Factors Affecting *Pediculosis Capitis*transmissionamong primary school children

Abstract

Introduction: Human head lice infest people worldwide and are most prevalent in children. Outbreaks of head lice more commonly affect children 3 to 12 yearsold, with girls being affected more commonly than boys.The aim is to studythe factors affecting transmission of the disease among the school children in villages in Benghazi - Libya

Patients and methods: In a cross-sectional study in western region of Benghazi, 556 students in three schools from Alhlys, Altry and Abofkra regions were enrolled. The ages of children were ranged from 6 to 13 years. Data collected include socio-demographic characteristicsof the students, sex, age, school and hair ~~was~~ wereexamined individually for head lice infestation in a separate room. Descriptive analysis and Chi-square test was used to determine the statistical significance of p-value ≤ 0.05.

Results: The data were collected on 556 students from the 3 villages~~,~~ :39.7% from Al-Helys, 28.8% fromAl-Tarya and 31.5% from Bo-Fakra regions. The age of children ranged from 6 to13 years.Female children were more than 50%. The mean of family size was 7±2 persons, number of bedroom in houses ~~wasranging~~ rangedfrom1-5 rooms. ~~Number of person in each bedroom ranged from one person to eight persons, 34.7% was two person and 33.3% for three persons~~. Sharing of personal equipment as hair comb and linen was reported in 33.5% of families. *Pediculosis capitis* manifestation was reported in 26.3% of the participants. The prevalence of pediculosis capitis was 19.5% in Al-Helys ~~19.5%~~,35.6% in Al-Tarya ~~was 35.6%~~ and26.3% in Bo-Fakra ~~26.3%~~,this difference was statistically significant (p<0.05)~~and Pvalue was .0.05>~~The prevalence of pediculosis capitis in males was10.2%, while in females was 41.8% , this difference was highly statistically significant (p~~P~~ =0.0001) The highest prevalence of pediculosis capitis was in age of 11 years old (42.9%), followed by age of 10 years old (36.6%). There ~~was~~ wereno reported cases at the age of 6 and 13 years.There was no effect of parent occupation or education level on pediculosis infestation transmission.

Conclusion: The present study revealed that, ~~p~~*Pediculosis capitis* was prevalent in school children, more in females. Furthermore~~,~~pediculosis infestation was higher in certain village than others.

Keywords: ~~p~~*Pediculosiscapitis*, school children, prevalence, transmission

Introduction

Pediculosis capitis is an infestation with the human head louse(*Pediculus humanus capitis*). They areectoparasites, in which~~where~~ theirinfestation clinically present with scalp pruritus,excoriations, cervical lymphadenopathy,conjunctivitis and hypersensitivity rash or pediculid that mimic a viral exanthema (1,2,3). Head lice infestation crosses all economic and social boundaries (4,5).Head lice are 1 mm to 3 mm long. The head louse is an obligate parasite

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that spends its entire life on the human host. Head lice feed exclusively on blood, unable to jump or fly, and transmission requires close contact. Transmission of head lice is thought tooccur by head-to-head contact, sharing of headgear, or other direct contact with fomites (6,7).The life cycle of the head louse has three stages: egg, nymph, and adult. Nits are head lice eggs hard to see and often confused for dandruff or hair spray droplets. Nits are laid by the adult female and are cemented at the base of the hair shaft nearest the scalp (1,2,8). They are 0.8 mm by 0.3 mm, oval and usually yellow to white. Nits take about 1 week to hatch (range 6 to 9 days). Viable eggs are usually located within 6 mm of the scalp (2,3).

.The aim of this study wasto assess the prevalence of head pediculosis capitis among school children in the villages in Benghazi – Libya andto study factors affecting transmission of the disease among this age group.

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Materials and Methods

In a cross-sectional study, 556 students in three schools from three villages in west region of Benghazi (Alhlys, Altry and Abofkra) were evaluated. The age of children in this study ~~were~~ was rangedfrom 6 to 13 years.Data collected regarding the selected socio-demographic characteristics of the students, sex,age, school, class, medical history, complaint if any. The hair of each child was examined individually for head lice infestation in a separate room, and *P~~p~~ediculosis capitis*was defined as the finding of living adult, nymph, or egg (nits) for all students.Questionnaire had been sent to parents of the children ~~includes~~ and includeddemographic data for mothers and fathers. The observation of nits and nymphs or adult lice was considered as a positive.

