Article

Epidemiological study of scabies in district Haripur, Pakistan

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Abstract

Scabies is a contagious disorder of skin caused by a mite called human itch mite, *Sarcoptes scabiei*. An epidemiological study of scabies was conducted from district Haripur to evaluate the prevalence and the important risk factors responsible for the spread of scabies. The study was conducted in General population from (February – April 2013).Surveys were carried out in general population comprising 200 families of district Haripur. Out of two hundred families in general population, 81 were scabetic showing a prevalence rate of 40.5%.Considering an individual as a unit, 109cases were detected, out of these total samples of 1193 individuals, exhibiting a prevalence rate of 9.13%.The disease was significantly more common in females (10.4%)than males(7.9%),in lower socio-economic classes (13.8%) than the upper and middle classes (5.22%,7.16%), in those living in uncemented houses (23.6%) than those living in cemented houses (7.5%),and in those having domestic animals at home(13.4%)than those without domestic animals(8.08%). Family size was of no significance but prevalence was positively co-related with the level of crowding (average number of person per room in a house). No clear trend was indicated in the prevalence rate of scabies changing with educational level. The distribution of the number of cases per family followed a Poisson distribution, demonstrating that all the families surveyed were equally exposed to the risk of scabies.

Keywords scabies; lesion; epidemiology; Pakistan.

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1 Introduction

Human scabies is a contagious disease transmitted mainly by person-to-person contact and is caused by a tiny mite *Sarcoptes scabiei* variety *hominis* (Acarina: Sarcoptidae) that threatens globally human health (Heukelbach et al., 2005; Daszak et al., 2000; Chen et al., 2014). This disease has several names as Sarcoptes, itch mite, Norwegian itch,crusted scabies and scabies (Hay et al., 2014). Many authors are agreeing that *S. scabiei* recorded from human and animals represents a single species (Alasaad et al., 2009; Chen et al., 2014).

The mite has infested human for at least 2500 years. Dermatologists estimate that more than 300 million cases of scabies occur worldwide every year (Hengge et al., 2006; Chen et al., 2014).

Scabies causes itching, pruritic skin rashes and due to subsequent scratching, leads to secondary bacterial infection like *Streptococcus pyogenes*and *Staphylococcus aureus;*cause acute glomerulonephritis,septicaemia and rheumatic heart disease (Adjei and Brenya, 1997; Currie and Carapetis, 2000; Heukelbach et al., 2005; Walton et al., 2008; Parks et al., 2012; Haar et al., 2014; Liu et al., 2014; Romani et al., 2015). According to recent research scabies is perfectly and exactly diagnosis by the more confirming methods like dermoscopy or adhesive tape test to reduce the chances of false-negative results (Walter et al., 2011; Albrecht and Bigby, 2011; Nazari and Azizi, 2014).This disease is worldwide in distribution and mostly endemic with high prevalence in resource-poor urban and rural communities of developing countries because of its improper management, and poverty leading overcrowding (Heukelbach et al., 2005; Makigami et al., 2009; Heukelbach et al., 2013; Licina et al., 2014; Nazari and Azizi, 2014). Among different communities different epidemiological distribution are reported for the scabies; however the highest rate are found in Pacific Island countries and in many other tropical countries including in Africa (Haar et al., 2014; Romani et al., 2015). The lowest prevalence rate for this skin disease is recorded in Western Europe (Hay et al., 2014). Globally, the prevalence rate of scabies ranged from 0.2% to 71.4% (Romani et al., 2015) All humans are susceptible to Scabies;however the transmission is more often in children and immune-suppressed persons (Muhammad Zayyid, 2010; Hay et al., 2012; Heukelbach et al., 2013).The disease is known to be quite prevalent throughout Pakistan. Several scabies epidemiological studies have been carried out in different areas of Pakistan; reports available are Jabeen, 1990; Bilquees, 1995; Anwar et al., 2006; Raza et al., 2009; Ursani and Baloch, 2009; Memon et al., 2011; Zeba et al., 2014; Qasim, 2015; but the epidemiological data from many areas is still missing. The present study was carried out to evaluate an epidemiological study of scabies in humans at District Haripur.

