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Factors affecting prevalence of head lice (*Pediculushumans capitis*) in Albaha region- Kigdom of Saudi Arabia

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ABSTRACT

Head lice infestation with *Pediculushumanus capitis* is a widespread health concern among school children. The study assessed the knowledge and attitudes of individuals of Albaha community about the risk factors causing the noticeably high prevalence of head lice infestation. A questionnaire was used that dealt with 24 factors categorized into 3 main groups: factors related to the student, to the family and to the school. About 800 individuals from Albaha community were selected randomly and the samples were categorized according to age, job and education level. Results showed that school-related factors were claimed to have the strongest effect on lice prevalence (mean = 2.57) followed by family-related factors (mean = 2.14), then student-related factors (mean = 2.04). There were significant differences in the response of individuals according to age and jobs, but no significance was found in response according to education level.

KEYWORDS: prevalence, head lice, *Pediculus humans capitis.*

INTRODUCTION

Pediculushumanus capitis infestation is a regular health concern which affects millions of children around the world.

In recent years, it was observed that there is an alarming increase in head lice infestation rates amongst primary school girls in Al Baha. This has lead to complaints from families and school teachers. No similar studies have been carried out in Albaha region so far. The higher incidence of head lice among young children may be due to their increased physical contact with each other and the sharing of objects that had contact with human hair infested with head lice. There are more cases of head lice infestation among school-age children than there are of all other communicable diseases combined, except for the common cold.

Head lice are minute (about the size of a sesame seed), wingless parasitic insects that must live on a person to survive. Transmission occurs by direct contact with an infected person's hair and possibly by sharing combs, hats, and other accessories. Head lice transmit from person to person directly during children's play or indirectly through contact with lice carrying objects such as brushes, combs, clothing and towels (Al-Shawa,2008). Many factors such as; poor hygiene, socioeconomic status, lack of medical treatment and resistance to the treatment leads to increase the prevalence of head lice (Koch *et al.,* 2001) and(Al-Shawa,2008). A survey of 2928 primary school girls living in Jeddah, Saudi Arabia, revealed that (7.9%) of the girls were infested with *Pediculus humans capitus*. In Abha, Saudi Arabia, an infestation rate of 19.8% was reported among school boys between 9-11years (Bahamdan*et al*., 1996). The study of Al Megrin (2015) aimed to assess the prevalence of head lice and associated risk environmental and personal factors among primary school girls. The results showed that (12.2%) 72/590 of students were infected with *Pediculosis capitis*.

MATERIALS AND METHODS

1. Characteristics of study sample:

The study was conducted by randomly selecting individuals of Albaha community to fill in questionnaires. The samples (800 questionnaires) were collected and statistically analyzed. Table 1 demonstrates the distribution of the samples according to age, education level and job.

2. Study tools:

The study tool was constructed according to the following steps:

(1) Selecting and designing a questionnaire as the most appropriate tool for this study.

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(2) Determining the objectives of the questionnaire.
(3) Determining the most important risk factors affecting lice infestation from previous study sources.

3. Questionnaire reliability:

(4) The reliability of the questionnaire was verified using Cronbach's Alpha method. Cronbach's Alpha coefficient values ranged from 0.857 to 0.848. The high values indicated that the questionnaire was reliable.(Table A and B) .

4. Correction of the questionnaire:

(5) A tri-scale was used to adjust the questionnaire. Thus the responses disagree, agree and strongly agree were allocated numbers 1, 2 and 3 respectively.
(6) According to this scale the following standard was used to evaluate the degree of response:
(7) Range of response = Highest response – lowest response = 3 – 1 = 2
(8) Class length = Range of response/No. of response classes = 2/3 = 0.67

Mean	response
1 less than 1.67	Disagree
1.67 less than 2.34	Agree
2.34 – 3	Strongly agree

5. Statistical methods:

The following statistical methods were used:

1. Frequencies and percentage to describe the primary data of the study sample.
2. The mean and standard deviation for calculating the value given by the study individuals for each statement.
3. Percentage was used to arrange the factors in descending order of importance.
4. Using the F-test to compare between the means of the responses for each statement in the study sample according to age, education level and job.
   And The t-test was also used to compare the means of responses for each statement in the study sample according to age, education level and job.
5. Statical analysis was conducted using SPSS version 23 program.

