

Socio-Economic Status Criteria of Head Lice Prevalence in Jeddah, Saudi Arabia

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Abstract: Head Lice, *Pediculus humanus capitis* are cosmopolitan parasites found in all socio-economic classes all over the world and its prevalence in children is the highest. Head lice may be troublesome due to their obligatory feeding habits on human blood. This study records the head lice prevalence among girl students at the elementary schools in Jeddah city. The socio-economic status was determined depending on the questionnaire which was completed by student's information kept in their schools. A total of 5150 girl students were checked to detect head lice infection and 580 students recorded the prevalence in Jeddah city as 11.26%. According to the socio-economic status, girl students were mainly attended to the public schools in the 5th grade and in age of 10->12 years, their fathers almost work in governmental jobs but their mothers were housewives. The head lice intensity was greater in the girl students which live with their parents and lower in those students their parents have high education levels.

Key words: Public Schools • Girl Students • Elementary Schools • Governmental Jobs • Housewives

INTRODUCTION

All over the world, lice are obligatory ectoparasites on mammals and birds [1, 2]. The head lice, *P. humanus capitis* feed on blood several times about every 4 to 6 hours each day [3]. Their life cycle consist three stages, egg, nymph and adult [4]. Although in the countries where announcement of infestation is required, the reported cases are constantly a minority as compared with non reported cases, almost five million children annually between 6 and 12 years old has head lice infection [5, 6]. In the United States of America, *Pediculosis capitis* yearly affects about six to twelve million individuals [4,7]. The head lice prevalence in the United Kingdom still high in spite of all control efforts [8]. In many sophisticated countries, *P. capitis* increased in the last two decades despite the enhanced hygienic situation and the achieved head lice treatment [9,10].

The prevalence of head lice in Gent, Belgium was 8.9% [11] while in Italy 70% of the informed head lice cases was in age of less than 15 years [12]. In Mersin, Turkey, the head lice prevalence was 6.8% and it was in boys significantly lower than in girls [13]. Pediculosis infestation rate was 3.7% among children living in Ilorin, Nigeria and girls had a higher infestation rate (5.6%) than boys where they had low socio-economic status [14].

Out of 500 individuals were infested by *P. capitis* in KotAddu (Punjab: Pakistan), the lice were more prevalent in females (70.81%) compared with males [15] whereas in Taitung county, Eastern Taiwan and in Korea, the prevalence was 12.9% and 5.8% respectively and the pediculosis capitis infestation was more common among girls than boys [16,17].

In rural areas of Khajeh City, East Azerbaijan Province in Iran, the total prevalence of head lice infection was 4.8% and the most frequent group was the first grade [18]. A number of 2795 schoolchildren from a low socio-economy area of Tabriz city in Iran enrolled in elementary and high schools were examined for *P. humanus capitis* and the infestation rate was 3.64% in the students aged 10-14 years [19]. Out of 750 pupils in 25 elementary schools in Paveh city in Iran, 60 students (8%) of fifth grade were infested by head lice [20].

The head lice incidence in 1096 girl pupils in Basrah City in Iraq was 25% in two large schools [21]. In Egypt, Cairo the head lice prevalence in school children was 21.67% and the prevalence rate among males and females were 17.02% and 37.8% respectively [22] while the pediculosis prevalence was 16% in three elementary schools in Sohag governorate [23]. The prevalence in Jordan was 13.4% and the boys (11.1%) showed lower prevalence than girls (14.5%) and the school children

aged 8–9 years showed greater prevalence rates than those aged 10–12 years [24]. In Gaza Governorate, the prevalence of *P. capitis* in children was 42.2 % in girls and 18.3 % in boys [25]. Another study conducted in 600 children, the prevalence rate for head lice was 16.8% in the North Gaza Governorate and there was significant correlation influenced by the socioeconomic status and hygienic practices in the family's home [26].

