



## Prevalence and associated factors of *Pediculus humanus capitis* infestation among primary schoolchildren in Sebha, Libya

\*Hasan Mohamed Saleh Ibrahim & Hind Omar Ali Mohamed  
Department of Zoology, Faculty of Science /Sebha University, Libya

\*Corresponding author: [has.elhajali@sebhau.edu.ly](mailto:has.elhajali@sebhau.edu.ly)

**Abstract** The infection with head pediculosis is prevalent worldwide and leads to health problems in all ages, especially in school aged children. Limited studies have been conducted on the prevalence of head lice infestation in Libya. The objective of this study was to determine the prevalence and risk factors of head lice infestation among primary schoolchildren in Sebha city, Libya. From March to May, 2019, a total of 971 pupils (569 boys and 402 girls) aged between 6-12 years from five primary schools in Sebha were randomly selected. The hair of each pupil was examined individually for head lice infestation in a separate room, and Pediculosis was defined as the finding of living adult, nymph, or egg (nits). The questionnaire was filled out and the data were analyzed using SPSS software. The overall prevalence of head lice infestation was 38.6% (375/971). The prevalence was significantly lower in boys (27.1%) than in girls (55.0%;  $p < 0.0001$ ). The infestation rate among schoolchildren was significantly varied from 51.8% in children aged 7 years to 27.5% in children aged 10 years ( $p < 0.0001$ ). Pediculosis was significantly more frequent in Aljamhoria school (48.0%) than other schools ( $p < 0.0001$ ). There were significant relationships between head lice infestation and smooth hair ( $p < 0.0001$ ), shared head cover/scarf with others ( $p < 0.0001$ ), shared hair comb ( $p = 0.032$ ), shared accessories ( $p < 0.0001$ ), frequency of hair-washing ( $p = 0.002$ ) and using a private bed and bedding facilities ( $p = 0.004$ ). While, statistically associations with pediculosis were not showed with some variables such as: family size ( $p = 0.196$ ), shared bath towel ( $p = 0.197$ ) and sleeping in a private room ( $p = 0.083$ ).

**Keywords:** lice, Infestation, Primary, Schoolchildren, Sebha.

### معدل انتشار قمل الرأس وعوامل الخطر المرتبطة به بين طلاب المدارس الابتدائية بمدينة سبها، ليبيا

\*حسن محمد صالح ابراهيم و هند عمر علي محمد

قسم علم الحيوان - كلية العلوم - جامعة سبها، ليبيا

\*للمراسلة: [has.elhajali@sebhau.edu.ly](mailto:has.elhajali@sebhau.edu.ly)