Table 1: Distribution of the study sample according to variables.

Variable	Classes	Number	Percentage (%)
Age	Less than 20	169	21.1
	20 less than 30	401	50.1
	30 less than 40	177	22.1
	40 and more	53	6.6
Level of education	Illiterate	1	0.1
	Primary	5	0.6
	Intermediate	17	2.1
	Secondary	76	9.5
	College graduate	606	75.8
	Postgraduate	95	11.9
The job	Unemployed	57	7.1
	Worker	19	2.4
	Government employee	164	20.5
	Teacher	122	15.2
	University lecturer	21	2.6
	Student	412	51.5
	Others	5	0.6

RESULTS

The questionnaire was used to assess the knowledge and attitudes of parents, teachers and other members of Albaha community (800 individuals) about the risk factors affecting head lice infestation. The risk factors were categorized into 3 main groups: those concerning the student, the family and the school. The results of the responses were as follows:

1. Student-related risk factors:

Descriptive statistical scales namely the mean and standard deviation were used for each factor.

The response of 'strongly agree' was obtained for six factors: transmission from infested students (mean = 2.78), sharing personal tools (mean = 2.6) and poor hygiene practice (mean=2.54). However, the factors which received the response 'disagree' were using hair oil, hair characters and using hair-dryers (with means 1.49, 1.61 and 1.64 respectively). The overall mean for student-related factors was 2.04, (Table 2).

Table A: Cronbach's Alpha coefficient values for the risk factors

Categories	Factors	Cronbach's Alpha
Student factors	poor hygiene practices	0.857
	Sharing personal tools	0.853
	using hair oil	0.857
	Non-use of hairdryer	0.857
	Transmission from infested student	0.854
	hair characters	0.856
Family factors	Father' education level	0.852
	mother's education level	0.851
	family awareness	0.852
	family denial of infesetation	0.851
	Low family income	0.849
	family instability	0.849
	increasing family members	0.848
	infested maid/servant	0.849
	infested relatives	0.849
	Overnight stay outside home	0.849
	(Sharing bedroom (with infested person	0.848
	Sharing bed	0.846
	Missed early detection	0.849
	Delayed treatment	0.849
School factors	Class crowdness	0.848
	School transport crowdness	0.850
	No. periodic student inspection	0.850
	Student contact in school yard	0.849

Table B: Cronbach's Alpha coefficient value for the questionnaire

Cronbach's Alpha	No. of items
0.856	24

Table 2: The means and standard deviations of responses for the student related risk factors.

Factors	Order	Mean	SD	Response
poor hygiene practices	1	2.54	0.690	Strongly agree
Sharing personal tools	2	2.60	0.79	Strongly agree
using hair oil	3	1.49	0.715	Disagree
Non-use of hairdryer	4	1.64	0.751	Disagree
Transmission from infested student	5	2.78	0.496	Strongly agree
hair characters	6	1.61	0.771	Disagree
Total	**-**	**2.04**	**0.56**	**Agree**

2. Family-related risk factors:

The responses were recorded for 14 family-related factors (Table 3). The response of 'strongly agree' was attained for the presence of infested servant, infested relatives, missed early detection and delayed treatment (the means ranged from 2.51 to 2.59). On the other hand, the factors which received 'agree' response were family denial, lack of family awareness, family instability, sleeping outside home, sharing bedrooms and beds. The factors which got 'disagree' were parents' education level, low family income an increase in family members. The overall mean for family-related factors was 2.14 with response of 'agree'.

3. School-related risk factors:

Results in Table.4 showed that the overall mean was 2.57 with response of 'strongly agree'. All the factors got 'strongly agree' response except crowdness in school transport (mean=2.39 – 'agree').

Table.5 and Table.6 demonstrated the three main groups of factors arranged according to their effect on lice prevalence. School-related factors were the most important (mean 2.57, 85.7%) followed by family-related factors (mean 2.14, 71.33%) and then by student-related factors (mean 2.04, 68%).

Table 3: The means and standard deviations of the responses for family related risk factors.