Some pediculosis studies were reported in Saudi Arabia, the head lice prevalence was 12% and the distribution of infestation among males and females was broadly similar [27]. In a survey of 2928 elementary school girls living in Jeddah, 9.7% of them had *P. capitis* infection [28]. In Abha city, the most frequent types of infested skin diseases were *P. capitis* (9.6%) [29] while the last study in Al-Khobar city stated that head lice prevalence was 5.2% in female school children [30].

The aim of this work was to determine the prevalence of head lice among the elementary schools girl students in Jeddah city and the influence of the socio-economic factor on the intensity of head lice infestation.

MATERIALS AND METHODS

In order to distribute a questionnaire between the girl students of the elementary schools in Jeddah city, an approval signed application was received from the General Administration of Education, Planning and Development, Department of Educational Research in Jeddah City. There are six levels in the Saudi elementary school and the protocol of head lice inspection was designed to make a visit to one classroom in each level and the classrooms were chosen randomly. The head lice detection was considered positive if the student's hair has one of head lice developing stages, including also nit residues. All data of examined students and infested students of the visited classrooms were recorded.

To estimate the intensity of head lice, more investigation was done and the infested student was met individually in specific room under the responsibility of a schoolteacher or administrator. The student hair, head, neck and behind ears were investigated for head lice or its effect manifestation. For all students, information regarding the demographic characteristics, such as nationality, age, class...etc. was recorded. The family characteristics such as number of children and socio-economical status...etc was also recorded in the questionnaire. The questionnaire was filled by all information that the student known, or by completing it from the school official records.

There are five degrees of parasitism were considered during the student's inspection for head lice infestation [31] ranging from (0 – 3). These five categories were modified to determine the presence of head lice infestation and the level of infestation intensity by visual eyes. The following is the five criteria for each category:

0) No developmental stage of *P. humanus capitis*, student considered free.

0+) there are one sign of pediculosis infestation, active lice (adult or nymph) or nits as well as its residue, student considered infested by head lice.

- 1) There are few nits and no mobile lice, student considered with low infested pediculosis signs.
- 2) There are more than 10 nits less than one cm from scalp and found behind the student ears, with one to five mobile lice, student considered with medium infestation of head lice signs.
- 3) There are more than five mobile lice and nits spread all over the hair, student considered with high pediculosis signs.

Date of questionnaires was analyzed by using computer Statistical Package for Social Science (SPSS) version 19. Chi-square test and statistical correlation were done in order to estimate the frequency of head lice infestation between the elementary school girls in Jeddah city and to compare between the factors that affect the intensity of the pediculosis infestation.

RESULTS

At period started from September 2012 to May 2013, the pediculosis prevalence and its intensity of infestation were estimated in Jeddah elementary girl schools, it included a total of 5150 students from some of public and private schools. In primary inspection, the pediculosis signs of infested students were considered by finding eggs and mobile head lice and the intensity of infestation was also recorded (Table 1). Number of infested students was 580 and the prevalence was 11.26%. Head lice intensity was classified as light (29.1%), mild (34) and heavy infestation (36.4%). Out of 580 infested students, only 547 were filled the questionnaire.

The first factor of socio-economic status (Table 2, Figure 1) was student's home location in Jeddah regions (Figure 2A). There were 27.8% inhabited South East, there was significant difference between head lice intensity according to students living in Jeddah regions ($P= 0.001$).

Table 1: Prevalence and infestation intensity of *P. humanus capitis* in primary school girl students in Jeddah city

Total primary girl school students	351
Total primary girl students visited	33
Total public schools visited	27
Total private schools visited	6
Total girl students	5150
Infested girl students	580
Prevalence percentage%	11.26
Students finished questionnaire	547
Intensity of infection	
Number of girl students examined	Percentage %
December 14, 2015Light	160 29.1
Mild	187 34
Heavy	200 36.4

Table 2: Prevalence and infestation intensity of *Pediculus humanus capitis* in the elementary school girl students in Jeddah city according to the socio-economic status