**الملخص** تعد الإصابة بقمل الرأس من الاصابات المنتشرة بشكل كبير في جميع أنحاء العالم و تؤدي إلى مشاكل صحية في جميع الأعمار، ولا سيما في الأطفال في سن المدرسة. نظرا الى محدودية الدراسات حول انتشار الإصابة بقمل الرأس في ليبيا، فإن هذه الدراسة تهدف الى تحديد مدى انتشار قمل الرأس وعوامل الخطر المرتبطة بالإصابة به بين تلاميذ بعض المدارس الابتدائية في مدينة سبها، ليبيا. أجريت الدراسة في الفترة من مارس إلى مايو 2019 على من خمسة مدارس ابتدائية في مدينة سبها، وتم خلالها وبشكل عشوائي اختيار 971 (569 تلميذ و 402 تلميذة) تتراوح أعمارهم بين 6-12 عاماً. تم فحص شعر كل تلميذ بشكل فردي و في غرفة منفصلة من أجل الكشف عن الإصابة بقمل الرأس. تم تأكيد الإصابة من خلال العثور على طور واحد على الأقل من الأطوار البالغة الحية أو الحوريات أو الصنبان (البيض). تم تعبئة الاستبيان الخاص بالمعلومات والبيانات ذات الصلة وتحليلها باستخدام البرنامج الاحصائي SPSS. أوضحت نتائج الدراسة أن معدل انتشار الإصابة العام بقمل الرأس بلغ 38.6% (375/971). كان الانتشار أقل بشكل ملحوظ في الأولاد (27.1%) منه في البنات (55.0% ؛  $P < 0.0001$ ). معدل الإصابة بين تلاميذ المدارس اختلف احصائيا بشكل ملحوظ من 51.8% في الأطفال الذين تتراوح أعمارهم 7 سنوات إلى 27.5% في الأطفال الذين تتراوح أعمارهم 10 سنوات ( $P < 0.0001$ ). أعلى معدل للإصابة كان في مدرسة الجمهورية (48.0%) مع وجود فرق احصائي في معدل الانتشار بين المدارس المختلفة ( $P < 0.0001$ ). أيضا أسفرت نتائج الدراسة أن هناك علاقات معنوية بين الإصابة بقمل الرأس وبين كل من: الشعر الناعم ( $p < 0.0001$ )، غطاء الرأس / الوشاح المشترك مع الآخرين ( $p < 0.0001$ )، مشط الشعر المشترك ( $p = 0.032$ )، الاكسسوارات المشتركة ( $p < 0.0001$ )، عدد مرات غسل الشعر اسبوعيا ( $p = 0.002$ ) واستخدام سرير خاص ومرافق الفراش ( $p = 0.004$ ). بينما لم تظهر نتائج الدراسة أي ارتباطات احصائية بين انتشار القمل و بعض المتغيرات مثل: حجم الأسرة ( $p = 0.196$ )، استخدام منشفة حمام مشتركة ( $p = 0.197$ ) والنوم في غرفة خاصة ( $p = 0.083$ ).

**الكلمات المفتاحية:** قمل الرأس، انتشار، الإبتدائية، أطفال المدارس، سبها.

### Introduction

*Pediculus humanus capitis* (Anoplura: Pedicullidae) is an ecto-parasite responsible for

head lice infestation (pediculosis). The infection with head pediculosis is prevalent worldwide and

leads to health problems in all ages, especially in school aged children. Head lice is a very common parasite infested school children [1], particularly between 5 to 11 years old [2]. Many factors like individual characteristics, environmental conditions, and social and economic situation contribute for increasing the prevalence of this louse [3].

Lice do not have strong wings or legs to jump, therefore, its mode of transmission occurs by three ways: direct contact (head-to-head) between the infested person and the non-infested, sharing special tools for the infested person (head cover, scarf, hair comb, bath towels, shaving tools, and accessories), or by sleeping in the infested person's bed [4,5]. The head lice infestation rates were vary in the different areas within the same country and between the different countries throughout the world. These wide rates start from 1.6% recorded in Poland [6] to the highest rate 81.5% recorded in Argentina [7].

Almost all the previous studies agreed on that personal hygiene play a significant role on the prevalence of head lice [5,8]. Furthermore, the most rates of head lice infestation occur in girls than boys, and in children between 5-12 years old. Some studies indicated that the prevalence of pediculosis was affected with some variables such as hair length, hair color, parents' education levels, and family outcome (data not included in this study). Limited studies have been conducted on the prevalence of head lice infestation in Libya. In a study done in Benghazi, 78.6% elementary school pupils had head lice infestation [9]. Whereas in Houn, the infestation rate among schoolchildren was 21.9% [10]. Another study in Misurata city conducted by Elserite [11] demonstrated a lower prevalence of 5.2% among school children.

Because the head lice infestations are health concern, especially in developing countries, health education programmes are required to decrease the opportunities of infection exposure with this parasite.

#### **Material and methods**

**Study area:** The study was done in Sebha city, Libya. This city is situated in the South-east of Libya between 26, 28 North, and 14,16 East. It is characterized by a very hot and dry desert climate in Summer (>45°C) and very cold in the Winter (< 0°C), and rare rain in most days of the year.

