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Assessment of the Prevalence of *Pediculosis capitis* among Primary School Girls in Riyadh, Saudi Arabia

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ABSTRACT

The prevalence of *Pediculosis capitis* human head lice, among children is a worldwide public health alarm. The study aimed to assess the prevalence of head lice and associated risk environmental and personal factors among primary school girls. Study sample included 590 students from different primary school grades. The results showed that (12.2%) 72/590 of students were infected with *Pediculosis capitis*. A high rates of infestation was observed among students, who had a long hair, poor family and illiterate mother's (30.2, 28.6 and 28.6%, respectively). However, association of *pediculosis capitis* with socioeconomic and personal factors showed that *pediculosis capitis* had a significant association with place of residence, school grade, hair length, previous infection, sharing of instruments, income of parents and education of parents level. While no significant differences could be found between infestation and nationality, frequency of hair washing, cleaning materials for hair washing, mother's occupation, number of children in family and number of people sharing room. The study recommended that the parents and teachers should receive training about the danger of infection and its distribution in family and school in order to prevent it.

Key words: Prevalence, *Pediculosis capitis*, primary school, girls, risk factors, Riyadh

INTRODUCTION

Head lice infestation caused by *Pediculus humanus* var. *capitis* De Geer, 1778, are wingless, worldwide prevalent human parasites (Falagas *et al.*, 2008; Toloza *et al.*, 2009) which responsible for distress to affected children and their families (Tebruegge *et al.*, 2010; Parison *et al.*, 2013). Head lice obligate ectoparasites of humans, which generally affect millions of children primary school especially girls, aged 3-12 year, in both the developed and the developing countries, generally (Burgess, 2004; Motovali-Emami *et al.*, 2008). It is a globally public health concern, in some developed countries, invasion head lice also consume important resources from public health organizations (Jahnke *et al.*, 2008; Rukke *et al.*, 2011). Head-to-head contact is the main route of head lice transmission (Mumcuoglu *et al.*, 2009; Heukelbach, 2010). Generally, Elementary school children showed the highest spread of head lice (Leung *et al.*, 2005; Rukke *et al.*, 2011). In addition, when students are intermingled in classes, they have high contact rates (Mossong *et al.*, 2008), prevalence of head lice occurs frequently. Consequently, when close friends or schoolmates are infested, the checking frequency and thoroughness should be intensified (Rukke *et al.*, 2012). The role of head lice in transmitting human disease is not well understood but it has received increased concern due to bioterrorism threats (Robinson *et al.*, 2003).

Moreover, some studies of head lice have primarily concentrate on aspects of insect biological, epidemiological and efficacy of head lice (Heukelbach, 2010). This is necessary for quantifying and understanding the character of head lice infestation for developing effective treatments. There are many factors related to the host that can be associated to head lice prevalence: race, age group,

sex, social-economical conditions and hair characteristics. Over crowded living conditions and the arising of resistance to insecticides have contributed to the increase of head lice in the last few years (Nazari *et al.*, 2006).

In addition, to decrease the prevalence of pediculosis, it is also important to know what people in a community actually do, when they face head lice (Counahan *et al.*, 2007; Heukelbach and Ugbomoiko, 2011; Rukke *et al.*, 2012). Checking routines are important for controlling head lice infestations, includes, both checking frequency and carefulness. The head lice infestation can be asymptomatic or remain undetected for several weeks (Heukelbach and Feldmeier, 2010), which influences the length of the infectious period. In Norway, where most people successfully treat *Pediculosis*, these factors might be the primary determinants of infestation time (Rukke *et al.*, 2012).

The present study was conducted to assess the head lice infestation rate and some risk factors among the primary school girls in Riyadh, Kingdom of Saudi Arabia.

MATERIALS AND METHODS

Study place: The study was conducted in Riyadh city, Kingdom of Saudi Arabia.