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Data was analyzed using (SPSS) statistical package of social science program version 23.The statistical analysis included: I. Descriptive Statistics: Including (Mean value, Standarddeviation, Number and Percentage). II. Inferential Statistics: was used when needed as t- test and Chi-square, P-value will be considered significant when ≤ 0.05.

Ethical statement: This study was approved~~al~~ by the local Ethics Committee.Informed written consent was obtained through a consent form that was given to the participants along with the questionnaire.

Results

The data collected on 556 children from three schools located in three different region inwestern of Benghazi-Libya(Al-Helys ,Bo-Fakra and Al-Tarya) represented as 39.7%, 31.5% and 28.8% respectively. The percentages of age of participants were high in 10-13 years and 6-9 years groupsand presented as50% each group~~.~~.Females were slightly higher than male (50.7% Vs 49.3%). Pediculosis capitis manifestation was reported in 26.3% of the participants (Fig.1). The diagnosis was depending on demonstration of nits and rarely on live louse (Fig.2,3). Pediculosis capitis was more prevalent in Al-Tarya region (P=0.002) (Table 1). Furthermore, there was significant difference between types of pediculosis infestation and genders (P=0.0001) in which girlshad more pediculosis infestation than boys (Table 2). Pediculosis increased with children ages and reache~~s~~ the peak at age 11 years old (P=0.0001) (Table 3). Parents occupations and education levels have been investigated and showed no statistically significant relation with pediculosis infestations (P0.05 <) (Table 4,5). The other variables such as family sizes, number

of bed rooms, number ofperson in each bed room, charring of personal equipment as hair comb and linen. There was no significant relationship between these variables and pediculosis capitis (Table 6,7).

Discussion

The prevalence of ~~pediculosis~~ *Pediculosis capitis* in this study was 26.3%, which was lower than the study conducted in Sabha city that ~~shown~~ showedthe head lice infestation ~~was~~ of38.6% (9). In literature, there are various studies which have reported prevalence rates of*P~~p~~ediculosis capitis* throughout the world among school children. In the Americas, prevalence varies from 3.6 % to 61.4 % and is higher in females (10). In Europe, prevalence oscillates from 0.48 to 22.4 %. In Asia, prevalence ranges from 0.7 to 59 %, being higher in girls and women. In Africa, the majority of studies were applied in Egypt and prevalence varied from 0 % to 58.9 % and was higher in females as well (11). ~~In the present study, the in our country, like a~~A study applied by the same authors in 2015 in our country ~~that~~ determined a prevalence of 11.5 % in a similar institution (12). In Yemen, the overall prevalence of head lice infestation was 13.3%, being that ~~;~~ 18.9% in girls and 8.6% in boys ~~)~~(13). In Argentina, the overall prevalence of head lice infestation in primary school students was 27.9%, which was significantly higher in girls than in boys (14).Despite the progress in medical science and development of the civilization, *P~~p~~ediculosiscapitis* is still an important health issue worldwide (15). A large variation in the global spread of head lice is observed. As demonstrated by the available data, its prevalence reaches even 64.1% depending on the examined population (16,17).The symptoms in the current research ~~*p*~~*P~~p~~ediculosis capitis*~~was~~ weremore common in girls than boys and long hairseems to be an important risk factor. Although long hair has been widely referred in the literature (18,19)~~even though,~~ there are some authors who disagree (20)~~.~~.While in other study in Houn city, ~~(~~21.9%~~)~~of individuals were found infested with nits, immature or adultof *P~~p~~ediculus humanus capitis* (21). In Jordan, the prevalence of *P~~p~~ediculosis capitis* was 26.6%(22).The prevalence of pediculosis capitis was 19.5% in Al-Helys,35.6% in Al-Tarya and26.3% in Bo-Fakra. ~~Al-Helys area19.5%, in Al-Tarya 35.6% and in Bo-Fakra 26.3%and~~ T~~t~~his difference was statistically significant (p<0.05).~~(p.(0.05>~~Nits ~~was~~ werepresent in all male students and in 87.2% of females at Al-Helys school, mixed was recorded in 12.8% of female students in the same school, these differences were not statistically significant (p~~.~~= 0.0919)~~.~~.Nits ~~was~~ werepresent among 88.9% of male students and 68.8% of females at Al-Tarya school, Mixed was recorded in 11.1% of male students and 31.3% of females in same school, thesedifferences were not statistically significant (p~~.~~ = ~~0.~~ 0.407)~~.~~.In a similar study,~~recorded that~~ the infestation rate among girls varied from 26.07% (12 year~~s~~ group) to 55.89% (8 years-group)(15).Nits ~~was~~ werepresent in all the~~100% of~~ male students and in 76.2% of females in Bo -Fakra school.~~,~~ Mixedwas recorded in 23.8% of females in the same school.~~,these~~ This difference was not statisticallysignificant ~~p value was (p=0.~~ 0.639). Prevalence of *P~~p~~eldiculosis capitis* in males was10.2% while in females was 41.8% , this difference was highly statistically significant (p =0.0001) the result was with agreement of other study the prevalence was significantly lower in boys (27.1%) than in girls (55.0%); (p< 0.0001).(9) Also there was agreement with other study in Houn city, male children had a lower rate of infestation (6.27%) than females (38.66%) (6)~~.~~.In the study in Jordan, there were significant differences in the prevalence between girls [34.7%] and boys [19.6%] (22). The highest prevalence of *P~~p~~ediculosis capitis* was in age 11 years(42.9%) followed by age 10 year (36.6%), this difference was statistically significant (p. 0.0001).In other study, the infestation rate among school children ~~was~~ significantly varied from

