HEAD PEDICULOSIS AMONG IN BAGHDAD AREA ELEMENTARY SCHOOLCHILDREN

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Abstract

Head louse is an integumentary disease infesting human hair and caused by the ectoparasite *Pediculus humanus capitis*. The endimicity of the disease among Iraqi elementary schoolchildren was investigated during the period from January to May 2009 in the city of Baghdad. From eight elementary schools, 540 boys and girls were included in the study. The total rate of infestation was 13.5%, however this rate was significantly higher among girls (17.33%) comparing to boys (8.75%). The prevalence rate was found to be highly influenced by certain factors. These were including the age (the rate was significantly higher (18.7%) among the age group of >8-10 years compared to other age groups), the hair characters (the rate was significantly higher (14.35-22.2%) among the black, straight long hairs compared to other hair characters groups), the crowdness of the classrooms (the highest rate was noticed among children in highly crowded (15.7%) compared to non-crowded classrooms) and the socioeconomic standards of the children's families (the highest rates (22-26.7%) were reported among children with different degrees of low economical, social and educational levels).

قمل الرأس(*Pediculus humanus capitis*) بين أطفال المدارس الابتدائية في بغداد

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الخلاصة

يعد الابتلاء بقمل الرأس من الأمراض التي تصيب اللواحق الجسمية ويسببها الطفيلي بيدكيولوس كابيتس (*Pediculus humanus capitis*) تم التقصي عن وبائية المرض بين أطفال المدارس الابتدائية العراقيين في مدينة بغداد للفترة ما بين كانون الثاني ومايس ٢٠٠٩. من ثمانية مدارس ابتدائية، ٥٤٠ ولدا وبنتا تم شمولهم بهذه الدراسة. كانت النسبة العامة للابتلاء بالمرض ١٣.٥% مع وجود فارق معنوي في نسبة الابتلاء مابين البنات (١٧.٣٣%) مقارنة بالأولاد (٨.٧٥%). وجد أن عددا من العوامل كان لها تأثير مباشر على نسب انتشار الطفيلي وشمل ذلك: العمر حيث كانت أعلى نسبة ابتلاء ما بين المجموعة العمرية أكثر من ٨ – ١٠ سنوات (١٨.٧%) مقارنة بالمجاميع العمرية الأخرى، صفات الشعر حيث وجد ان أعلى نسبة ابتلاء كانت بين الأطفال من ذوي الشعر الأسود، الطويل غير المجعد (من ١٤.٣٥ إلى ٢٢.٢%) مقارنة ببقية المجاميع من الصفات الشعرية الأخرى، الكثافة التزاحمية في القاعات الدراسية حيث كانت نسبة الابتلاء أعلى في القاعات المزدحمة (١٥.٧%) مقارنة بالقاعات غير المزدحمة، والمستوى الاجتماعي والاقتصادي لعوائل الأطفال المشمولين بهذه الدراسة حيث وجد أن العلاقة التناسبية ما بين المستوى الاجتماعي (أو التعليمي) الاقتصادي ونسبة الابتلاء بالمرض كانت علاقة قوية ولكن بدرجات متفاوتة تراوحت ما بين ٢٢ – ٢٦.٧% للمستويات الاجتماعية الاقتصادية المتدنية.

Introduction

Pediculosis is a disease which is caused by the ectoparasite *Pediculus humanus capitis*. The disease is transmitted usually by direct person-to-person route or indirect by using an infested person's belongings (hats, combs, hairbrushes, clothing… . etc) by another healthy person.

Fortunately, the head louse, unlike the body louse, is not known to be a vector of human disease [1]. The infestation may be completely asymptomatic, or cause intense scalp itchiness, dermatitis, secondary bacterial infection, and an allergic reaction. Bite reactions, pruritus, excoriation, lymphadenopathy, and conjunctivitis have been frequently seen more infested children [1]. Pruritus, which occurs due to sensitization to both louse salivary and fecal antigens, may be so intense that secondary bacterial infection may occur [2].

Since head lice feed on human blood, chronic heavy infestation among schoolchildren may lead to anemia, which is manifested as fatigue, sleepiness in the classroom, and poor learning performance and cognitive function. Infested children may also experience disturbance of sleep at night due to intense scratching. Head lice infestation can be very costly because of repeated treatments, time spent in eradication attempts and days absent from school. It also frequently causes psychological distress for the children and their families due to social stigmatization by the society following detection. Prevalence pediculosis of more than 5% has been considered to be an epidemic [3]. Schoolchildren are the most commonly infested compared to general population. It was believed that at least one-quarter of schoolchildren were infested.