2 Materials and Methods

2.1 Study area

The survey for the prevalence of scabies was conducted in residential colony of Telephone Industries of Pakistan (TIP), Haripur. This Colony lies in the North–East of the main city of Haripur.

2.2 Study population

Prevalence of scabies was studied in General population of district Haripur.

2.3 Diagnosis

Diagnosis of scabies is confirmed on the presence of burrows, extraction of mite or egg from burrow at the typical site of lesion (Khan et al., 1992). In this study diagnosis was made on the presence of active burrows or those transformed into lesions due to secondary bacterial infection or excessive rash (rubbing). In an attempt to obtain *Sarcoptes scabiei*, a number of smears were made both from the school children and general population. For preparation of smear following method was adopted.

A burrow was opened with a straight cutting surgical needle and then scrapped longitudinally with a sharp border of a lancet. The material thus obtained was mounted on a glass slide with a drop of mounted media (KOH + Glycerin 1:1) and examined under low power microscope. A total of 70 slides were examined (30 from school children and 40 from general population).

3 Results

3.1 Prevalence of scabies sex and age wise

Sex-specific prevalence data classified by 5-year interval of age are set out in Table 1. Age wise percentage of infection was high in the age-group 5-14 (females, 11.4 %; males, 9.6 %) low in the age-group 15-34 (females, 6.5 %; males, 5.1 %) again high in age-group 35-39 (females, 14.2 %; males, 8.3 %), low in the age-group 40-49 (females, 9.7 %; males, 9.2 %) followed by a higher rate in older age-group i-e. above 50 (female, 263; males 6.8).A comparative evaluation of age-specific rates indicated a higher prevalence in females than in males. In age groups below 50 the age-specific rates were slightly but insignificantly higher in females than males. In the age group above 50 there was a highly significant difference with females showing a higher prevalence than males. The data pooled over all age-group indicated that scabies was significantly more common in females than males ($\chi 2 = 10.2$; df = 1; P< 0.405)

Table 1 Age - and sex-specific prevalence of scabies in general population classified by 5-years age intervals.

Age	**Females**		**Males**		**Total**	
Year	**No. Infected/ Examined**	**% Infection**	**No. Infected/ Examined**	**% Infection**	**No. Infected/ Examined**	**% Infection**
0-4	3/36	8.3	3/37	8.1	6/73	8.2
5-9	20/153	13.4	20/174	11.14	39/327	11.9
10-14	10/87	11.4	5/85	5.8	15.172	8.7
15-19	4/51	7.8	7/66	10.6	11/117	9.4
20-24	4/65	6.1	1/50	2.0	14/115	12.9
25-29	1/46	2.17	0/21	0	1/67	1.4
30-34	3/35	8.5	1/38	2.6	4/73	5.4
35-39	6/42	14.2	2/24	8.3	8/41	19.5
40-44	2/16	11.2	3/25	8	5/65	7.6
45-49	2/25	8	3/14	7.5	6/13	20
50-54	3/5		2/25			
60-64	0/4		0/9			
65-69	1 5/19	26.3	0/6	6.8	9/77	11.6
			4/58			
70-74	1/3		1 /4			
75-79	Nil		0/2			
≥ 80	Nil		0/2			
Total	**60/575**	**10.4**	**49/618**	**7.92**	**109/1193**	**9.13**

3.2 Pattern of distribution of scabies in the community

Distribution of families by the number of scabies patients per family was analyzed to understand the nature of distribution of scabies in the community. Data pertaining to the distribution of families by number of scabies patients per family showed that 125 out of 200 families were free of infestation. The remaining 75 families had at least one family member infested with scabies. Similarly those families in which only one member was suffering from scabies were obviously more as compared to those in which more than one member was infested. The distribution of families by the number of cases per family is depicted in Table 2. A theoretical Poisson distribution using estimated x as μ, fitted the observed data.

