

PREVALENCE OF HEAD LICE INFESTATION AND ITS ASSOCIATED FACTORS AMONG CHILDREN IN KINDERGARTEN AND PRIMARY SCHOOLS IN KUWAIT

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ABSTRACT

*This study was undertaken to assess the prevalence of head lice (*Pediculus capitis*) infestation among students in Kindergarten and primary schools in the six governorates of Kuwait. The descriptive survey design was adopted. The students who involved in this study were (233 in Kindergarten and 579 in primary schools) from both sexes across the six governorates. A structured questionnaire was distributed to the student parents to be filled. Data were analyzed using the chi-square test of independence. The results showed that 46.2% (375/812) of students were infected with higher infestation rate observed among girls (50.4%) in comparison to boys (37.5%). The intensity of infestation was ranging from 6-10lice per student. Students from Al-Ahmadi governorate showed the highest infection rate. Nationality and mother education level were risk factors as the Saudi, Pakistani or Indian students and the students of mothers with low educational level were highly infested. Climate had also an influence in the prevalence of head lice as higher infestation was observed in the hot season. This study revealed that the prevalence of head lice infestation was high in Kuwait and should be controlled by the co-operation between school, home, and ministry of health.*

KEYWORDS: *Factors, Head Lice, Kindergarten, Kuwait, Prevalence, Primary*

Article History

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INTRODUCTION

Head lice (*Pediculus scapitis*) is one of the most annoying ectoparasites that invades human scalp and hair all over the world. In addition, it is commonly considered by parents and school staff to be a public health problem, as infections are most prevalent in children of primary school age (Counahan *et al.*, 2004). Head lice infestation not only induces health and social problems but also causes economic loss, which was estimated in the UK to be € 23 million due to control and treatments (Holiday, 2011). Physical symptoms (itching) and consequently sleeplessness, as well as psychological effect (shy and awkward), may lead to the impairment of the student learning performance (Alborziet *et al.*, 2016). Alzain (2012) found that alopecia was associated in 5% and fever in 3.1% of infested cases lice transferred from one person to another by direct contact or by contact with clothing, hats etc. from lousy individuals (Markell *et al.*, 1999). The prevalence of head lice

was recorded in many parts of the world e.g. Nigeria (16.7%; Olaitan, 2006). Brazil (35%; Borges and Mendes, 2002) and Iran (0.47 to 35.3%; Moosazadehet *al.*, 2015). Many publications also have appeared in the Middle East countries (Khidhuret *al.*, 2017; AlBashtawy and Hasna, 2012; Kassiri., *et al.*, 2017) elucidating the health, social and economic impacts of head lice infection on humans. However, there are no studies, dealing with this health problem in Kuwait. Thus, this study was conducted to determine the prevalence of *pediculosis capitis* among children attending kindergarten and primary schools and to identify the risk factors associated with infestation.

MATERIALS AND METHODS

Study Area and Population

Kuwait is a small country (18.000Km²), located in the northwestern part of the Arabian Gulf with a desert climate which features heat and drought most of the year. Summer is long, hot and dry (April to October) while winter is short and warm, and it rains sometimes. Kuwait is made up of six Governorates (Al-Asema, Hawalli, Al-Farwania, Mubarak Al-kabeer, Al-Jahra and Al-Ahmadi). The 2015 census recorded 4,239,006 Peoples as a total population with 81,982 students in kindergarten and 264,820 students in primary schools (Educational Statistical Group 2015-2016).

Study Design and Sample

This study was conducted between April 2015 –July 2016, to provide data on head lice infestation among the students (girls and boys) of Kindergarten and primary schools, whatever they were governmental or private. To identify the risk factors of head lice infestation, a questionnaire was designed to give information, related to lice infestation, about the students involved in the study, regarding their characteristics and behavior, demography, school, and family as well as about the season of the infestation (see Tables1, 2,3). Copies of thequestionnaire were distributed either manually or via WhatsApp application to be filled by the parents, who were also asked to check the scalps of their kids for nits as well as to comb them thoroughly and receive and count lice (if any) on a white sheet. The child was considered positive if even a louse or nits were detected. The data were analyzed by using Chi-Square test of Independence.

RESULTS

Out of 829 students (548 girls and 264 boys) from different grades in Kindergarten and primary schools involved in the study, 812 responded to the questionnaire, 357(46.2%) were found positive for head lice infestation with the intensity of infestation rate from 6-10 lice. A significant relationship was found between lice infestation and gender, Governorate, nationality, mother educational level and season. The infestation rate was significantly higher in girls (50.4%) than in boys (37.5%). The highest infection rate (67.4%) was reported in the students of AL-Ahmadi governorate schools. The frequency of infestation was higher and reached 100% in Saudi, Pakistani and Indian students when compared with that in the students from other nationalities (Table 1). A significant relationship between the mother education level and the head lice prevalence (p=0.011) was reported; head lice infestation was more prevalent among children whose mothers with low education when compared with students whose mothers with high education (Table 3). In hot seasons from April to September, the prevalence was nearly 100% while it is varied from 76.5% to 96.2% in the remaining months of the year (Table 2).

