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Investigation of prevalence of infestation with head lice and some factors affecting on them in infected people in Kirkuk city, Iraq

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ABSTRACT

The current study was made during the period from July to November 2020. The infestation with head lice was searched for residents of Kirkuk city, and a random samples (1988 cases) were collected from city residents and check up their scalps to detect the head lice infestation. This study aims to determinate the prevalence of head lice infestation in different regions of Kirkuk city and to demonstrate the role of some epidemiological factors on the infestation as age, gender, nature of hair tissue, hair length, hair density. The current study showed the head lice infestation reached 117 cases with a total prevalence of infestation 5.88%. These results come from a clinical study that made on 1988 people from a variety of age groups, society, social-economic and cultural groups. The highest prevalence of infected was recorded (15.11%) for the age group 6-12 years, while the lowest prevalence of infected was for the age group 46-80 years (0.42%). The present research concluded that the infestation was higher in female than male (9.35, 2.10%, respectively). The highest prevalence of infected was in straight hair (3.40 and 11.76%) for both male and female (respectively), and the lowest prevalence of infestation was for curly hair (2.30%) in female, while the infestation for curly hair in male are not recorded. The results also showed the highest prevalence of infestation was in long hair (10.79 and 12.16%) than in short hair (0.63 and 3.63%) for both male and female (respectively). The highest prevalence of infestation was also recorded for high dense hair (3.13 and 12.63%) compared with low dense hair (0.66 and 1.65%) for both male and female (respectively).

Introduction

Pediculosis is lice infestation, can be caused by head lice *Pediculus humanus capitis* which is a common parasitic infection distribute all over the world, and it causes health problems in many societies [1].

Human head lice are an obligatory ectoparasite that infects the scalp [2]. It lives three to four weeks if left untreated [3]. Head lice are settle near the surface of the scalp, providing them with food, warmth, shelter and moisture [4]. They feed every three to six hours by sucking blood from the scalp and injecting saliva at the same time inside the injury skin. The adult lice or nymphs can survive one or two days away from the human host without eating any meal [5].

Individuals of all ages are exposed to head lice, although the infection are more common in school-age children, and the prevalence can reach 40% in children under the age of 12 years. Therefore, a head lice infestation is a global problem, especially in primary schools, where head lice are seen as a public health problem in the world, with an increase in the incidence of lice in poor societies, poor countries and developing countries compared to advanced countries [6]. Head lice parasite is endemic in all parts of the world, and there is no gender, age or race are resistant to infestation with it, although it is more prevalent in age groups between 6-12 years, and females have a chance of infecting four to eight times more than males [3].

According to the medical importance of head lice, many research studies have been conducted in the world (in general) and Iraq (in particular). Those studies conducted in Iraq have discuss the epidemic

of head lice. According to what was mentioned above, the objectives of the current study was done to: **1)** determinate the prevalence rate of head lice infestation in random samples from the residents of different regions in Kirkuk city, due to previous studies of infestation of head lice in the city are limited to specific residential areas without others, **2)** explain the role of some epidemiological factors (age, gender, nature of hair tissue, length of hair, hair density) on the prevalence of infection with head lice among the residents of Kirkuk city.

Materials and methods

Through the period of July to November 2020, a total of 1988 individuals were randomly selected from community of Kirkuk city, and tested for head lice. Members of community were from different age groups (≤ 5 year - 80 years old) of both gender (male and female). People were interviewed one by one and their hair was examined for head lice and many epidemiological data were recorded during the process of investigating head lice among the residents of Kirkuk city. The hair of the samples under investigation was classified based on the apparent hair characteristics. Hair texture is also classified as straight, slightly wavy (moderate) and very wavy (curly). Hair length was classified into three categories, namely, short hair (for the ears), long hair (for the shoulders) and very long hair (below the shoulders). As for the density of the hair, it was divided into high dense, moderate and low dense. The direct interview was conducted with the people under study. Clinical examinations were performed for them, where the scalp was examined, especially the nape area of the head and behind the ears [7]. To investigate the presence of lice eggs (nits), nymphs and adult lice, a magnifying glass with self-lighting are using [8].

To confirm the examination and determine whether or not the infestation is present, plastic combs with fine teeth and fine iron-toothed combs have been used, as these combs have the ability to separate the lice eggs (nits) from the hair when combing the hair with them. White papers were also used to be placed under the head of the examined person, to facilitate the identification of adults and nymphs that have fallen on these white papers.

The results of the epidemiological study were analyzed to investigate the prevalence of head lice infestation in the population of Kirkuk city, by calculating the percentage of infestation according to the report of a committee of the American Society of Parasitologists (ASP) on the use of environmental terms in parasitology [9].

Results

The results of investigation the head lice infestation according to age groups Tab 1. indicated that the age group 6-12 years had the highest prevalence of infestation (15.11%), followed by the age group ≤ 5 years (9.24%), and the age group 13-25 years (2.19%), followed by the age group 26-45 years (0.78%). whereas the lowest infestation (0.42%) was recorded in the age group 46-80 years.

The prevalence of infestation with head lice was high for female (9.35%) compared with male (2.10%) as showed in Tab 2.