**Study populations:** The study was carried out on 971 primary school children (569 boys and 402 girls) aged between 6-12 years. Five primary schools (Aljamhoria, Alqadesia, Sokkarah,

Annaser, and 23 October) located in Sebha were selected for the study.

**Physical examination and questionnaire:** The hair of each pupil was examined individually for head lice infestation in a separate room under a hand lamp using medical magnifying lens. The areas over neck and behind the ears were carefully inspected. The presence of adult lice, nymphs or nits (eggs) was considered as infested pupils. The time spent for each pupil was 5-8 minutes, and the data from this physical examination including stage, intensity of infection and infection site were recorded. Using a toothed comb, the hair was combed onto A4 white paper, and the different stages were transferred to the glass vials containing 70% of

ethanol [12]. To estimate the effect of risk factors on the prevalence of pediculosis, a questionnaire was filled out with some important information including sex, age, school, family size, the type and abundance of hair, sharing head cover/scarf, sharing combs and accessories, sharing bath towels, sleeping in a private room and bed, and frequency of hair washing per week.

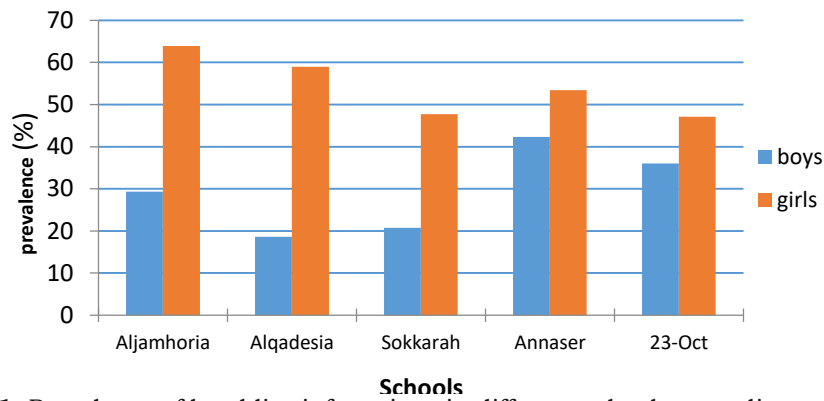
**Statistical analysis:** The data were analyzed using SPSS (Statistical Package for Social Science), version 20.0. The Chi-square test was used to measure the statistical significant differences between the infestation and variables. statistical significance was calculated at *P* value less than 0.05.

#### **Results**

In the present study, nine hundred and seventy one schoolchildren (569 boys and 402 girls) aged 6-12 years from 5 primary schools in Sebha were included to investigate the presence of head lice infestation. The overall prevalence of pediculosis was 38.6% (375/971). The prevalence of infestation was higher in girls (55.0%) than in boys (27.1%). There was a significant difference ( $p < 0.0001$ ) between the rate of infection and sex (Table 1).

The results showed that there was a significant relation between the infestation rate and age of children ( $p < 0.0001$ ), and these rates were varied from 51.8% in children aged 7 years to 27.5% in children aged 10 years (Table 1).

Pediculosis rates in the five primary schools (Aljamhoria, Alqadesia, Sokkarah, Annaser, and 23 October) enrolled in this study were 48.0%, 34.2%, 30.3%, 46.9% and 40.5% respectively (Figure 1). A significant association between pediculosis and schools was noted ( $p < 0.0001$ ).



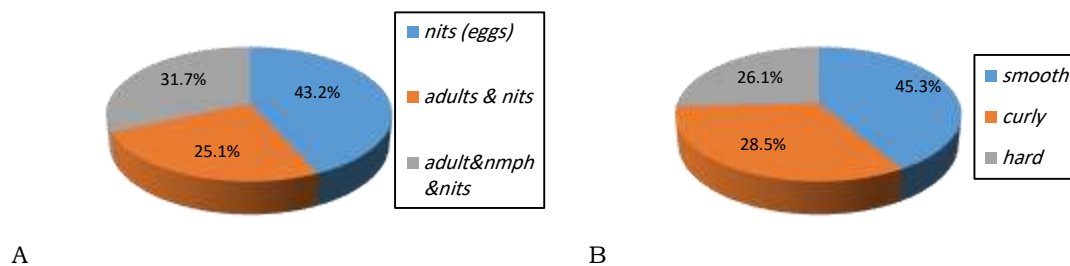
**Figure 1:** Prevalence of head lice infestations in different schools according to gender.