Mothers of infested children tried many methods to treat and eradicate lice by using traditional medicines (herbs), gasoline, Dettol, and insecticides. Shaving, cutting, combing of hairs or using hair dryer were other methods used. Some mothers asked help from specialized saloons to get rid of lice. The most effective method was using insecticide where 44.6%

of infested students were cured. This indicates that treatments were not successful to eradicate head lice completely as 74.4% of girls and 25.6% of boys could not get rid of lice.

DISCUSSIONS

For the first time in Kuwait, this study was conducted to evaluate the head lice infestation status in school children as they have been considered the most vulnerable groups (Meister and Ochsendorf, 2016). According to the 812 respondents to the questionnaire, 46.2% of the students were found to be infested in the six governorates of Kuwait. This infestation rate was comparable to 44.2% of El-Khawaga *et al.*, (2012) in Egypt and 45.6% of Gboeloh and Elele (2013) in Nigeria, but higher than 1.3% results of Moradi *et al.*, (2009) in Iran and 8.9% of Willems *et al.*, (2005) in Belgium. Higher infestation rates of 74.24% were recorded in Pakistan (Lashari *et al.*, 2015) and 61.4% in Argentina (Catalá *et al.*, 2005). These variations in infestation rates might be attributed to the social status, personal hygiene practices of people and environmental factors (Karim *et al.*, 2012). However, the method of diagnosis can play a role; Jahnke *et al.*, (2009) found that the sensitivity of wet combing in diagnosis active infestation was significantly ($p < 0.001$) higher than visual inspection. In this study, combing was used to detect head lice infestation.

A significant ($p < 0.05$) infestation rate was found in girls (50.4%) in comparison to boys (37.5%). These observations agree with many studies in different countries such as Egypt (Nada *et al.*, 2006), Angola (Magalhães *et al.*, 2011) and Malaysia (Bachok *et al.*, 2006). In contrast, Olaitan (2006) found that the prevalence of head lice was higher in boys in both urban and rural primary schools in Nigeria. Lack of significant association between sex and head lice infestation was reported in Kenya, Saudi Arabia, Israel and Belgium (Chunge, 1986; Boyle, 1987; Mumcuoglu *et al.*, 1990; Willems *et al.*, 2005). In this study, girls showed higher infestation rate probably because of their long hairs, which may provide a reservoir conducive environment for survival and reproduction of lice (Gulguret *et al.*, 2013); while boys have their hairs cut from time to time; the action which may remove nits and control the insect infestation (Tappah *et al.*, 2012). It seems also that hair length plays a role in the success of lice treatment; 76.65% of girls failed to get rid of lice from the first time compared to 23.4% of boys. Even, the treatment was faster in boys to eradicate lice, taking one week, while it took triple that period in girls. However, Mumcuoglu *et al.*, (1990) found girls with short hairs showed the highest incidence of lice infestation. Gender behavior may influence the rate of infestation; the transmission of lice could be more frequent among girls, who play together more closely, but boys are only briefly in contact during playing (Meister and Ochsendorf, 2016).

Willems *et al.*, (2005) identified hair color as a risk factor in children, particularly girls; those with brown and red color were found to be more infested than those with black color (Mumcuoglu *et al.*, 1990). It was assumed that lice can remain undetectable longer in hairs of these colors. In our study, students with brown and black colors showed higher infestation rate compared to those with blonde hair, but the difference was not significant., ($P > 0.05$).

The infestation rate varied geographically in Kuwait; the highest infestation rate was reported in Al-Ahmadi governorate, probably because of the high population of students; as according to the Educational Statistical group (2016) this governorate constitute alone about 23.8% of the total number of students in kindergarten and primary schools in Kuwait. High population is a predisposing factor for the spread of head lice infestation (Gulguret *et al.*, 2013).