Factors	Order	Mean	SD	Response
Father' education level	7	1.42	0.688	Disagree
mother's education level	8	1.54	0.741	Disagree
family awareness	9	2.33	0.635	Agree
family denial of infesetation	10	2.27	0.716	Agree
Low family income	11	1.63	0.763	Disagree
family instability	12	1.75	0.763	Agree
increasing family members	13	1.36	0754	Disagree
infested maid/servant	14	2.51	0.652	Strongly agree
infested relatives	15	2.51	0.625	Strongly agree
Overnight stay outside home	16	2.22	0.733	Agree
Sharing bedroom (with infested (person	17	2.30	0.732	Agree
Sharing bed	18	2.31	0.740	Agree
Missed early detection	19	2.46	0.628	Strongly agree
Delayed treatment	20	2.59	0.611	Strongly agree
Total		**2.14**	**0.638**	**Agree**

Table 4: The means and standard deviations of responses for school related risk factors.

Factors	Order	Mean	SD	Response
Class crowdness	21	2.61	0.604	Strongly agree
School transport crowdness	22	2.39	0.715	Agree
No. periodic student inspection	23	2.50	0.643	Strongly agree
Student contact in school yard	24	2.50	0.648	Strongly agree
Total		**2.57**	**0.616**	**Strongly agree**

Table 5 : The means and standard deviations of head lice prevalence among primary school girls.

Factors	Mean	Percentage	SD	Response
School factors	2.57	85.7	0.616	1
Family factors	2.14	71.33	0.638	2
Student factors	2.04	68	0.56	3

4. Comparison of the responses according to age, education level and jobs of the respondents:

(I). Comparison according to age:

The results recorded in Table 7 indicated significant differences in the responses due to age ($P \leq 0.05$).

(II). Comparison according to education level:

Table 8 showed there were significant differences in the responses to family- and school-related factors. However, student-related factors were insignificant.

(III). Comparison according to jobs:

There were no significant differences in the responses concerning student-related factors (Table 9), although other factors got significantly different responses ($P \leq 0.05$).

Table 6: The arrangement of means & standard deviations of the responses for all risk factors

Factors	Order	Mean	SD	Response
Transmission from infested student	1	2.78	0.496	Strongly agree
Class crowdness	2	2.61	0.604	Strongly agree
Sharing personal tools	3	2.60	0.79	Strongly agree
Delayed treatment	4	2.59	0.611	Strongly agree
poor hygiene practices	5	2.54	0.690	Strongly agree
infested relatives	6	2.51	0.625	Strongly agree
infested maid/servant	7	2.51	0.652	Strongly agree
Student contact in school yard	8	2.50	0.648	Strongly agree
No periodic student inspection	9	2.50	0.643	Strongly agree
Missed early detection	10	2.46	0.628	Strongly agree
School transport crowdness	11	2.39	0.715	Agree
family awareness	12	2.33	0.635	Agree
Sharing bed	13	2.31	0.740	Agree
Sharing bedroom (with (infested person	14	2.30	0.732	Agree
family denial of infestation	15	2.27	0.716	Agree
Overnight stay outside home	16	2.22	0.733	Agree
family instability	17	1.75	0.763	Agree
Non-use of hairdryer	18	1.64	0.751	Disagree
increasing family members	19	1.36	0754	Disagree
Low family income	20	1.63	0.763	Disagree
hair characters	21	1.61	0.771	Disagree
mother's education level	22	1.54	0.741	Disagree
using hair oil	23	1.49	0.715	Disagree
Father' education level	24	1.42	0.688	Disagree

Table 7: Comparison means of responses according to age (F - test)

Categories	Variation sources	Sum of Squares	df	Mean square	F	Sig.
Student factors	Inside groups	6.852	3	2.284	7.460	0.000
	Between groups	243.703	796	0.306		
	Total	250.55	799			
Family factors	Between groups	20.246	3	6.755	17.6	0.000
	Inside groups	304.775	796	0.383		
	Total	325.039	799			
School factors	Between groups	3.559	3	1.186	3.147	0.025
	Inside groups	300.09	796	0.377		
	Total	**303.649**	**799**			

df = degree of freedom F = f- valueSig.= significance

Table 8: Comparison means of responses according to education level (F - test)