**Table 1: Prevalence of head lice infestation according to different variables.**

Factor	Variable	No. of examined	Infested pupils		Non-infested pupils		p-value
			No.	(%)	No.	(%)	
Sex	Boys	569	154	27.1	415	72.9	p<0.0001
	Girls	402	221	55.0	181	45.0	
Age (year)	6	49	22	44.9	27	55.1	p<0.0001
	7	220	114	51.8	106	48.2	
	8	232	85	36.6	147	63.4	
	9	77	28	36.4	49	63.6	
	10	91	25	27.5	66	72.5	
	11	138	48	34.8	90	65.2	
School	Aljamhoria	200	96	48.0	104	52.0	p<0.0001
	Alqadesia	158	54	34.2	104	65.8	
	Sokkarah	360	109	30.3	251	69.7	
	Annaser	211	99	46.9	112	53.1	
	23-October	42	17	40.5	25	59.5	
Lice stages	nits (eggs)		162	16.7			p<0.0001
	nits & adult	971	119	12.2	596	61.4	
	all stages		94	9.7			
Intensity of infection	low		182	18.7			p<0.0001
	medium	971	143	14.7	596	61.4	
	high		50	5.1			
Type of hair	smooth	322	170	52.8	152	47.2	p<0.0001
	curly	299	107	35.8	192	64.2	
	hard	350	98	28.0	252	72.0	
Infestation sit on the head	all the head		132	13.6			p<0.0001
	behind the ears	971	149	15.3	596	61.4	
	over neck		94	9.7			

According to lice stages, the majority of infested pupils (162/375) were with nits only, and 31.7% (119/375) were infested with the three stages (adult, nymph and nits). While 25.1% (94/375) were infested with nits and adult (Figure 2). On the other hand, statistical significant relationships were observed between head lice infestation and

smooth hair (p<0.0001), intensity of infestation (p<0.0001) (Table 1 & Figure 2). The most infestations were significantly (p<0.0001) concentrated behind the ears (39.7%), then on whole the head and over neck with percentages of 35.2% and 25.1% respectively (Table 1 & Figure 2).





C

D

**Figure 2:** Distribution (%) of Infested pupils according to: Type of stage (A); type of hair (B); intensity of infestation (C); and the infestation site on the head (D).

Regarding to the associated risk factors, the rate of lice infestation significant relations with shared head cover/scarf (53.0% among children who shared than 29.8% in those who did not share;  $P < 0.0001$ ), with shared hair comb (41.3% among children who shared than 31.8% in those who did not share;  $p=0.032$ ), with shared accessories (58.8% among children who shared than 27.8% in those who did not share  $p<0.0001$ ), and having a private bed and bedding (45.5% among children who did not have than 34.4% in those who have;  $p<0.004$ ). Moreover, significant association was recorded between the number of hair washing per week and lower rate of lice infestation (44.0% among those who washing hair once a week compared with 24.7% among those washing hair 7 times a week;  $p=0.002$ , Table 2).

On the other hand and as shown in Table 2, statistically associations with pediculosis were not showed with some variables such as: family

size ( $p=0.196$ ), shared bath towel ( $p=0.197$ ) and sleeping in a private room ( $p=0.083$ ).

### Discussion

In all the world, especially in developing countries, school-age children suffer from the increasing prevalence of contact-borne diseases like pediculosis. Head lice infestation is considered as a public health problem for most families with children at this age.