Socio-economic status	No. of students	Prevalence (%)	Intensity of infestation				Socio-economic status	No. of students	Prevalence (%)	Intensity of infestation							
			light	%	mild	%				heavy	%	light	%	mild	%	heavy	%
Student's home in Jeddah regions			Mother's job														
North	98	17.9	49	50	20	20.4	29	29.6	Housewife	500	91.4	162	32.4	150	30	188	37.6
South East	152	27.8	35	23	48	31.6	69	45.4	Governmental	30	5.5	16	53.3	8	26.7	6	20
South West	150	27.4	51	34	50	33.3	49	32.7	Private	17	3.1	9	52.9	2	11.8	6	35.3
Central	147	26.9	52	35.4	42	28.6	53	36.1	Retired	0	-	-	-	-	-	-	-
School's type			Father's education														
Public	523	95.6	178	34	153	29.3	192	36.7	Uneducated	54	9.9	13	24.1	15	27.8	26	48.1
Private	24	4.4	9	37.5	7	29.2	8	33.3	Elementary	100	18.3	36	36	21	21.2	43	43.4
Student's nationality			Mother's education														
Saudi	388	70.9	133	34.3	112	28.9	143	36.9	Intermediate	114	20.8	24	21.2	43	37.7	47	41.2
Non saudi	159	29.1	54	34	48	30.2	57	35.8	Secondary	176	32.2	67	38.1	47	26.7	62	35.2
Studying grade			University														
1 st	65	11.8	20	30.8	18	27.7	27	41.5	Higher education	4	0.7	1	25	2	50	1	25
2 nd	94	17.2	39	41.5	33	35.1	22	23.4	Mother's education								
3 rd	91	16.6	33	36.3	25	27.5	33	36.3	Uneducated	90	16.5	28	31.1	30	33.3	32	35.6
4 th	82	15	24	29.3	21	25.6	37	45.1	Elementary	120	21.9	27	22.5	30	25	63	52.5
5 th	113	20.7	37	32.7	33	29.2	43	38.1	Intermediate	115	21	36	31.3	33	28.7	46	40
6 th	102	18.6	34	33.3	30	29.4	38	37.3	Secondary	152	27.8	62	40.8	49	32.2	41	27
Student's age			University														
6 - >8	64	11.7	20	31.3	18	28.1	26	40.6	Higher education	69	12.6	33	47.8	18	26.1	18	26.1
8 - >10	194	35.5	76	39.2	62	32	56	28.9	Student live with								
10 - >12	188	34.4	56	29.8	53	28.2	79	42	Parents	511	93.4	179	35	147	28.8	185	36.2
12 - 14	101	18.5	35	34.7	27	26.7	39	38.6	Father alone	23	4.2	7	30.4	10	43.5	6	26.1
Father's job			Mother alone														
Governmental	260	47.5	94	36.2	72	27.7	94	36.2	Others	1	0.2	-	-	-	-	1	100
Private	21	3.8	6	28.6	12	57.1	3	14.3	Student live with								
Retired	52	9.5	19	36.5	14	26.9	19	36.5	Parents	511	93.4	179	35	147	28.8	185	36.2
Worker	181	33.1	58	32	50	27.6	73	40.3	Father alone	23	4.2	7	30.4	10	43.5	6	26.1
Not work	33	6	10	30.3	12	36.4	11	33.3	Mother alone	12	2.2	1	8.3	3	25	8	66.7

The head lice prevalence in the public schools was 95.6% and 4.4% in the private ones (Table 2, Figure 2B). The Pediculosis intensity and school types in Jeddah are independent (P= 0.927). The student's nationality was 70.9% Saudi and 29.1% were non-Saudi (Table 2, Figure 2C). The nationality of infested girl students is not statistically significant associated with head lice intensity (P= 0.95). According to the studying grades (Table 2, Figure 2D), 20.7% was the highest percentage in 5th grade while the lowest was 11.9% in 1st grade. The head lice

intensity was not significantly related to student's studying grades (P= 0.38). The girl students were characterized in four age categories. In age of <8-10 years revealed 35.3 (Table 2, Figure 2E), there were no significant differences between pediculosis intensity among student's age and the P-value was (0.202).