Categories	Variation sources	Sum of Squares	df	Mean square	F	Sig.
Student factors	Between groups	1.409	5	0.282	0.898	0.482
	Inside groups	249.146	794	0.314		
	Total	250.555	799			
Family factors	Between groups	6.355	5	1.271	3.167	0.008
	Inside groups	318.684	794	0.401		
	Total	325.039	799			
School factors	Between groups	3.938	5	0.799	2.087	0.065
	Inside groups	299.710	794	0.377		
	Total	**303.649**	**799**			

df = degree of freedom F = f- valueSig.= significance

Table 9: Comparison means of responses according to job (F - test)

Categories	Variation sources	Sum of Squares	df	Mean square	F	Sig.
Student factors	Between groups	3.138	6	0.523	1.676	**0.124**
	Inside groups	247.417	793	0.312		
	Total	250.555	799			
Family factors	Between groups	14.780	6	2.463		**0.000**
	Inside groups		Total	0.391		
		School factors	Between groups			
			Inside groups	1.477	3.974	**0.001**
			Total	**0.372**		
		303.649	**799**			

df = degree of freedom F = f- valueSig.= significance

DISCUSSION

The present study seems to be the first investigating the knowledge, attitudes and practices of members of Albaha community concerning head lice infestation.

The questionnaire results concerning student-related factors showed that poor hygiene practices, sharing personal tools and transmission from infested students were the most effective factors on the prevalence of head lice infestation. This was in agreement with the results of Tolozaet *al*., 2009, Vahabi 2013, AlBashtawy and Hasna 2012 and Al-Megrin 2015, who found that infestation was more prevalent in children sharing common instruments such as combs, hats, scarves, pillows, beds, towels and sweaters etc.Al-Shawa,2008, determined two ways of head lice transmit from person to person: First directly during children's play, Second indirectly through contact with lice carrying such as brushes, combs, clothing and towels. Head lice have six jointed legs with specially adapted claws for holding on to hair.

According to the results for family-related factors it was found that family awareness, instability and denial of infestation were important factors affecting lice prevalence (Counahan *et al.,* 2007). Aba Hussein *et al*., (2009) concluded that infestation with lice was considered embarrassing and stigmatic which lead to 11% of families denying infestation. Furthermore, missing early detection and delayed treatment of lice infestation were shown to be strong contributing factors to increase in prevalence. Similarly, Aba Hussein *et al.* (2009) stated that 30% of their study sample did not use treatment and 11% of the mothers missed detection, also because of their small size, flattened bodies and color, they maybe very difficult to see on someone's head.

This study also showed that presence of infected relatives and/or house servant in the same home aided in increasing prevalence, which concurred with the findings of Speare and Buttneur (1998) and Al-Megrin (2015). Magalhães *et al.* (2011) reported that contact with another person infested with head lice showed a significant relationship with prevalence of infestation. Çetinkaya1, *et al.* (2011). also demonstrated that if member of a family is infested with head lice other family members had a high risk of infestation. Other factors affecting lice prevalence were found to be sharing bedrooms and beds. Tolozaet *al*.(2009) arrived at the same conclusions while Magalhaes *et al*.(2011) differed.

Results pertaining to school-related factors showed that crowdness in classrooms, in school transport and in schoolyards had significant effects on prevalence. The same results were obtained by Toloza *et al*. (2009) and Mahmood (2010).Furthermore, lack of periodic inspection of students aided in increasing lice infestation. The questionnaire results also established that decreased family awareness about head lice infestation or the lack of it can be an influential factor on lice prevalence. Aba Hussein (2013) stressed on the importance of the role of schools in supporting community health, delivering on their mission of raising health awareness of students, families and communities about head lice infestation.

The present study demonstrated that school-related factors had the greatest impact on lice prevalence, followed by family-related factors and finally by student-related factors.

Conclusions:

The survey questionnaire indicated that periodic inspection was crucial in detection and prevention of infestation among primary school children. This stressed the importance of the role of school health centers as well as education authorities in controlling infestation and raising awareness of families and community.

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