The overall rate of head lice infestation among primary-school children in the present study was 38.6%. This result is differ than previously studied in other cities in Libya such as: 78.6% in Benghazi [9], 21.9% in Houn [10], 18.9% in Al-Khums [13], and 7.3% in Misurata [11]. This result is almost similar to previous studies conducted in England (37.4%), Malaysia (35.0%) and Kuwait (46.2%) by Harris et al. [14], Bachok et al., [15], and Henedi et al., [16], respectively.

The rate of infestations reported from different countries in the world were, 16.8% [17] and

**Table 2: Risk factors associated with head lice infestation.**

Factor	Variable	No. of examined	Infested pupils		Non-infested pupils		p-value
			No.	(%)	No.	(%)	
Family size	2-3	14	5	35.7	9	64.3	P=0.196
	4-5	205	76	37.1	129	62.9	
	6-7	413	148	35.8	265	64.2	
	8-9	203	93	45.8	110	54.2	
	$\geq 10$	136	53	39.0	83	61.0	
Frequency of hair washing (per week)	once	361	159	44.0	202	56.0	P=0.002
	twice	353	140	39.7	213	60.3	
	3-4 times	180	57	31.7	123	68.3	
	every day	77	19	24.7	58	75.3	
Shared head cover/scarf	yes	338	179	53.0	159	47.0	p<0.0001
	no	473	141	29.8	332	70.2	
	sometimes	160	55	34.4	105	65.6	
Shared head comb	yes	676	279	41.3	397	58.7	P=0.032
	no	236	75	31.8	161	68.2	
	sometimes	59	21	35.6	38	64.4	
Shared bath towel	yes	496	202	40.7	294	59.3	P=0.197
	no	379	143	37.7	263	62.3	
	sometimes	96	30	31.2	66	68.8	
Shared the accessories	yes	301	177	58.8	124	41.2	p<0.0001
	no	616	171	27.8	445	72.2	
	sometimes	54	27	50.0	27	50.0	
Using a private bed & bedding	yes	579	199	34.4	380	65.6	P=0.004
	no	332	151	45.5	181	54.5	
	sometimes	60	25	41.7	35	58.3	
Sleeping in a private room	yes	81	25	30.9	56	69.1	P=0.083
	no	890	350	39.3	540	60.7	

32.4% [18] in Palestine; 31.2% [5] and 5.2% [19] in Saudi Arabia; 14.3% in Syria [20]; 21.8% in Egypt [21]; 26.6% in Jordan [22]; 29.7% in Argentina [23]; 4.1% in Korea [24]; 3.3% in France [25]; 1.6% in Poland [6]; 56.2% in Iran [26]; and

13.1% in Turkey [27]. These differences in infestation rate could be due to lifestyle, season, geographic distribution, personal hygiene practices, and the number of cases in each study. This study started in the end of Winter and ended

the beginning of Summer, therefore, the opportunities for children getting closer and closer to sources of heating are increasing, as well as decrease the number of showers and washings due to the cold, and the increase of using scarves and head covers in this season. Henedi et al., [16] found that the infestation rate increased in the hot/dry season from April to September.

The prevalence of infestation was significantly higher in girls (55.0%) than in boys (27.1%). Almost all the previous studies reported higher rates of pediculosis among girls than boys. For instance, the head lice infestation over boys and girls were, 0.86% vs 25.2% [27]; 1.7% vs 15.1% [17]; 4.7% vs 23.7% [20]; 37.5% vs 50.4% [16]; and 5.5% vs 42.8% [5]. However, there was an *exception* to this result which were two studies done in Misurata city, Libya [11] and Ibadan city, Nigeria [28] reported that the infestation rates in boys were lower than in girls. The differentiation between boys and girls may be attributed to different behaviour styles and also to the correlation between hair length and the difficulty of hair washing and combing in girls.