In the point of fathers job (Table 2, Figure 3A), the high prevalence rate was 47.5% for whom their fathers had governmental jobs and the low rate was 3.8% in students whom their fathers worked in private sector.

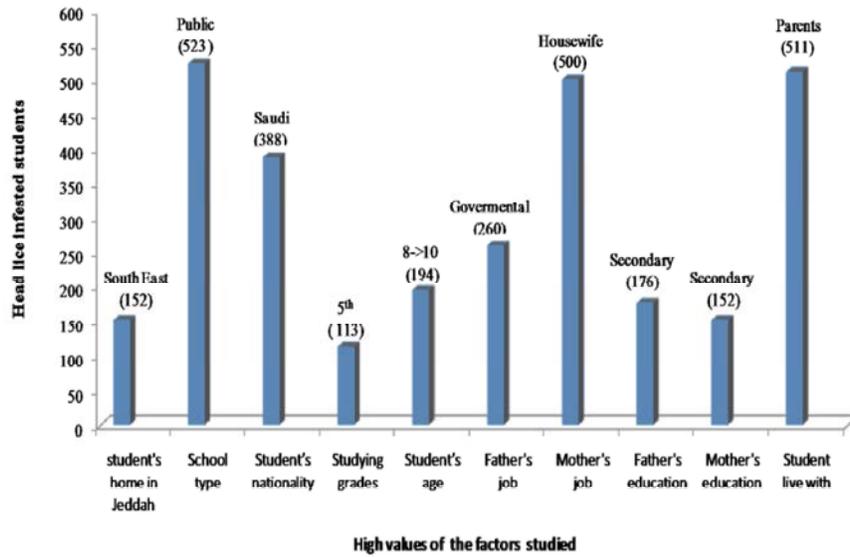


Fig. 1: High values of the studied factors which influencing prevalence of *P. humanus capitis* related to the socio-economic status of the elementary school girl students in Jeddah city