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51.8% in childrenaged 7 years old to 27.5% in children aged 10 years old(p .(9) (0.0001> p)>In the Houn study, it was found thatschool children exhibited decreased in infestation rate with age groups, the children aged 7-8 years were the most frequently affected (6).A study in Iran recorded that the children aged 10-11 years were the most frequently affected (23). In another study, there was significant difference between age (p<0.001)(22)..Evidence by cases of transmission between siblings recorded in 68.5% of the surveyedschools. Having siblings as one of the factors increasing the probability of *P. humanus capitis*infestation has been indicated by other authors as well (24-26). Dissemination of head louse is facilitated by staying in large groups of people. Our analysis has shown that*Ppediculosiscapitis* is more frequent in schools with greater numbers of children. This was similar to study conducted in Poland (27)..There were wasno effect of fathers' occupation in having *Ppediculosis capitis* (p=0.419).Also there was no effect of fathers level of education (p=0.697).Also, pediculosis was not effectedaffected with mothers' occupation or education level (p=0.320 and 0.740),respectively).In other study, there was a significant relationshipbetween head louse infestation, family income and parents' education level (24).-Prevalence of *Pediculosis capitis* was seen in 17.4% in family size ≤ 5 persons and 23.9% in family size 5<person, although there was no significant difference (p=0.255). In study in Jordan found that there was significant difference for family size and income (p<0.001) (22).

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Conclusion

Pediculosis capitis constitute a major health problem in school children in the threestudy villages (Alhlys, Altrya and Abofkra).The present study revealed that, the prevalence of pediclusois was lower than the otherstudies, particularly those done in Libya.Girls have significantly higher rate of *pPediculosis capitis*infestation than boys and socio-demographic factors including parents' education, jobs, family size, number of rooms have not been shown to play asignificant role in overspread or increased the infestation.

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CONSENT

Informed consent form was distributed to all participant parents were taken through the three school administrationsbefore starting the study.

ETHICAL APPROVAL

As per international standard or universitystandard written ethical approval has beencollected and preserved by the author(s).