In this study, the prevalence of head lice infestation was significantly higher in children aged 7 years (51.8%) than those who aged 10 years (27.5%). Almost the infestation head lice decreases with the increasing of age. This finding may referred to that pupils who aged 10 years or more rely on themselves instead of others for dressing and hygiene. Furthermore children around 7 years old consume a long time for playing together with direct contact. Similar result was obtained in Libya by Elserite [11] who recorded that the highest infestation rate (15.7%) among school children was detected in pupils at 7 years old. Other previous studies among school children from Egypt [21] and Palestine [17] reported a highest rate of infestation were in children aged 6-8 years. While in Libya Ebrahem [10] found that the highest rate was 29.6% in children aged 7-8 years. Recent studies by Saraswat et al., [29] and Rezaee et al., [30] showed that the most infestation rates with head lice were in the age group between 5-7 and 6-10 years, respectively.

In the current study, the most of risk factors were played a significant correlation with infestation rates of pediculosis. For example, a high significance was found between smooth hair and lice infestation. About 45.3% (170/375) of infested children had a smooth hair compared to those with curly (28.5%; 107/375) or hard hairs (26.1%; 98/375). This result may be due to the fact that the number of washing and combing the hair is low in people with smooth hair.

According to the risk factors, significant correlations were obtained in this study between infestation rates with head lice and children sharing head cover/scarf, hair comb, and accessories (data listed in Table 1). This finding were identical with studies reported by Toloza et al., [23] and Al Bashtawy and Hasna [22]. Some of these factors like sharing bath towel and sleeping in a private room were not significant. Chungue [31] found no correlation between the rate of lice infection and sharing bath towel.

Even though, the highest rate of infestation (45.8%) were in children who their families consist of 8-9 members and the lowest in those who their families consist of 2-3 members, the significant figure never noted between the infestation rate and family size ( $p=0.196$ ). This result is agreement with studies reported previously by Moradi et al., [32]; Kamiabi and Nakhaei [33]; and Nazari et al., [34].

A highly significant variation was found between head lice infestation and the frequency of hair washing per week ( $p=0.002$ ). About 42.4% (159/375) of infested children who washing hair once per week reported a high infestation rate (44.0%), whereas, 5.1% (19/375) of infested pupils who daily washing their hair reported an infestation rate of 24.7%. This result was convenient with some studies in different countries reported by Ebrahim [10]; AlBashtawy and Hasna [22], Ali and Ramzan [35]; and Mohammed [36].

### **Conclusion**

Despite the limited previous studies in Libya, which are only four studies, the prevalence of lice in primary schools has increased dramatically in the last ten years due to the collapse of the health sector in Libya and the absence of health care in the primary schools, which led to the re-infection of head lice among school children. Therefore, health education programmes and increased interest in this group of children are required.

### **Acknowledgements:**

Many thanks and gratitude to all staff in the five targeted schools in this study for their cooperation. We would also like to thank Dr. Alsaedi Altaher , Statistics department for his kind assistance.

### **References**

- [1]- Heukelbach, J. and Feldmeier, H. (2004). Ectoparasites; the under estimated realm, *The Lancet.*, 363: 889-891.
- [2]- Noyan, E. and Demir, V. (2006). Investigation of pediculosis carried out as the special study module No. 74, a part of Ege University Medical Faculty's educational program. *Türkiye Parazitoloji Dergisi*, 30: 32-33.
- [3]- Falagas, M., Matthaiou, D., Rafailidis, P., Panos, G., and Pappas, G. (2008). Worldwide Prevalence of head lice., *Emerging Infectious Diseases.*, 14: 1493-1494.
- [4]- Shayeghi, M., and Paksa, A. (2010). "Epidemiology of head lice infestation in primary school pupils, in Khajeh city, East Azerbaijan province, Iran." *Iranian Journal of Arthropod-Borne Diseases.*, 4(1): 42-46.
- [5]- Mohamed, K., Elmubarak, A., Zaghloul, D., Zahrani, M., Jefri, M., Alfaqih, K., Ashi, M., Alnefaie, M., Alkinani, A., Alhazmi, A., Jafar, M., and Babalghith, A. (2018). Prevalence of Head Lice (*Pediculus humanus capitis*) Infestation among Pupils in Elementary Schools in Makkah, Saudi Arabia. *International Journal of Medical Research & Health Sciences.*, 7(8): 66-76.
- [6]- Buczek, A., Markowska-Gosik, D., Widomska, D., Kawa, I. (2004). *Pediculosis capitis among*