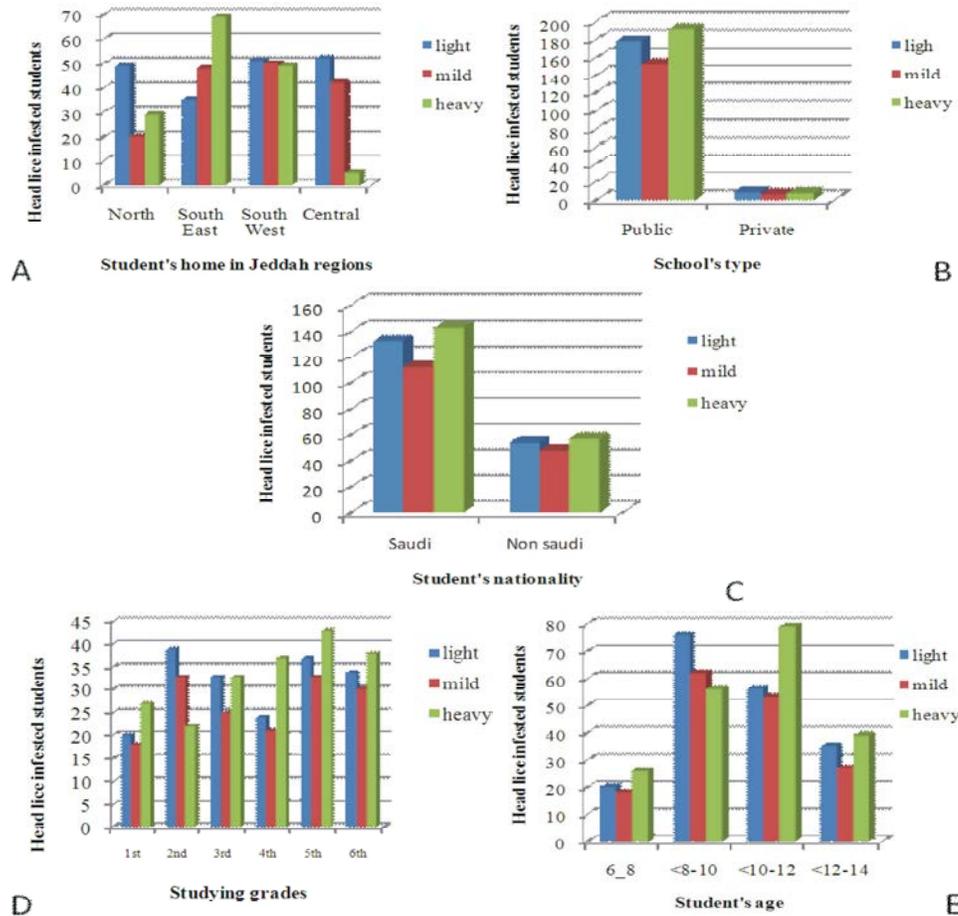


Fig. 2: Infestation intensity of *P. humanus capitis* in the elementary schoolgirl students in Jeddah city according to the socio-economic status (A: Student's home in Jeddah regions, B: School's type, C: Student's nationality, D: Studying grades, E: Student's age)

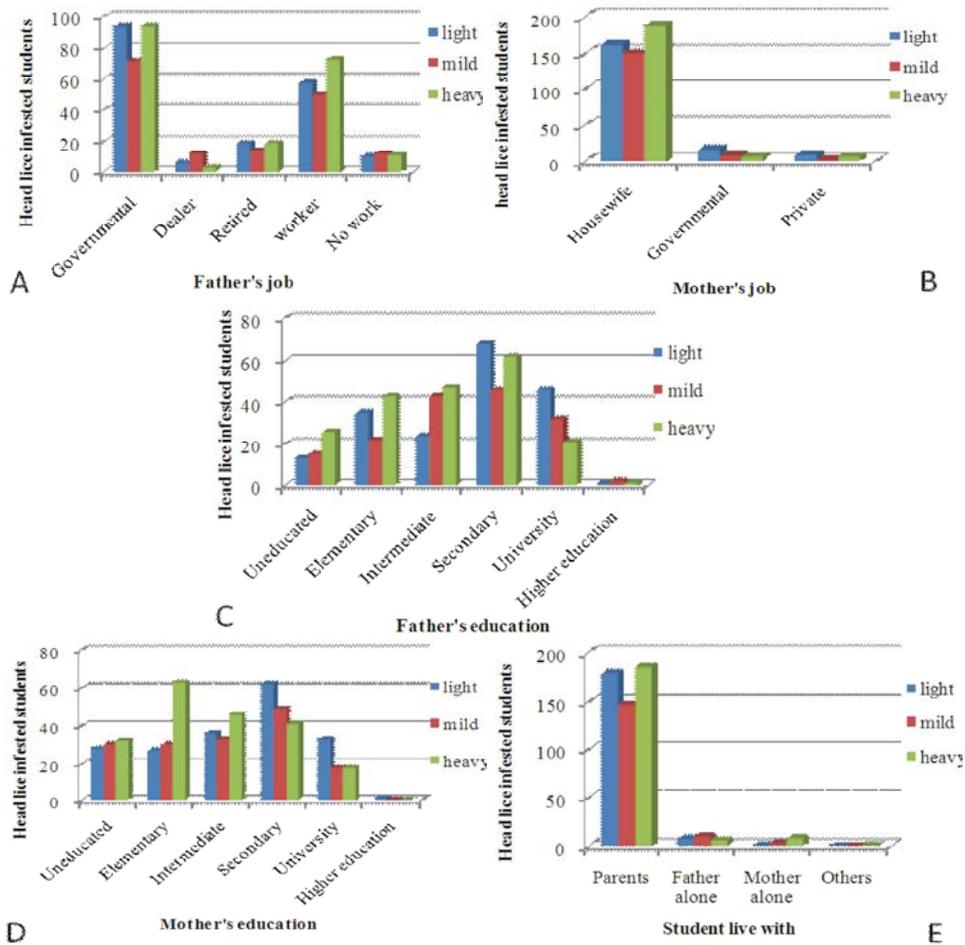


Fig. 3: Infestation intensity of *P. humanus capitis* in the elementary school girl students in Jeddah city according to the socio-economic status (A: Father's job, B: Mother's job, C: Father's education, D: Mother's education, E: Student lives with)