Table 2 Distribution of families by number of scabies patients per family and fitted Poisson distribution.

No. Cases Per Family(x)	**No. families Observed Frequency**	**Expected Frequency (Poisson)**	**χ2**
0	125	115.9	0.71
1	55	63.2	1.06
2	12	17.2	
3	05	3.12	
4	01	0.42	0.05
5	01	0.04	
6	0	0.004	
7	01	0.32	
Total	**200**	**199.4**	**1.82**

$\bar{x} = 0.545$ $[\chi^2 = 1.82; df = 1; P<0.05]$

Goodness of fit test indicated no significant discrepancy between the observed and expected frequency. This analysis leads to the conclusion that cases of scabies were randomly distributed among families. In other words all families were equally likely to have scabies cases.

3.3 Prevalence of scabies in relation to family size

The total number of families (200) was classified into five groups on the basis of family size. Since scabies was more common in females than males, sex-specific rates were considered while analyzing prevalence in relation to family size. Comparison of prevalence rates among five groups by χ^2-test indicated no significant difference, either in females, males or total (Table 3). Thus family size did not appear to be a significant factor in the distribution of scabies.

3.4 Prevalence in relation to crowding

The data were classified into four density classes on the basis of average number of persons per living room in a house. When the data were analyzed considering a household as a unit a significantly high correlation (r =0.99) was indicated between crowding (average number of person per family) and prevalence of scabies (in families). Regression Analysis leads to the regression equation

$\hat{Y} = 0.245+0.088X$

When the data were analyzed considering an individual as a unit the correlation co-efficient was 0.84, which was significant at 10 % level but not significant at 5 % level. The regression is

$\hat{Y} = 0.040+0.030X$

Thus the prevalence rates (based on the data pooled for both sexes) among the four density classes indicated that there was a steady increase in the prevalence of scabies with the increase in the number of persons per room a true measure of crowding.

Table 3 Prevalence of scabies in relation to family size.

Family Size	**No. of Families**	**Females**		**Males**		**Total**	**% Infestation**	**χ^2 sex-specific**
		No. +ve/No. Examined	**% Infestation**	**No. +ve/No. Examined**	**% Infestation**	**No.+ve/ Examined**		
1-3	21	2/17	11.7	2/32	6.25	4/40	8.1	0.43
4-6	97	32/233	13.7	18/257	7.05	50/490	10.2	6.07
7-9	68	18/225	7.05	23/230	10	41/485	806	1.32
10-12	10	6/58	10.3	4/67	5	10/125	8.0	0.82
$\geq$ 13	04	2/12	16.6	2/32	6.25	4/44	9.0	1.12
Total	**200**	**60/575**	**10.4**	**49.618**	**7.92**	**109/1193**	**9.13**	**9.76**
	χ^2 =		6.53		2.14			1.2
	df =		4		4			4
	P		<0.001		>0.05			>0.05

3.5 Association of scabies with socio-economic condition

In order to find out a possible association between scabies and socioeconomic condition of the subject, the families constituting the study population were classified into three groups according to their monthly income: Upper class having monthly income above Rs.10, 000, middle class Rs.6, 000-10,000 and lower class below Rs.6, 000. Data pertaining to the prevalence of scabies in relation with socio-economic condition are set out in Table 4. It was supposed that socio-economic condition might have some association with scabies infestation because poor economic conditions result in overcrowding. The data pooled over both the sexes indicated that upper and middle class had low prevalence rates (5.1% and 7.1%) as compared to the lower class (13.18%). A comparison of the groups in a single test indicated a highly significant difference (χ^2 =14.08; df = 2; P<0.001) However there was no significant difference between the upper and the middle class (χ^2= 0.69; df = 1; P>0.05). It is therefore concluded that scabies was more prevalent among lower and the middle socio-economic classes.