Study design and sample: This descriptive, analytical study was conducted between September and December 2013. The study was carried out in 10 primary girls schools which, were selected randomly, according to the most clusters. A total of 590 girls students in grades from 1-6 were observed and examined. All students were examined individually and privately under the flashlight for all stages of lice or their nits. Presence of adult lice or immature stages of them (nymphal stage or eggs) were considered infested.

Data collection (Questionnaire): Before examining the students, they were asked to complete a questionnaire to evaluate the influence of risk factors on the prevalence of head lice. We gathered detailed information of questionnaire including: nationality, place of residence, school grade, hair length, previous infection of head lice, frequency of hair washing, cleansing material for hair washing, sharing of articles in contact with hair (e.g. combs, scarves, towels, pillows), income of parents, education level of the father, education level of the mother, occupation of the mothers, number of children in family and number of people sharing one room.

Statistics analyses: Chi-Square test was used to compare the difference in proportions for the variables included p was less than 0.05 were considered statistically significant.

RESULTS

As shown in Table 1, the overall prevalence of *Pediculosis capitis* infestation among primary school girls in Riyadh was 12.2% (72/590). The socioeconomic and personal factors associated with head lice infestation show up the prevalence of head lice was higher in non-Saudi students (14.6%) more than Saudi students (10.9%) ($p > 0.05$). The infestation rate was significantly higher in rural (19.2%) ($p < 0.001$). In addition, the infestation rate in the first, second and third grade were higher (17.6, 17.9 and 14.1%, respectively), it was a significant difference ($p < 0.01$). A high significant difference was found between long haired (30.2%) as compared with shorthaired students (8.2%) ($p < 0.001$). Students, who had been infested in the past with *Pediculosis capitis* were more infested (21.8%) than those, who had not been infested before (10.7%) ($p < 0.05$).

Table 1: Association between socioeconomic, personal factors and *Pediculus capitis* in Riyadh

Factors	N = 590	Positive		Negative		Statistical analysis
		No.	%	No.	%	
Nationality						
Saudi	392	43	10.9	349	89.1	X ² = 1.63 p>0.05
Non Saudi	198	29	14.6	169	85.4	
Place of residence						
Urban	371	30	8.1	341	91.9	X ² = 15.85 *p<0.001
Rural	219	42	19.2	177	80.8	
School grade						
1	131	23	17.6	108	82.4	X ² = 16.95 *p<0.01
2	112	20	17.9	92	82.1	
3	92	13	14.1	79	85.9	
4	82	8	9.8	74	90.2	
5	96	5	5.2	91	94.8	
6	77	3	3.9	74	96.1	
Hair length						
Short	388	32	8.2	356	91.8	X ² = 25.57 *p<0.001
Medium	139	21	15.1	118	84.9	
Long	63	19	30.2	44	69.8	
Previous infection of head lice						
Yes	78	17	21.8	61	78.2	X ² = 7.73 *p<0.05
No	512	55	10.7	457	89.3	
Frequency of hair washing						
Once/week	328	47	14.3	281	85.7	X ² = 3.67 p>0.05
Twice/week	204	21	10.3	183	89.7	
Three or more/week	58	4	6.9	54	93.1	
Cleansing material for hair washing						
Shampoo	538	63	11.7	475	88.3	X ² = 1.49 p>0.05
Soap	52	9	17.3	43	82.7	
Sharing of instruments**						
Yes	233	38	16.3	195	83.7	X ² = 6.1 *p<0.05
No	357	34	9.5	323	90.5	
Income of parents						
Poor	49	14	28.6	35	71.4	X ² = 16.9 *p<0.001
Medium	419	51	12.2	368	87.8	
Rich	122	7	5.7	115	94.3	
Education level of the father						
Illiterate	0	0	0.0			X ² = 11.54 *p<0.05
Read and write	11	2	18.2	9	81.8	
Primary	19	5	26.3	14	73.7	
Intermediate	85	16	18.8	69	81.2	
Secondary	172	23	13.4	149	86.6	
University or higher	303	26	8.6	277	91.4	
Education level of the mother						
Illiterate	7	2	28.6	5	71.4	X ² = 29.9 *p<0.001
Read and write	13	3	23.1	10	76.9	
Primary	34	11	32.4	23	67.6	
Intermediate	76	10	13.2	66	86.8	
Secondary	188	24	12.8	164	87.2	
University or higher	272	12	4.4	260	95.6	
Occupation of the mother						
House wives	327	44	13.5	283	86.5	X ² = 3.67 p>0.05
Working	263	28	10.6	235	89.4	
No. of children in family						
1	20	2	10.0	18	90.0	X ² = 1.43 p>0.05
2	79	9	11.4	70	88.6	
3	137	13	9.5	124	90.5	
4	245	33	13.5	212	86.5	
5 and more	109	14	12.8	95	87.2	
No. of people sharing a room						
0	32	3	9.4	29	90.6	X ² = 7.79 p>0.05
1	164	15	9.1	149	90.9	
2	231	26	11.3	205	88.7	
3	125	19	15.2	106	84.8	
4 or more	38	9	23.7	29	76.3	
Total	590	72	12.2	518	87.8	