The distribution of head lice was found to be affected by the season, age, sex, socioeconomic status, hair length, family size, crowding in homes and classrooms, degree of infestation of other family members, modes of transport to school, use of headsets, and urban-rural location [1, 3, 4, 5, and 6]. A poor level of hygiene and personal grooming may have an effect on the prevalence, however, most literature has agreed that, conversely, head lice infestation is not an indicator of a lack of personal hygiene, and that it may infest anybody [1]. Other variables found to be significantly related to pediculosis included education level of parents and pet ownership [5] and accessibility to and consumption of water, and better health care systems [6].

The optimal way to diagnose pediculosis is controversial. Most epidemiological studies have used direct visual examination and most examinations in schools are done the same way. In addition, the diagnosis of louse infestation is generally based on the presence of nits. However not everyone who has nits also has living lice [7]. Comb method looks four times more effective than and twice as fast for the diagnosis of louse infestation as direct visual examination [7]. The procedure of cut hair analysis was used in some other studies [4].

This study was investigating pediculosis in primary schoolchildren within the boundaries of Baghdad city and some of the possible risk factors that might have an effect on the rate of infestation of pediculosis were studied including; gender, age, hair characters, crowdness index of classroom and the socioeconomic status of the investigated children

Materials and methods

A total of 540 child of both sexes from 8 public elementary schools of ages ranges from 6-12 years from different districts of the west side of Baghdad city (Al-Karkh) were examined from January to May 2009 for infestation of *Pediculus capitis*. Previous to study initiation, parents or legal guardians of the children signed a consent form. Hair examination, which was supervised by the author and the assistance of six trained volunteers, consisted of visual inspections of children's heads for 3 min, paying special attention to the neck and behind the ears with the help of hair manipulation. Using combs was unfeasible because of social obstacles. Children whose hair had at least one of the developing stages of *P. capitis*, including only nit residues, were considered positive [5]. After each exam, a data form with child's age, sex, and hair characteristics: type, color, length, as well as parents' or legal guardians' socio-economic status was filled in. Hairs were classified as straight, wavy or curly in relation to type. Regarding color, hairs were considered black, brown or fair. For length, hairs were classified as short (0 to 3 cm), medium (> 3 - 10cm) and long (> 10 cm).

The crowdness index of classrooms was calculated as follows:

Normal (not-crowded) = 1 square meter/ child.

Crowded = 0.75 square meter/ child.

Highly crowded = <0.75 square meter/ child The socio-economic level of the children was investigated using either a fill in form or the school's documents. The economic level of children was evaluated according to their parents or guardians monthly income (200 or less US Dollar was considered as low income, more than 200 to 500 US Dollar was considered as middle income, and more than 500 US Dollar is considered as high income). The social level was evaluated according to the parents or guardians education level (illiterates, secondary school education or university (or higher) degrees).

The t test was applied for statistical analysis. For all statistical analyses, a significance level of 0.05% was adopted.

Results

The effect of gender on the rate of prevalence of pediculosis is shown in Table 1. The rate was much higher among girls (17.33%) compared to boys (8.75%) with a significant P value (<0.01). The overall rate of pediculosis AMONG SCHOOLCHILDREN IRRESPECTIVE OF THEIR GENDER WAS 13.5%.

Table 1: Prevalence of pediculosis in schoolchildren according to their genders.

Gender	№ of infested children	% of infestation	P value
Boys (n=240)	21	8.75	-
Girls (n=300)	52	17.33	-
Total (n=540)	73	13.5	< 0.01

Table 2 elucidates the prevalence of pediculosis among schoolchildren according to their ages. The highest rate was with a significant P value (<0.05) was noticed among the age group of >8-10 years (18.7%) compared to other age groups.

Table 2: Prevalence of pediculosis among schoolchildren according to their ages.

Age (years)	№ of infested children	% of infestation	P value
6-8 (n=220, %=40.7)	22	10	<0.05
>8-10 (n=182, %= 33.7)	34	18.7	
>10-13 (n=138, %= 25.6)	17	12.3	
Total= 540	73	13.5	-

Hair characters had exhibited a potential effect on the rate of hair louse frequencies among schoolchildren (Table 3). The black hair color was of a highly significant effect (P <0.005) on this rate (14.35%) compared to other hair colors (9.1% and 5.6% for the brown and fair hair colors respectively) in both genders. Similarly, the type of hair was of a significant effect (P <0.05) on the rate of the disease prevalence rate as the highest rate was noticed among those with a straight hair (17.3%) compared to other types of hair (12.3% for wavy and 7.14% for curly) in both genders. The length of hair (in girls only) was, again, of a very high significant effect (P <0.001) on the rate of prevalence mainly among the long haired girls (22.2%) compared to other hair lengths (10.7% for medium and 0% for short).