- schoolchildren in urban and rural areas of Eastern Poland. *European Journal of Epidemiology*, 19:491-495.
- [7]- Chouela, E., Abeldano, A., Cirigliano, M., Ducard, M., Neglia, V., La Forgia, M., and Colombo, A. (1997). Head louse infestations: Epidemiologic survey and treatment evaluation in Argentinian schoolchildren. *International Journal of Dermatology*, 36: 819-825.
- [8]- Dehghanzadeh, R., Asghari-Jafarabadi, M., Salimian, S., Hashemi, A., Khayatizadeh, S. (2015). "Impact of family ownership, individual hygiene, and residential environments on the prevalence of pediculosis capitis among schoolchildren in urban and rural areas of northwest of Iran." *Parasitology Research*, 114(11): 4295-4303.
- [9]- Bharija, S., Kanwar, A., Gurmohan, S., Belhaj, M. (1988). *Pediculosis Capitis* in Benghazi, Libya. *International Journal of Dermatology*, 27(3):165-166.
- [10]- Ebrahem, H. A. (2019). Infestation of Head Lice, *Pediculus humanus capitis*, in Primary School Children at Houn City, Libya., *Journal of Academic Research*, 13: 38-52.
- [11]- F. S. Elserite (2016). Prevalence of pediculosis among urban-rural school children in Misurata-Libya. The Third Symposium on Theories and Applications of Basic and Biosciences. 3rd September 2016. [www.misuratau.edu.ly](http://www.misuratau.edu.ly)
- [12]- Ebomoyi, W. (1994). *Pediculosis capitis* among urban school children in Ilorin, Nigeria. *Journal of the National Medical Association*, 86: 861-864.
- [13]- A. AL-Hadar, B. Benrou, B., H. Annajhar, M. Idris, A. EL-Buni, (2007). Prevalence of pediculosis in AL-Margeb. Shabyoat (DisTrucy) in the Northwest Region of Libya. IEDSC.4-7 May 2007. Tripoli, Libya.
- [14]- Harris, J., Crawshaw, J., Millership, S. (2003). Incidence and prevalence of head lice in a district health authority area. *Communicable disease and public health*, 6: 246-249.
- [15]- Bachok, N., Nordin, R., Awang, C., Ibrahim, N., Naing, L. (2006). Prevalence and associated factors of head lice infestation among primary schoolchildren in Kelantan, Malaysia. *Southeast Asian Journal of Tropical Medicine and Public Health*, 37:536-43.
- [16]- Henedi, A., Salisu, S., Asem, A., and Alsannan, B. (2019). Prevalence of Head Lice Infestation and its Associated Factors among Children in Kindergarten and Primary Schools in Kuwait. *International Journal of Applied and Natural Sciences*, 8(3): 2319-4022.
- [17]- 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 (1): 1286-1291.
- [18]- Al-Shawa, R. (2008). *Pediculus capitis*, infestation according to sex and social factors in Gaza Governorate. *Islamic University Journal*, 16: 75-83.
- [19]- Al-Saeed, W., Aldawood, K., Bukhari, I., and Bahnassy, A. (2006). "Prevalence and pattern of skin disorders among female schoolchildren in Eastern Saudi Arabia." *Saudi Medical Journal*, 27(2): 227-234.
- [20]- Ismail, M., Kabakibi M., Al-Kafri, A. (2018). Epidemiology of pediculosis capitis among schoolchildren in Damascuc, Syria. *Indian Journal of Paediatric Dermatology*, 19: 331-334.
- [21]- Morsy, T., El-Ela, R., Mawla, M., Khalaf, S. (2011). The prevalence of lice infesting students of primary, preparatory and secondary schools in Cairo, Egypt. *Journal of the Egyptian Society of Parasitology*, 31(1): 43-50.
- [22]- Al Bashtawy, M. and Hasna, F. (2012). *Pediculosis capitis* among primary-schoolchildren in Mafraq Governorate, Jordan. *Eastern Mediterranean Health Journal*. 18 (1): 43-48.
- [23]- Toloza, A., Vassena, C., Gallardo, A., González-Audino, P., Picollo, M. (2009). Epidemiology of pediculosis capitis in elementary schools of Buenos Aires, Argentina. *Parasitology Research*, 104: 1295-1298.
- [24]- Oh J., Lee, I., Lee, W., Seo, M., Park, S., Lee, S., Seo, J., Yong, T., Park, S., Shin, M., Pai, K., Yu, J., and Sim, S. (2010). Prevalence of pediculosis capitis among Korean children. *Parasitology Research*, 107:1415-1419.
- [25]- Durand, R., Millard, B., Bouges-Michel, C., Bruel, C., Bouvresse, S., Izri, A. (2007). Detection of pyrethroid resistance gene in head lice in schoolchildren from Bobigny, France. *Journal of Medical Entomology*, 44: 796-798.
- [26]- Sanei-Dehkordi, A.; Soleimani-Ahmadi, M.; Zare, M.; Madani, A.; Jamshidzadeh, A. (2017). Head Lice Infestation (*Pediculosis*) and Its Associated Factors among Primary School Girls in Sirik County, Southern Iran. *International Journal of Pediatrics*, 5(12): 6301-6309.
- [27]- Gulgun, M., Balci, E., karaoglu, A., Babacan, O., Turker, T. (2013). *Pediculosis capitis*: Prevalence and its associated factors in Primary School children living in Rural and Urban areas in Kayseri, Turkey. *Central European Journal of Public Health*, 21(2): 104-108.
- [28]- Olaitan, L. (2006). Head lice infestation among primary school children in Ibadan Oyo State, Nigeria. *African Journal Of Educational Studies(AJES)*. 4(1):134-140.
- [29]- Saraswat, N., Shankar, P., Chopra, A., Mitra, B., Kumar, S. (2020). Risk factors associated with head lice infestation in rural pediatric patients., *Indian Journal of Dermatology*, 11:25-28.
- [30]- Rezaee, E., Heidari, F., and Nowrouzi, M. (2020). Investigation of the prevalence of Head Lice and Factors Affecting Them in Infected People Referring to Gerash County Health