*Significant different, **Such as combs, scarves, towels, pillows, bed

However, the frequency of hair washing and cleansing material for hair washing were not significant difference between infested and non-infested students ($p>0.05$). The infestation rate was significant among students, who shared instruments such as combs, scarves, towels, pillows and bed (16.3%) ($p<0.05$). Additionally, the prevalence rate was high significantly increased in poor family (28.6%) ($p<0.001$). Furthermore, the association between education level of the father and mother was observed, decreased rate of infestation among students, who had parents with high level of education (8.6 and 4.4%) for father and mother, respectively. Moreover, it was significant associations between level of mother education more than father. On the other hand, occupation of mother was not significantly associated with head lice infestation. Moreover, the size of family and number of people sharing a rooms were not significant with prevalence of head lice.

DISCUSSION

Head lice (*pediculosis capitis*) infestation is public health problem even in well developed countries (Karakus *et al.*, 2014). A total of 590 students were examined for present of head lice and overall infestation rate in the present study was 12.2% (72/590), which is similar that reported in Jazan Province (13.3%) by Bosely and El-Alfy (2011), but it is higher than that recorded in Eastern of Saudi Arabia (5.2%) by Al-Saeed *et al.* (2006). That may due to the survey were conducted around 10 year before this study. There are many studies have stressed differences in the prevalence of head lice infestation between children with different socio-economic level and personal factors. This study also was conducted to detect head lice infestation rate among students girls in primary school in Riyadh and associated with different socio-economic level and personal factors. The prevalence of head lice was higher among non Saudi students (14.6%) most of them form Egypt, Jordan and Syria some of these countries which have a high rate of infestation (16.7%) in Egypt (Abd El Raheem *et al.*, 2014) and (26.6%) in Jordan (AlBashtawy and Hasna, 2012). Admittedly, the infestation rate was significantly higher in rural (19.2%) ($p<0.001$) that was in agreement, which found in Turkey by Gulgun *et al.* (2013) (9.7 and 20%), in Jordan with highly significant by AlBashtawy and Hasna (2012) (23.5 and 31.2%), in Iran by Moradi *et al.* (2009) (0.66 and 1.66%) in urban and rural, respectively and in Yemen by Al-Maktari (2008), who recorded the highest infestation rate in rural area (20.6%). Moreover, the high rates infestation in rural were recorded in different province in Saudi Arabia, in Al Hassa by Amin *et al.* (2011) (4.9%) and in Jazan by Bosely and El-Alfy (2011) (20.5%). The highest rates of infestation between students were in the first, second and third grade (17.6, 17.9 and 14.1%, respectively) ($p<0.01$). In spite of this disagreement with Vahabi *et al.* (2012), who reported children aged 10-11 years were the most frequently affected, it is in agreement with AlBashtawy and Hasna (2012) who found children aged between 6 years and 8 year was the highest rates of infestation significantly and Degerli *et al.* (2013), who recorded that the first grade students were more infested. This can be explained by behavioral factors whereby children at this age have more direct physical contact with each other.