Table 3: Prevalence of pediculosis among schoolchildren according to their hair characters.

Hair character		№ of infested children	% of infestation	P value
Color (Boys + Girls)	Black (n=467, %= 86.7)	67	14.35	<0.005
	Brown (n= 55, %= 10.19)	5	9.1	
	Fair (n= 18, %= 3.3)	1	5.6	
Type (Boys + Girls)	Straight (n= 162, %= 30)	28	17.3	<0.05
	Wavy (n= 350, %= 64.8)	43	12.3	
	Curly (n= 28, %= 5.2)	2	7.14	
Length (Girls only)	Short (n= 8, %= 2.7)	0	0	<0.001
	Medium (n= 112, %= 37.3)	12	10.7	
	Long (n= 180, %= 60)	40	22.2	

The crowdness index of the classrooms was proved its self as an effective factor on the prevalence rate of pediculosis with a significant P value (<0.05). As it is shown in Table 4, the highest rate was noticed among children placed in a highly crowded classrooms (15.7%) compared to less crowded (13.8%) or normal non-crowded (7.5%) classrooms.

Table 4: Prevalence of pediculosis among schoolchildren according to the crowdness of classrooms.

Crowdness of Classrooms	№ of infested children	% of infestation	P value
Normal (n=80, %= 14.8)	6	7.5	<0.05
Crowded (n= 282, %= 52.2)	39	13.8	
Highly crowded (n=178, %=33)	28	15.7	
Total= 540	73	13.5	

The prevalence of pediculosis among schoolchildren according to the family socio-economic level is shown in Table 5. Concerning the family monthly income, the highest rate was reported among children whose family income is low (22%) compared to those whose their family income was middle (12%) or high (7.4%). The P value for this factor was highly significant (<0.005). The social/educational level of the children's parents was investigated as a possible risk factor affecting the prevalence of pediculosis. It was noticed that in groups when one of the parents was illiterate the rate was much higher with a high significant P value than other groups when none of the parents was illiterate (Table 5).

Table 5: Prevalence of pediculosis among schoolchildren according to the socio-economic level.

Living standards		№ of infested children	% of infestation	P value
Economical (family income)	Low (n= 132, %= 24.4)	29	22	<0.005
	Middle (n= 300, %= 55.6)	36	12	
	High (n= 108, %= 20)	8	7.4	
Social/ Educational	L/L* (n=52, %= 9.64)	12	23.07	<0.001
	L/S* (n= 15, %= 2.8)	4	26.7	
	L/U* (n= 1, %= 0.19)	0	0	
	S/L* (n= 108, %= 20)	24	22.2	<0.001
	S/S* (n= 78, %= 14.4)	8	10.3	
	S/U* (n= 6, %= 1.1)	0	0	
	U/L* (n= 29, %= 5.37)	7	24.14	<0.05
	U/S* (n= 135, %= 25)	12	8.9	
	U/U* (n= 116, %= 21.5)	6	5.2	

**= Father/Mother education level (L= illiterate, S= Secondary school education, U= University or higher education)*

Discussion

This study was conducted to elucidate the rate of prevalence of pediculosis among schoolchildren in the city of Baghdad and the influence of certain possible risk factors on such rate.

The total rate of prevalence of pediculosis among schoolchildren in this study was 13.5%. Comparing of this rate with other rates in other places in the world reveals that it is within the moderate level of endimicity of the disease among children ageing between 6-13 years. Dissimilarities in the rate of prevalence of pediculosis are evident among different places in the world. In Europe, different studies targeting different population groups were conducted which showed different rates for the prevalence of pediculosis. The following rates were found; 4% in Albania among refugees from Kosovo [8], 8.9% in Belgium among schoolchildren [9], 14.1% in Czech Republic among schoolchildren [10], 3.3% in France among schoolchildren [11], 2.03% in England among schoolchildren [12], and 1.59% in Poland among schoolchildren [6]. In Africa;