Low socioeconomic status of the students may play a role in the high prevalence of lice infestation as shown by Willems *et al.*, (2005). In Kuwait, where the standard of living is high, no significant relationship was reported between the family-income factor and the infestation of the students. On other hands, Kuwait receives a large number of expatriates from

many parts of the world, who may have brought diseases to the Kuwait community. In this study, Saudi, Pakistani and Indian students had a 100% infestation rate. It seems that head lice are endemic in Pakistan (Chaudhry *et al.*, 2012), Saudi Arabia (Gharsanet *et al.*, 2016) and India (Rashmi *et al.*, 2009). The only socio-economic and family factor that showed a significant relationship with head lice infestation was the level of mothers' education, which influenced the infestation of their kids with lice. It could be explained that educated mothers are more careful about the sanitary of their kids and aware of the methods of head lice control (Al-Megrin, 2015).

The effect of the season was prominent in this study; the infestation rate reached its peak nearly 100% in the hot/dry season from April to September. The temperature is highly influential on lice, which prefer a temperature between 29-32 °C in the laboratory (Maunder, 1983). In hot season ambient temperatures may reach 50°C in Kuwait; however, the use of air conditions in homes minimize the effect of climate on the survival of nits and lice, which are obligate and permanent parasites. The hot season is the summer vacation time and students might catch the infestation during mingling and playing with friends as well as they might not strictly care with their personal sanitation as in the school time. Another explanation is that during summer vacation, expatriates leave for their countries where the kids may be infested. In Germany, Bauer *et al.*, (2008) found that the head lice infestation followed a seasonal pattern and increased when schools opened again after holidays.

This study revealed that many methods were used in the treatment of head lice in Kuwait, including mechanical methods e.g. picking up of lice, combing, shaving of the hair or using the hair dryer and chemical methods e.g. gasoline, Dettol, or commercial insecticides. Comparatively, using insecticides proved the most effective method; the observations which were reported by Vladeni, *et al.*, (2008) and Al-Shawa, (2008) were in line with the result of the current study. While other investigators like Gboeloh and Elele (2013) and Khokhar (2002) found that the mechanical way like hand picking was the preferable choice in most cases which was not in accordance with our finding.

However, in general, treatment failed to eradicate lice in about 74.4% of girls vs. 25.6% of boys. Willems *et al.*, (2005) found that 41% of children despite appropriate treatment recommendations. Eradication of lice is a difficult job because of drug resistance, incorrect treatment, bad personal hygiene. And Thus, repeated and synchronized treatment should be applied to eradicate lice (Meister and Ochsendorf, 2016). Co-operation between families, schools and medical authorities should be a policy adopted to control head lice in Kuwait.

CONCLUSIONS

Head lice infestation is prevalent among children in Kindergarten and primary schools in Kuwait, but with low intensity. There is a relationship between head lice infestation and governorate, gender, nationality, mother education level and climate. Many methods were used to eradicate head lice, however it was found that using insecticides is the most efficient. In girls, the eradication process is tough especially in girls with long hairs.

CONFLICT OF INTEREST

No conflict of the interest exists relative to this paper for all authors.

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Table 1: School Factors Related to Head Lice Infestation

		No of Non-Infested Students	% of Non-Infestation	No of Infested Students	% of Infestation	P - Value
Governorate	Al-Ahmadi	47	32.6	97	67.4	0.000
	Al-Farwania	91	47.4	101	52.6	
	Al-Asema	82	5.6	58	41.4	
	Al-Jahra	54	59.3	37	40.7	
	Mubarak Al-Kabeer	53	62.4	32	37.6	
	Hawalli	110	68.8	50	31.3	
Type of School	Private	154	53.1	136	46.9	0.817
	Government	283	54.2	239	45.8	
Type of Private School	Pakistani School	19	43.2	25	56.8	0.448
	Bilingual School	23	46.0	27	54.0	
	Indian School	5	50.0	5	50.0	
	Arabic School	46	54.8	38	45.2	
	American School	23	59.0	16	41.0	
	British School	38	60.3	25	39.7	
Grade	KG1	60	50.8	58	49.2	0.272
	KG2	66	57.4	49	42.6	
	Primary1	69	58.5	49	41.5	
	Primary2	53	46.9	60	53.1	
	Primary3	58	61.7	36	38.3	
	Primary4	54	49.1	56	50.9	
Student Gender	Female	272	49.6	276	50.4	0.001
	Male	165	62.5	99	37.5	
Student Nationality	Kuwaiti	388	53.4	339	46.6	0.402
	Non-Kuwaiti	49	57.6	36	42.4	
Nationality of Non-Kuwaiti Student	Pakistani	0	0.0	4	100.0	0.003
	Saudi	0	0.0	2	100.0	
	Indian	0	0.0	3	100.0	
	No specified nationality	7	41.2	10	58.8	
	Syrian	7	58.3	5	41.7	
	Jordanian	5	62.5	3	37.5	
	Egyptian	25	73.5	9	26.5	
	French	4	100.0	0	0.0	
	Lebanese	1	100.0	0	0.0	
Student Age	3.5 - 4.5	39	41.5	55	58.5	0.084
	4.5 - 5.5	65	56.0	51	44.0	
	5.5 - 6.5	49	61.3	31	38.8	
	6.5 - 7.5	73	61.9	45	38.1	
	7.5 - 8.5	57	52.3	52	47.7	
	8.5 - 9.5	55	53.4	48	46.6	
	9.5 - 10.5	54	48.2	58	51.8	
	> 10.5	45	56.3	35	43.8	