Moreover, the incidence of close contact with members of family and friends at this age may effect infestation rate, which might decrease as children get older (AlBashtawy and Hasna, 2012). Regarding to hair length, a high significant difference was found between long haired (30.2%) and short haired students (8.2%) ($p<0.001$), because it is hard to keep it clean, comparison with short hair. This result was come to an agreement with AlBashtawy and Hasna (2012), Tappeh *et al.* (2012) and Degerli *et al.* (2013). Additionally, Students, who had previous history of infestation with

Pediculosis capitis were receptivity to infested (21.8%) more than those, who had not been infested before, (10.7%) ($p < 0.05$), which in matching with Degerli *et al.* (2013) and AlBashtawy and Hasna (2012).

In spite of there were directly proportional to the invasion of head lice with frequency of hair washing, it was not significant that is in agreement with Moradi *et al.* (2009), Tappeh *et al.* (2012) and Degerli *et al.* (2013). However, It is contradict some studies which found strong associated between infestation and number of hair washing per week (Sim *et al.*, 2011; AlBashtawy and Hasna, 2012). Also, cleansing material for hair washing were not significant difference between infested and non-infested students ($p > 0.05$), which means kind of washing materials is not effect on infestation head lice that was in reach a decision with Gulgun *et al.* (2013).

On the other hand, Degerli *et al.* (2013) suggested that there was no significant association between head lice infestation and sharing articles, while according to Vahabi *et al.* (2012), Toloza *et al.* (2009) and AlBashtawy and Hasna (2012), the head lice infestation rate was more prevalent significantly in children sharing common instruments such as combs, hats, scarves, pillows, beds, towels and sweaters etc. This is because head lice infestation may be transmitted by sharing infested tools, which is more in agreement with result of this study. Studies from Turkey and Jordan proposed that a significant association between family income and prevalence rate of head lice (AlBashtawy and Hasna, 2012; Gulgun *et al.*, 2013). Our finding is an agreement with them. Demographical results showed that there was a significant increase of prevalence of head lice with increasing father's education. Regarding to mother's education, there was a high significant difference in students infestation and mother's education. This is because mothers, who have a high level of education will have more knowledge about head lice due to their social communication (Toloza *et al.*, 2009; Moradi *et al.*, 2009). The infect of socioeconomic status upon the prevalence rate found in this study support with other studies (Toloza *et al.*, 2009; Moradi *et al.*, 2009; AlBashtawy and Hasna, 2012; Vahabi *et al.*, 2012; Gulgun *et al.*, 2013). In spite of that, it is disagreement with Sim *et al.* (2011) and Tappeh *et al.* (2012), who found no significant relationship between parent's education and infestation. On the other hand, Sim *et al.* (2011) found the children, whose mothers are house wives are easily infested by head lice with significant association. Despite, in this study, the researcher did not detect any significant associations among infestation rates and occupation of mother, which come in agreement with that recorded in other studies (AlBashtawy and Hasna, 2012; Tappeh *et al.*, 2012; Gulgun *et al.*, 2013). AlBashtawy and Hasna (2012) suggested that there was a significant association between head lice infestation and size of family, while according to Sim *et al.* (2011) who found a low correlation between the infestation and the size of family or the number of people sharing room. Our finding showed that, in spite of the high rates of prevalence of head lice was in families, which have 4 children or more and when four or more people sharing room, there were no significant difference. Consequently, our finding are more in agreement with Sim *et al.* (2011).

CONCLUSION

Head lice (*Pediculus humanus, capitis*) infestations remain a pesky communicable problem, particularly in school-age children in Kingdom of Saudia Arabia, misdiagnosis of head lice infestations is common. The diagnosis requires detection of live head lice. Detection of nits alone does not indicate active infestation. We recommend that the parents and teachers should receive training about the danger of infection and its distribution in family and school in order to prevent it.

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