- Center. International Journal of Epidemiologic Research., 7(2): 58-62.
- [31]- Chunge R. (1986). A study of head lice among primary schoolchildren in Kenya. Transactions of the Royal Society of Tropical Medicine and Hygiene, 80(1): 42-46.
- [32]- Moradi A., Zahirnia A., Alipour A., and Eskandari, Z. (2009). The prevalence of pediculosis capitis in Primary School Students in Bahar, Hamadan Province, Iran. Journal of Research in Health Sciences. , 9(10): 45-49.
- [33]- Kamiabi, F., and Nakhaei, F. (2005). Prevalence of pediculosis capitis and determination of risk Factors in primary school children in Kerman. Eastern Mediterranean Health Journal, 11(5-6): 988-992.
- [34]- Nazari, M., Fakoorziba, M., Shobeiri, F. (2006). Pediculus capitis infestation according to sex and social factors in Hamedan, Iran. Southeast Asian Journal of Tropical Medicine and Public Health., 37(3): 95-98.
- [35]- Ali, N. and Ramzan, F., (2004). Head Lice Infestation In School Children At Dera Ismail Khan. Pakistan Journal of Zoology., 36: 273-280.
- [36]- Mohammed A. (2012). Head lice infestation in schoolchildren and related factors in Mafraq governorate, Jordan. International Journal of Dermatology. , 51(2):168- 172.