54.1% in Egypt among schoolchildren [13], and 8.6% in South Africa among white schoolchildren [14]. In South America: 13.3% in Brazil among children [15], 14.54% in Cuba among different ages [16]. In USA: 1.6% among students [17]. In Asia: 14.2 in China among refugee children [18], 48% in India among children [19], 6.85% in Iran among schoolchildren [20], 56.7% in Israel among children [7], 5.85 in South Korea among children [21], 12.8% in Malaysia among schoolchildren [22], 14.1% in Palestine among schoolchildren [23], 5.2% in Saudi Arabia among female schoolchildren [24], 31.1% and 7.75 in Turkey among low and high socioeconomic schoolchildren respectively [25] and 48.9 to 9.4% in Iraq among different environmental and hygienic status schoolchildren [26]. The total rate of prevalence of pediculosis in this study looks very near to those reported in China, Malaysia, Palestine, Czech Republic, Brazil, and Cuba, but much lower than those reported in Egypt, India, Turkey, and Israel, and higher than those documented in many other countries including Albania, Belgium, France, England, USA, South Africa, Poland, Iran, South Korea, and Saudi Arabia (see the above references).

In this study the frequency of pediculosis infestation was higher among girls (17.33%) compared to boys (8.75%) which was consistent with many other studies [27, 7, 4, 5, 6, 28, and 22]. This was an expected result due to the behavioral variations between the two sexes. Boys have a tendency only in brief contacts during sports or rough activities, while girls have closer, prolonged and more intimate head contacts in small groups, in particular pairs [3].

Concerning the age variation in this study, the highest rate of infestation was noticed among children age group of >8-10 years (18.7%) comparing to other lower or higher age groups (Table 2). In other studies, it was also found some significant variations in the rate of pediculosis infestation between different age groups [4, 29, 30, 28, and 23]. The higher rate of pediculosis among this age group in this study could be explained partially as this particular age is occurring between the younger ages of a complete dependence on parents and guardians for combing and washing or cleaning their hair which helps to early detection of infestation before its establishment, and the older ages of nearly a complete independence on parents which accompanied by increasing knowledge and awareness of the surrounding environmental factors.

The hair characters and their effect on the rate of infestation of pediculosis are highly controversial. In this study, it was found that the highest rate was among those with black and straight hairs (14.35% and 17.3% respectively) in both genders compared to other hair colors and types (Table 3). Nevertheless, the comparison wasn't fair enough regarding that some hair characters are rare among the Iraqi population (as the fair and curly hairs) which creates a non equivalence state among the sample sizes of different groups. [4] found that the rate of infestation of head louse is higher among children with dark and wavy hair, whereas [22] found a higher rate among those with straight hair. Concerning the hair length, this study had investigated such character among girls only as boys in the Iraqi society are mostly with short hair. Long hair girls were much more infested with *Pediculus capitis* (22.2%) than those with medium or short hair (10.7% and 0% respectively). Similar results were found in most other literatures [7, 4, 31, 28 and 22]. This may be due to earlier and easier diagnosis and control of head lice in children with short hairs and/or the more frequent regular washing for hair which is habitual in short hair people. However, some authors see that hair length did not appear to be an independent risk factor [31].

The effect of crowdness index in classrooms on the rate of infestation of pediculosis is shown in Table 4. To the best of our knowledge, it is the first time the effect of such factor on the prevalence of pediculosis is elucidated. Children in crowded or highly crowded classes were significantly (<0.05) more infested (13.8-15.7%) than those in non-crowded (normal) classrooms (7.5%). This result is predictable as the more children crowdness in the classrooms is the more physical contacts between children and subsequently, the higher rate of head louse transmission rate. Most Iraqi primary schools are using sharing classrooms chairs for each 2-3 child which would speculatively, increases the direct physical contact between children. Thus decreasing the crowdness of schools classrooms should include decreasing the number of children per classroom and/or using separated chairs for each individual child.

One study [22] had discussed the family income as a possible risk factor in the prevalence of pediculosis. They found a proportional

relationship of increasing infestation rate of this ectoparasite and the decreasing family income of the children under test. In this study, a similar result was found as the infestation rate was at its highest level (22%) with those children of low family income compared to those children of middle or high family income (Table 5). Extreme poverty due to low family income was closely related to overcrowded dwellings, poor hygiene, poor attitude of less concern about head lice infestation, poor knowledge about transmission and less accessibility to health care [22]. The social/educational level of parents as an influential factor that reflexes on the infestation rate of pediculosis was investigated in the current study. It was noticed that when (at least) one of the parents (especially the mother) was illiterate the rate of infestation was significantly (P <0.05-<0.001) high (22.2-26.7%). These results were in consistency with the results of other studies in other places in the world [22 and 28]. However, it was stated in other reports that pediculosis is widespread throughout the world and does not discriminate on socioeconomic status grounds [32].

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