within burrows, it seems unlikely. There are a far greater number of immature mites on skin surface and they seem important in transmission of the disease [*16*]. It is quite possible that frequent bathing and rubbing soap and water on the body while bathing removes immature mites from the skin and as the number of these mites reduces, the likelihood of transmission of the infestation also decreases. However, as only 2 (1%) patients and 1 (0.5%) control in our study would not always use soap while taking a bath, we could not evaluate the role of infrequent use of soap while bathing as a risk factor.

The spread of scabies through fomites has been a controversial topic. Certain studies have suggested that spread of scabies is possible through sharing of linen, clothes and towels. Scabies mites live their entire lives on human skin as obligate parasites, and can only live outside the human body for up to 48 hours, making transmission through fomites like towels, blankets, bedding etc. possible, but unlikely [*12*]. Others have dismissed contact with infested fomites and clothes as risk factors for the spread of scabies [*17*]. In our study we found that sharing of towels or clothes was not a risk factor for scabies, whereas sharing of beds was. In a military environment, soldiers are employed on various night duties. Different soldiers may use one bed in turn after completing their stretch of night duty.

Soldiers in the patient group were more likely to have been away from their place of duty during the month prior to the onset of itching than those in the control group. While travelling, people are prone to using different bedding and blankets, and may encounter patients harbouring the scabies mite. Therefore, travelling to areas with a high prevalence of scabies may be an important factor in the spread of infection [*5,9*]. There are a number of reports of the spread of scabies in hospitals [*16,1*8], hospitalization was, however, not found to be associated with scabies risk in our study.

Given the identified risk factors associated with scabies among soldiers, steps should be taken to improve their hygiene practices and living conditions. Furthermore, dermatologists need to improve case-finding, and notification could be made mandatory, along with treatment of the affected individual and all those they have been in contact with. Greater health awareness of scabies is needed among soldiers and the public in general and programmes to achieve this should be implemented.

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