The student father's job was independent of pediculosis intensity ($P = 0.188$) and the relationship was absent. The high prevalence as 91.4% recorded in students that their mothers were housewives (Table 2, Figure 3B), the P value as 0.044 indicates an association between head lice intensity and mother's jobs which means that the head lice infestation is increased when student's mother doesn't have a job. Regarding parent's education (Table 2, Figure 3C), the high prevalence of pediculosis was associated with secondary levels of parents education, being as 32.2% for father's education and 27.8% for mother's education. The pediculosis prevalence was decreased if parents had the university level or higher education (Table 2, Figure 3D). P -value was 0.001, which reflected high correlation between them, which means the higher parents education level, the lower intensity of head lice incidence. Out of 547 students, 511 (93.4%) were lived with their parents (Table 2, Figure 3E),

there was no significant association between the intensity of head lice infestation and the person who takes the student responsibility ($P = 0.139$).

DISCUSSION

Head lice are still a community health problem among female students' particularly in elementary schools as well as in other school's stages. In the point of determining the prevalence of pediculosis infestation in Saudi Arabia, head lice prevalence as 11.26% was similar with that recorded in 300-child population, from birth to ten years old, as 12% in Jeddah city [27] but it was higher than 7.9% and 9.6% that found in 2928 of primary schoolgirls in Jeddah and in 647 of young pupils in Abha respectively [28, 29] as well as it was extremely higher than 5.2% that registered between female school children in Al-Khobar city [30].

The head lice prevalence in Jeddah was greatly lower than that in Mafraq governorate, Jordan [32] that recorded highly prevalence of pediculosis infestation as 26.6%. The head lice prevalence was 14.5% in northern Jordan [24] 16% in Sohag governorate/Egypt [23] and 16.8% in the North Gaza Governorate [26], all these results were slightly higher than 11.26% which recorded recently in Jeddah.

Also, the percentage of 11.26% was resembled the lonely study in Korea [17] who recorded the pediculosis prevalence as 11.2%. On the other hand, two studies conducted in Iran as 6.66% in Khajeh city [18] and 8% in Paveh city [20] were greatly lower, while the third study in Iran gave high pediculosis incidence as 69.69% in Tabriz city [19]. The prevalence in female hosts from Pakistan as 70.81% [15] was highly greater than 11.26% in Jeddah city, while it was slightly lower than *P. capitis* prevalence in Taitung county, eastern Taiwan, which was as 12.9% [16].

The head lice prevalence was less predominant in Jeddah north region (17.9%) than the other regions, which was unlike the Kenya study that stated a considerable variation in the selected five different regions [33]. The pediculosis prevalence in the public schools was higher than private schools and this was resembled that recorded by Catalá *et al.* [31] but it was differ from the Kenya results which was higher in the private schools [33]. The pediculosis prevalence in Jeddah was in the 5th grade which was incompatible with the Boyle study in Saudi Arabia [27] who showed high prevalence in the early school years, but it differed from El-Mehmady result who recorded the highest rate in the 1st grade and the lowest rate was in the 5th grade [28]. The head lice prevalence as were in age of 8->10 and 10->12 respectively which was differ from one study recorded the incidence in age of 6-8 years [27] and from another study mentioned that pediculosis infection was equal in all age groups in the eastern Saudi Arabia [30].

The demographical results showed a significant increase in the children's infestation that their fathers had governmental jobs, which was differs from Akisu *et al.* [34] who found the infestation rate was higher in children whose fathers were farmers and unemployed fathers. Irrespective of father's job status, an increase in head lice prevalence in Jeddah was detected in students of mothers, whom were housewives which unlike the pediculosis prevalence found in children of mothers whom were employed [34].