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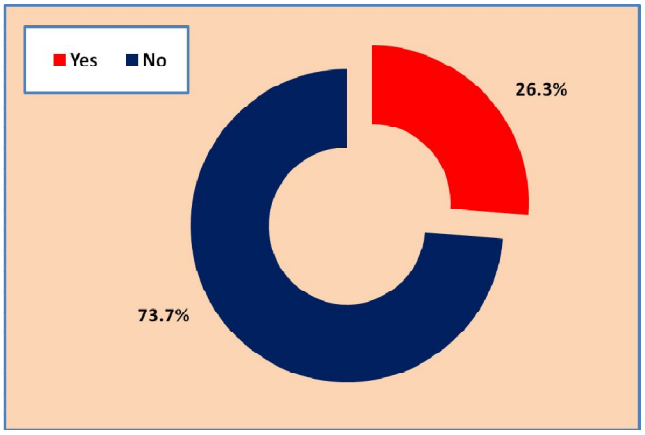

Fig. 1: Percentage of infested students with *Ppediculosis capitis.*

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Figure.2: Diagnosis of *Pediculosis capitis*~~pediculosis capitis~~: Nits attached to hair shaft

Figure.3: Diagnosis of *Pediculosis capitis*~~pediculosis capitis~~: Live lice

Table 1: Distribution of students*Pediculosis capitis*~~pediculosis capitis~~ by each school ~~In relation to school names~~

Name of school	*Pediculosis capitis*			
	Yes		No	
	No	%	No	%
Al-Helys	43	19.5	178	80.5
Al-Tarya	57	35.6	103	64.4\
Bo-Fakra	46	26.3	129	73.7
Total	146	26.3	410	73.7

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$X^2 = 12.529=2$, *p*~~P~~= 0.002

Table.2: Distribution of students *Pediculosis capitis*~~pediculosis capitis~~ in relation tosex

Sex	*Pediculosis capitis*			
	Yes		No	
	No	%	No	%
Male	28	10.2	246	89.8
Female	118	41.8	164	58.2
Total	146	26.3	410	73.7

X^2 = 71.779 df=1, p= 0.0001

Table 3 : Distribution of students *Pediculosis capitis*~~pediculosis capitis~~, according ~~in relation~~ to age

Age /year		*Pediculosis capitis*		
		Yes	No	
	No	%	No	%
6	0	0	2	100
7	18	22.8	61	77.2
8	14	13.7	88	86.3
9	23	24.7	70	75.3
10	34	36.6	59	63.4
11	36	42.9	48	57.1
12	21	20.8	80	79.2
13	0	0	2	100
Total	146	26.3	410	73.7

X^2 =28.909 df=7, p= 0.0001

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Table 4: Distribution of students *Pediculosis capitis*~~pediculosis capitis~~ in relation to Fathers'education

Fathers level of education		*Pediculosis capitis*		
		Yes	No	
	No	%	No	%
Illiterate	0	0	3	100
Primary	10	29.4	24	70.6
Preparatory	20	20.2	79	79.8
Secondary	21	23.6	68	76.4
University and above	17	21.5	62	78.5
Total	68	22.4	236	77.6

X^2 = 2.213 df=4, p= 0.697

Table 5: Distribution of students *Pediculosis capitis*~~pediculosis capitis~~ in relation to Mothers' occupation

Mothers' occupation		*Pediculosis capitis*		
		Yes	No	
	No	%	No	%
House wife	44	23.8	141	76.2
Teacher	18	28.1	46	71.9
Employee	1	5.9	16	94.1
Doctor	0	0	5	100
Nurse	2	16.7	10	83.3
Student	1	50	1	50
Lab. technician	0	0	2	100
Total	66	23	221	77

X^2 = 7.013 df=6, p= 0. 320

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Table 6: Distribution of students *Pediculosis capitis*~~pediculosis capitis~~ in relation to family size

Family size		*Pediculosis capitis*		
		Yes	No	
	No	%	No	%
≤ 5	12	17.4	57	82.6
>5	58	23.9	185	76.1
Total	70	100	242	100

X^2 =1.296 df=1, p= 0.255

Table 7: Distribution of students *Pediculosis capitis*~~pediculosis capitis in relation~~, according to the number of personsliving in each bedroom

Number of person in each bedroom	*Pediculosis capitis*			
	Yes		No	
	No	%	No	%
One	2	16.7	10	83.3
Two	19	19	81	81
Three	21	21.9	75	78.1
Four	15	27.8	39	72.2
Five	8	34.8	15	65.2
Seven	0	0	1	100
Eight	1	50	1	50
Total	66	22.9	222	77.1

X^2 =4.876 df=6, p= 0. 560

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