The results of the current study Tab 3. showed a variation in the prevalence of infestations according to the nature of the hair tissue. For male, the highest infestation rate was for those with straight hair (3.40%), followed by moderate (slightly wavy) (1.00%). While no infestation was recorded for male with curly hair. Also, for female, the highest infestation rate was for straight hair (11.76%), followed by moderate (slightly wavy) hair (7.99%), and the lowest infestation rate was (2.30%) for female with curly hair.

The prevalence of infestation with head lice were different between males and females according to hair length, Tab 4. The highest infestation rate was for long hair in both male and female (10.79 and 12.16%) (respectively). In female, it was noticed that the very long hair group had a lower infestation rate (7.77%) compared with long hair group. It must be noted that no case of head lice infestation was recorded for very long hair in male. The lowest infestation rate was for the short hair group (0.63 and 3.63%) in both male and female (respectively).

The results of the current study Tab 5. showed similarities between male and female in the infestation rate according to hair density. The highest infestation rate was for high dense hair (3.13 and 12.63%) for male and female (respectively), followed by moderate hair dense (2.25 and 6.94%) in male and female (respectively). Low dense hair had the lowest infestation rate (0.66 and 1.65%) in male and female (respectively).

Table 1: Prevalence of infestation with head lice according to different age groups.

Age group (year)	Number of examined cases	Number of infected cases	Prevalence of infestation (%)
≤ 5	184	17	9.24
6 – 12	556	84	15.11
13 – 25	502	11	2.19
4526 –	509	4	0.78
46 – 80	237	1	0.42
Total	**1988**	**117**	**5.88**

Table 2: Prevalence of infestation with head lice according to the gender.

Sex	Number of examined cases	Number of infected cases	Prevalence of infestation (%)
Male	953	20	2.10
Female	1035	97	9.37
Total	**1988**	**117**	**5.88**

Table 3. Prevalence of infestation with head lice according to the nature of the hair tissue.

	Males			Females		
Nature of Hair tissue	**Number of examined cases**	**Number of infected cases**	**Prevalence of infestation (%)**	**Number of examined cases**	**Number of infected cases**	**Prevalence of infestation (%)**
Straight	471	16	3.40	510	60	11.76
Moderate	400	4	1.00	438	35	7.99
Curly	82	0	0.00	87	2	2.30
Total	**953**	**20**	**2.10**	**1035**	**97**	**9.37**

Table 4. Prevalence of infestation with head lice according to hair length.

	Males			Females		
Hair density	**Number of examined cases**	**Number of infected cases**	**Prevalence of infestation (%)**	**Number of examined cases**	**Number of infected cases**	**Prevalence of infestation (%)**
Low dense	304	2	0.66	121	2	1.65
Moderate	266	6	2.25	360	25	6.94
High dense	383	12	3.13	554	70	12.63
Total	**953**	**20**	**2.10**	**1035**	**97**	**9.37**

Table 5. Prevalence of infestation with head lice according to hair density.

	Males			Females		
Hair length	**Number of examined cases**	**Number of infected cases**	**Prevalence of infestation (%)**	**Number of examined cases**	**Number of infected cases**	**Prevalence of infestation (%)**
Short	790	5	0.63	193	7	3.63
Long	139	15	10.79	559	68	12.16
Very long	24	0	0.00	283	22	7.77
Total	**953**	**20**	**2.10**	**1035**	**97**	**9.37**

Discussion

The total prevalence of head lice infestation in the current study was lower than that recorded by many studies conducted in Kirkuk city, which targeted specific age groups and included primary school students and high school students, and for specific areas [18, 21, 22, 30]. Also, the infestation rate obtained in the current study was higher than other studies in Iraq [10, 11, 12, 13, 14].

The reason for the discrepancy in the incidence of infestation with head lice in different studies is due to the difference in the general health level, in addition to the limitation of some studies (which recorded high infestation rates) to areas with poor health and economics and with a high population density (overcrowding) and with decrease of methods of hygiene [15].

The current study represents the first research in Iraq in that it covers all age groups of the community of Kirkuk city, as well as being the first study completed in conjunction with the period of closure due to the Coronavirus pandemic (COVID 19).

In the results of the current study, the highest rate of head lice infestation is within the age group of 6-12 years. These results are consistent with the other studies [16, 17, 18]; whereas, it is differ than results of others [14, 19].

The emergence of prevalence of infestation according to age groups in the current study is due to close contact between children aged 6-12 years with the group of older children, as some studies [20, 21], which showed the relationship of higher head lice infestation with increased close contact among children in the 5-7 age group. Also, it has been

confirmed that the younger ages are more susceptible to head lice infestation [21].

The results of the current study showed a variation in the head lice infestation by gender, as the infestation rate was higher in female compared to male. This current result is consistent with the findings of many studies, whether within Iraq [15, 17, 18, 19, 23, 24, 25, 26] or in the world [1, 4, 6, 20, 21], in that the rate of infestation of female is higher than that of male.