Table 1 Contd.,

Number of Class Students	20-25	273	54.9	224	45.1	0.366
	25-30	125	54.8	103	45.2	
	30-35	27	45.0	33	55.0	
	> 35	12	44.4	15	55.6	

Table 2: Student Factors Related to Head Lice Infestation

		No of Non-Infested Students	% of Non-Infestation	No of Infested Students	% of Infestation	P - Value
Hair Washing Frequency per Week	1	26	40.6	38	59.4	0.569
	2	52	34.4	99	65.6	
	3	58	33.0	118	67.0	
	> 3	53	31.0	118	69.0	
Hair Combing Frequency Daily	1	33	27.0	89	73.0	0.063
	2	68	30.8	153	69.2	
	3	31	33.7	61	66.3	
	> 3	46	43.0	61	57.0	
Using Hair Creams or Oils Daily	Yes	7	28.0	18	72.0	0.237
	No	56	43.1	74	56.9	
Sharing Items Like Towels and Comb	Yes	85	32.0	181	68.0	0.821
	No	96	33.2	193	66.8	
Skin Color	Light	25	40.3	37	59.7	0.953
	Tan	37	42.0	51	58.0	
	Dark	2	50.0	2	50.0	
Blood Group	AB	2	20.0	8	80.0	0.078
	B	10	26.3	28	73.7	
	O	23	46.9	26	53.1	
	A	20	48.8	21	51.2	
Hair Length	Long	19	33.9	37	66.1	0.223
	Medium	61	35.1	113	64.9	
	Short	51	44.3	64	55.7	
Hair Type	Curly	2	22.2	7	77.8	0.364
	In-between	69	41.6	97	58.4	
	Silky	61	35.9	109	64.1	
Hair Color	Brown	42	35.3	77	64.7	0.901
	Black	63	37.7	104	62.3	
	Blonde	10	38.5	16	61.5	
Hair Thickness	Light	4	33.3	8	66.7	0.811
	Medium	40	40.8	58	59.2	
	Thick	19	44.2	24	55.8	
Infection Month	January	5	16.1	26	83.9	0.021
	February	1	3.8	25	96.2	
	March	4	7.4	50	92.6	
	April	0	0.0	23	100.0	
	May	4	23.5	13	76.5	

	June	0	0.0	16	100.0	
	July	0	0.0	12	100.0	
Table 2 Contd.,						
	August	0	0.0	12	100.0	
	September	0	0.0	31	100.0	
	October	2	5.9	32	94.1	
	November	5	20.0	20	80.0	
	December	1	6.7	14	93.3	

Table 3: Family Factors Related to Head Lice Infestation

		No on Non-Infested Students	% of Non-Infestation	No of Infested Students	% of Infestation	P-Value
Father's Educational Level	Primary	5	33.3	10	66.7	0.092
	Intermediate	16	29.6	38	70.4	
	Secondary	27	33.3	54	66.7	
	Diploma	32	39.0	50	61.0	
	Bachelor or Higher	76	47.5	84	52.5	
Mother's Educational Level	Primary	2	20.0	8	80.0	0.011
	Intermediate	8	38.1	13	61.9	
	Secondary	10	20.0	40	80.0	
	Diploma	41	47.7	45	52.3	
	Bachelor or Higher	94	42.0	130	58.0	
Family's Income	Less than 1000 KDs	15	34.9	28	65.1	0.42
	More than 1000 KDs	48	43.6	62	56.4	
Family Members	3-6	50	46.3	58	53.7	0.068
	7-10	13	30.2	30	69.8	
	> 10	1	100.0	0	0.0	
Number of House Maids	None	22	47.8	24	52.2	0.471
	1-3	40	38.1	65	61.9	
	4-6	1	50.0	1	50.0	
House Character	House Extension	1	14.3	6	85.7	0.171
	Apartment	20	41.7	28	58.3	
	Floor	7	26.9	19	73.1	
	House	21	52.5	19	47.5	
	Villa	15	45.5	18	54.5	
Number of Bedrooms	1-3	36	41.4	51	58.6	0.709
	4-6	22	40.0	33	60.0	
	> 6	6	54.5	5	45.5	

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