Table 4 Association of scabies with socio- economic condition.

Both sexes combined	**Upper Class**	**Middle Class**	**Lower Class**	**Total**
+ve	8	43	58	109
-ve	153	600	440	1193
Total rate (%)	5.22	7.16	13.18	9.13

Total = No. + ve/ No. Examined (Male + Female) 109/1193=9.13

χ^2 =lower class (3.57), middle class (0.13), upper class (0.009).

3.6 Prevalence of scabies in relation to housing condition

Data pertaining to the prevalence of scabies in relation to housing condition in two categories of houses, cemented and uncemented are set out in Table. 5: comparison of prevalence rates among inhabitants of two categories indicated highly significant difference (χ^2 =31.9; df =1; P<0.001). These two categories differed from one another as the prevalence rates in people living in cemented and uncemented houses revealed a big difference i.e. (7.5% Vs 23.6 %). The housing condition thus seems to play an important role in the occurrence of scabies. As expected the prevalence rate decreased with the improvement of the housing condition. The housing condition which is an indicator of the socio-economic condition appeared as an important factor in the epidemiology of scabies. The fact that similar difference with respect to housing condition was demonstrated in females and males lends credence to the association of the two variables – housing condition and occurrence of scabies.

Table 5 Prevalence of the scabies in relation to the housing condition.

House Characteristics	No. **Families**	**Females**		**Males**		**Total**	
		No. +ve/ Examined	**% infection**	**No. +ve/ Examined**	**% infection**	**No. +ve /examined**	**% infection**
cemented	183	45/518	8.6	37/561	6.57	82/1079	7.5
uncemented	17	15/57	26.3	12/57	21.0	27/114	23.6
Total	200	60/575	10.43	49/618	7.92	109/1193	9.13
χ^2		17.07		14.84		31.9	
df		1		1		1	
P		< 0.001		< 0.001		< 0.001	

3.7 Prevalence of scabies in relation to the presence of domestic animals

The data on the prevalence of scabies in relation to the presence of domestic animals in the house is presented in Table. 6. In order to find out whether the presence of domestic animals in the house is a risk factor in occurrence of scabies, the families in the study population were classified according to the presence or absence of cattle within the house premises.

Interestingly, the data pooled over both sexes indicated that member of the families having cattle suffered more (13.04%) from scabies compared to those without cattle (8.08%). A similar pattern was demonstrated by the prevalence rates among females but not among males. Thus the overall result remained inconclusive and need a cautious interpretation.

Table 6 Prevalence of scabies in relation to presence of domestic animals at home.

Domestic Animals	**No. Families**	**Females No.+ve/ Examined**	**% Infection**	**Males No. +ve/ Examined**	**% Infection**	**Total No. + ve/No Examined**	**% Infection**	**χ^2**
Cattle	44	19/106	17.9	14/147	9.5	3/253	13.04	3.8
No. Cattle	156	41/469	8.7	35/471	7.4	76/740	8.08	0.5
Total	**200**	**60/575**	**10.4**	**49/618**	**7.92**	**109/1193**	**9.13**	**4.36**
χ^2	=		7.6		0.67		5.87	
df	=		1		1		1	
P			<0.001		>0.05		<0.05	

3.8 Prevalence of scabies in relation to education

Data on prevalence of scabies in relation to educational level are set out in Table. 7: Preschool and the children from prep to class 4 are placed in a separate class, as there is no sense in categorizing them to their educational level. The data indicated that illiteracy rate was much higher among females 129/408 than males 33/417 but there was a little difference in prevalence rates of scabies in both the sexes (females 10.07 % and males 9.90 %).

The χ^2-statistic applied on both the sexes including all the educational level give a highly significant difference ($\chi^2 = 135.90$; df = 1; P> 0.05).

This highly significant difference was due to two educational levels i.e. illiterate and upto matriculation, where the educational rate in females was low. Within either sex, there is no clear trend in the prevalence rate of scabies changing with educational level.