The low infestation rate in males may be due to the dependence of male on shaving their heads to the point of full shaving [27] and the lack of the contact between male and female while playing in the streets and schools. Therefore, the difference in the infestation rate has no physiological basis, but rather depends on the length of the hair, on the difference in the hairstyle and on the number of its washing [22].

Several factors explain this difference in infestation by gender, as it has been found that female hair length is associated with a head lice infestation. Other factors have been attributed to behavioral differences related to gender, including that male prefer to play outside only in short contacts during sports or rough sporting activities, while female tend to play in small groups with close contact and direct contact with each other [28]. As well as the role of passive transmission of infestation through the sharing of hair extensions, brushes, hats, or combs. However, direct contact is an important way to transmit infestation with head lice. Head lice prefer dark areas in the hair away from the light, head lice are most active in the dark [29], therefore the long hair in females represents a haven for head lice.

The results of the nature of hair tissue and its relationship with the incidence of head lice were consistent with many studies [13, 17, 23, 24, 25, 30]. The present study differed according to hair tissue, with results from other studies [16, 31]. The increase in the prevalence of infestation in the current study in straight hair is attributed to the speed and ease of attachment and movement of head lice, due to the lice can use its legs and the claw to attach with the hair shaft. While it is difficult for head lice to move along curly hair with curly coils.

The highest rate of infestation was recorded in present study for people with long hair. These results are agreed with the findings of a other studies [24, 25, 32]. While the current results differed from the findings of the others [16, 23, 26].

The reason for the increase the infestation rate for people with long hair is that long hair provides a suitable environment for adult lice and a safe location for a longer period of time to lay eggs, providing a greater opportunity for them to hatch [33]. Also, lice eggs remain in the hair of the head when not exposed to shearing for a long period. Also, in the current study, an increase in the density of nits was observed in the examined individuals with long hair, and this leads to difficulty in removing it and thus, gradually hatch, which leads to an increase in the length of the infestation duration in individuals.

The current study indicated that no case of infestation of very long hair appeared in males, and this may be because the attention of male with hair and lengthening it is often accompanied by special care in terms of hygiene to obtain a decent appearance, which in turn contributed to reducing the percentage of infestation.

In the current study (according to hair density) was consistent with what was shown by the some studies [12, 15, 17, 25]. The reason for the increase the infestation rate for individuals with thick hair may be because it is a haven for head lice to hide. As well as it provides an optimum temperature suitable for hatching eggs. Also, increasing the number of hairs (that head lice use to stick eggs to them) leads to an increase in the places of laying eggs and an increase the number of adult insects, which are hide between the locks of hair, unlike thin hair, which does not provide such conditions.

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التحري عن نسب الاصابة بقمل الرأس وبعض العوامل المؤثرة عليه لدى الأشخاص المصابين في مدينة كركوك / العراق

فاضل مهدي رشيد ، فاطمة شهاب الناصري

قسم علوم الحياة ، كلية العلوم ، جامعة تكريت ، تكريت ، العراق

الملخص

تم اجراء الدراسة الحالية خلال المدة الممتدة من شهر تموز الى شهر تشرين الثاني 2020. تم البحث عن الاصابات الخارجية بقمل الرأس لدى سكان مدينة كركوك. حيث تم اخذ 1998 عينة عشوائية من سكان المدينة، وتم فحص فروة رؤوسهم لأجل الكشف عن وجود الاصابة بقمل الرأس. هدفت الدراسة الحالية إلى تحديد مدى انتشار الإصابة بقمل الرأس في مناطق مختلفة من مدينة كركوك، وبيان دور بعض العوامل الوبائية (العمر، الجنس، طبيعة نسجة الشعر، طول الشعر، كثافة الشعر) على الإصابة. أظهرت الدراسة الحالية أن عدد الإصابات بقمل الرأس قد بلغت 117 حالة اصابة مع نسبة انتشار إجمالية مقدارها 5.88٪ بعد اجراء دراسة سريرية على 1988 شخصا من مختلف الفئات العمرية للمجتمع باختلاف طبقاته الاجتماعية والاقتصادية والثقافية. سجلت أعلى نسبة إصابة (15.11%) للفئة العمرية 6-12 سنة، في حين كانت اقل نسبة إصابة من نصيب الفئة العمرية 46–80 سنة. لوحظ من الدراسة الحالية أن نسبة الإصابة كانت أعلى في الإناث مقارنة مع الذكور (9.35، 2.10% على التوالي). وكانت اعلى نسبة إصابة للشعر المسربل (3.40 و11.76%) لكل من الذكور والاناث (على التوالي)، وكانت اقل نسبة إصابة للشعر المجعد (2.30%) في الاناث بينما لم تسجل اية اصابة لدى الذكور من ذوي الشعر المجعد . كما أظهرت النتائج ان اعلى نسبة إصابة كانت في الشعر الطويل (10.79 و12.16%) مقارنة بالشعر القصير (0.63 و 3.63%) لكل من الذكور والاناث (على التوالي). كما سجلت اعلى نسبة إصابة للشعر الكثيف (3.13% و12.63%) مقارنة بالشعر الخفيف (0.66 و 1.65%) لكل من الذكور والاناث (على التوالي).