The prevalence of *P. capitis* in Jeddah was high between students whom their father's education was

secondary level which resembled that recorded in the East of Saudi Arabia [30] that the pediculosis had a negative association with the high level of father's education. Related to the mother's education, it was 0.2% in the higher education which was compatible with the result stated that the head lice infestation rate was low in girls have educated mothers [28]. The high pediculosis infestation was recorded in Jeddah when students were lived with parents which differed from a study mentioned that the head lice prevalence was lower when children lived with both parents [17].

In conclusion, the increase in head lice infestation among the elementary school girl students may be due to the student's accumulation in one classroom. The infestation was lower in the 1st grade students which may lack head to head contact. The prevalence was high in student lived with parents which reflect that her caring responsibility missed between them, or she may have many brothers or sister and couldn't take her parents attention.

REFERENCES

1. Durden, L.A., 2001. Lice (Phthiraptera). In Parasitic diseases of wild mammals, Eds., Samuel, W.M., M.J. Pybus and A.A. Kocan, Iowa State University Press, Ames, 2nded, pp: 3-17.
2. Carter, V. and A. Davies, 2005. Encyclopedia of insects and spiders, Grange books an imprint of Grange books Plc. London, pp: 50-51.
3. Ko, C.J. and D.M. Elston, 2004. Pediculosis. Journal of the American Academy of Dermatology, 50: 1-12.
4. Elston, D.M., 1999. What's eating you? *Pediculushumanus* (head louse and body louse). CUTIS, 63: 259-264.
5. Gratz, N.G., 1997. Human lice: their prevalence, control and resistance to insecticides, A review 1985-1997. World Health Organization, Division of Control of Tropical Diseases, WHO Pesticide Evaluation Scheme.
6. Scanni, G. and E. Bonifazi, 2008. Head lice. European Journal Pediatric Dermatology, 18: 33-64.
7. Chosidow, O., 2000. Scabies and pediculosis. Lancet, 355: 819-826.
8. Plastow, L.M. Luthra, R. Powell, J. Wright, D. Russell and M.N. Marshall, 2001. Head lice infestation: bug busting vs. traditional treatment. Journal of Clinical Nursing, 10: 775-783.
9. Burgess, I.F., 2004. Human lice and their control. Annual Review of Entomology, 49: 457-481.