The prevalence rates based on the data pooled over both sexes plotted against the educational status are graphically shown in Fig.7, which indicated that prevalence rate was high in the illiterate group and low in those having educational level beyond Matric. The middle three groups did not differ much from one another. On the whole, the data do not indicate a strong relationship between prevalence of scabies and education.

Table 7 Prevalence of scabies in relation to education.

Education	Females		Males		Total No.+ve/ Examined	% infection	χ^2
	No.+ve/ Examined	% Infection	No. +ve/ No. Examined	% Infection			
Pre-school	3/37	8.1	7/40	17.5	10/77	12.9	1.57
Prep-4 class	20/130	15.3	20/161	12.4	40/291	13.7	0.52
Illiterate	13/129	10.03	3/33	9.09	16/162	9.8	.022
Primary	9/85	10.5	4/86	4.6	13/171	7.6	2.12
Middle	4/58	6.89	5/63	7.9	8/121	6.6	.053
Matric	7/65	10.76	6/117	5.12	13/182	7.1	2.01
Inter	3/42	7.14	2/75	2.6			
Bachelor	1/26	3.8	2/40	5			
Degree					8/189	4.2	1.95
Master	0/3	0	0/3	0			
Total	**60/575**	**10.43**	**49/618**	**7.92**	**109/1193**	**9.13**	**6.68**

4 Discussion

Distribution of families by the number of scabies patients per family fitted a Poisson distribution. This analysis leads to the conclusion that cases of scabies were randomly distributed among families. In other words, all families were equally exposed to scabies.

The present work investigated that this disease is positively correlated with age and sex of the patient. Some earlier authors also reported that scabies are commonly seen in younger age (Ursani and Baloch, 2009; Zeba et al., 2014; Qasim, 2015) and in older age group (Harris et al., 1992; Feldmeier et al., 2009; Haar et al., 2014; Romani et al., 2015).In the present study the prevalence of scabies was positively correlated with the level of crowding (average number of persons per room in a house). Some earlier workers (Sachdev et al., 1982; Feldmeier and Heukelbach, 2007; Poudat and Nasirian, 2007; Shah et al., 2010; Zeba et al., 2014) also recognized overcrowding as a prominent feature for the spread of scabies. The present study indicated that scabies was more prevalent among lower and middle socio-economic classes as compared to upper classes which is in line with Stanton et al., 1987; Green, 1989; Heukelbach and Feldmeier, 2006; Zeba et al. (2014) noticed that more than 70% of their patients belonging to low socio-economic group. Studies indicated that more families without scabies owned the house they were living in, had electricity, good sanitary condition, belonged to well-educated families than those who apparently experienced scabies. This present study demonstrated that housing condition is also significance in the epidemiology of scabies. A high prevalence in families living in uncemented houses was most probably due to low socio-economic condition. Some earlier workers also noticed a similar relation-ship. Stanton et al. (1987) reported that scabies was less common in community having better housing conditions. The present study regarding about the prevalence of scabies in

relation to education did not indicate a strong relation-ship between scabies and educational level. In contrast, Feldmeier and Heukelbach (2009), and Ursani and Baloch (2009) stated that illiteracy and low standard of education are the factor responsible for the distribution of scabies. For the proper eradication it is important to treat all close contacts, they can remain asymptomatic for as long as 8 weeks after the infestation and so can spread the disease unknowingly (Association for Consumer Research, 1988). The cream or the lotion is applied to all skin surfaces below the neck and the face in children. Patients with relapsing scabies and elderly should be treated from head (including the scalp) to toe. One ounce is adequate for adults. Re-apply the medicine to the hands if the hands are washed. The nails should be cut short and medication applied under them vigorously with a toothbrush. Infants should have linden applied during the day and be fully clothed and be observed to prevent licking of treated sites. If the licking cannot be prevented sulfur or permethrin should be used. One application of either medicine is considered adequate.

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