10. Kim, H., S. Symington, S. Lee and J.M. Clark, 2004. Serial invasive signal amplification reaction for genotyping permethrin-resistant (Kdr-like) human head lice, *Pediculus capitis*. Pesticide Biochemistry and Physiology, 80: 173-82.
11. Williams, S., H. Lapeere, N. Haedens, I. Pasteels, J. Naeyaert and J. Maeseneer, 2005. The importance of socio-economic status and individual characteristics on the prevalence of head lice in schoolchildren. European Journal of Dermatology, 15: 387-392.
12. Bartolozzi, G., 2003. Pediculosi. In *Pediatria. Principi e pratica clinica*, Eds., Bartolozzi, G. and M. Guglielmi, 2a edizione Milano, Masson, pp: 604-608.
13. Kokturk, A., K. Baz, R. Bugdayci, T. Sasmaz, U. Tursen, T.I. Kaya and G. Ikizoglu, 2003. The prevalence of *Pediculosis capitis* in school children in Mersin, Turkey. International Journal of Dermatology, 42: 694-698.
14. Ebomoyi, E.W., 1994. *Pediculosis Capitis* among urban school children in Ilorin, Nigeria. Journal of the National Medical Association, 86: 861-846.
15. Bibi, F., Z. Tasawarand and Z. Ali, 2011. The prevalence of human pediculosis in KotAddu district Muzaffargarh (Punjab) Pakistan. The Journal of Animal and Plant Sciences, 21: 364-367.
16. Wu, Y.H., H.Y. Su and Y.J. Hsieh, 2000. Survey of infectious skin diseases and skin infestations among primary school students of Taitung County, Eastern Taiwan. Journal of the Formosan Medical Association, 99: 128-134.
17. Sim, S., I.Y. Lee, K.J. Lee, J.H. Seo, K.I. Im, M.H. Shin and T.S. Yong, 2003. A survey on head lice infestation in Korea (2001) and the therapeutic efficacy of oral trimethoprim/sulfamethoxazole adding to lindane shampoo. The Korean Journal of Parasitology, 41: 57-61.
18. Shayeghi, M., A. Paksa, Y. Salimabadi, A. Saneidehkoordi, A. Ahmadi, M. Eshaghi and S. Bazrafkan, 2010. Epidemiology of head lice infestation in primary school pupils, in Khajeh City, East Azerbaijan Province, Iran. Journal of Arthropod-Borne Disease, 4: 42-46.
19. Hodjati, M.H., N. Mousavi and M. Mousavi, 2008. Head lice infestation in school children of a low socioeconomic area of Tabriz city, Iran. African Journal of Biotechnology, 7: 2292-2294.
20. Vahabi, B., A. Vahabi, A. Gharib, M. Sayyadi and S. Sayyad, 2013. Prevalence of head louse infestations and factors affecting the rate of infestation among primary schoolchildren in Paveh City, Kermanshah Province, Iran in the years 2009 to 2010. Life Science Journal, 10: 360-364.
21. Al-Affas, N.H., 1993. The incidence of the head louse, *Pediculus humanus capitis*, among pupils of two schools in Basrah city. Journal of Community Medicine, 6: 37-44.
22. Morsy, T.A., R.G. El-Ela, M.Y. Mawla and S.A. Khalaf, 2001. The prevalence of lice infestation of primary schools in Cairo, Egypt. Journal of the Egyptian Society of Parasitology, 31: 43-50.
23. Essam El-din A.N., N.A. El-Nadi and S.H. Abu-El Dahab, 2006. Epidemiological studies on *pediculosis capitis* in Sohag governorate. Egyptian Dermatology Online Journal, 2: 9.
24. Amr, Z.S. and M.K. Nusier, 2000. *Pediculosis capitis* in Northern Jordan. International Journal of Dermatology, 39: 919-921.
25. Al-Shawa, R.M., 2008. *Pediculus capitis*, infestation according to sex and social factors in Gaza Governorate. The Islamic University Journal (Series of Natural Studies and Engineering), 16: 75-83.
26. Alzain, B., 2012. *Pediculosis capitis* infestation in school children of a low socioeconomic area of the North Gaza Governorate. Turkish Journal of Medical Sciences, 42: 1286-1291.
27. Boyle, P., 1987. Pilot study of the prevalence of head lice infestation in a population of Saudi Arabian Children. Family Practice, 4: 138-142.
28. EL-Mehmady, R.M.A., 1995. The prevalence of the head lice (*Pediculus humanus capitis*) among primary school girls in Jeddah city. Journal of the Egyptian German Society of Zoology, 16: 113-124.
29. Bahamdan, K., A.A. Mahfouz, T. Tallab, I.A. Badawi and O.M. Al-Amari, 1996. Skin diseases among adolescent boys in Abha, Saudi Arabia. International Journal of Dermatology, 35: 405-407.
30. Al-Saeed, W.Y., K.M. Al-Dawood, I.A. Bukhari and A.A. Bahnassy, 2006. Prevalence and pattern of skin disorders among female school children in Eastern Saudi Arabia. Saudi Medical Journal, 27: 227-134.
31. Catalá, S., L. Junco and R. Vaporaky, 2005. *Pediculus capitis* infestation according to sex and social factors in Argentina. Revista de Saúde Pública, 39: 438-443.

32. Al-Bashtawy, M. and F. Hasna, 2012. *Pediculosis capitis* among primary-school children in Mafraq Governorate, Jordan. The Eastern Mediterranean Health Journal, 18: 43-48.
33. Chunge, R.N., 2004. A study of head lice among primary schoolchildren in Kenya. Royal Society of Tropical Medicine and Hygiene, 80: 42-46.
34. Akisu, C., U. Aksoy, S.B. Delibas, S. Ozkoc and S. Sahin, 2005. The prevalence of head lice infestation in school children in Izmir, Turkey. Pediatric Dermatology, 22: 372-373.