



Iranian J Parasitol

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Original Article

The prevalence of *Pediculus capitis* among School Children in Fars Province, Southern Iran

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(Received 19 July 2008; accepted 20 Jan 2009)

Abstract

Background: *Pediculus capitis* or head louse infestation affects millions of children worldwide, especially those in the 5–11 years age group. This study aimed to determine the prevalence of head pediculosis among school children in urban and rural areas of Fars Province, southern Iran.

Methods: All school children of age 6–11 yr from both genders in all urban and rural areas of the province were screened for head louse infestation by examination of their hair and scalps. Parents of all infested children were also examined. The study was repeated in different seasons in the same areas. Moreover, infested children were treated with 5% permethrin shampoo and re-examined one week later for any relapse.

Results: The general prevalence of head louse infestation in primary school students was 0.49% in autumn, 0.37% in winter and 0.20% in spring. In the mentioned seasons, the prevalence of *P. capitis* was higher among females and in rural areas ($P=0.001$). Although treatment with permethrin shampoo failed in females, it was successful in all infected males from both regions in autumn and spring and in males from urban areas in winter.

Conclusion: Head louse infestation is uncommon among Fars Province school children in rural and urban areas and should not be considered a public health priority. However, due to the higher prevalence of pediculosis in low socioeconomic group and rural area in our region, it seems that health promotion, particularly early detection and effective management strategies should target this group in the province.

Keywords: *Pediculus capitis*, Head louse infestation, School children, Iran

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Introduction

Lice are blood-sucking insects which are specific parasites of human being. *Pediculus capitis* lives on the head (head lice); *P. corporis* lives in clothing, benefiting from the warmth and feeding on the body (body lice); and *Phthirus pubis* lives on the pubic area. Infestations with parasites that live on or in the skin, namely ectoparasitoses, are usually considered vexing disorders; these disorders do not attract much clinical attention, but can cause significant morbidity. Depending on the socioeconomic setting, these infections may affect a large proportion of a population (1).

Head lice (*P. humanus* var. *capitis*) are wingless, obligate ectoparasites of humans, which affect millions of children worldwide, especially those in the 5–11 years age group. The presence of head lice usually raises concern amongst school health workers, teachers, children and parents, but it is believed that in areas where there are other serious health priorities, head louse infection is ignored and thus remains undetected (2, 3). Although head lice are not known to be vectors of human disease, pediculosis causes scalp pruritus that may lead to secondary bacterial infections, which may be severe (4). Pediculosis may also detrimentally influence schoolchildren's learning performance by negatively affecting concentration, or through stigmatization by peers following detection. Pediculosis is contagious with transmission occurring mainly by scalp-to-scalp contact, affecting school children of all socio-economic strata and not just the poor, uneducated or those living in unhygienic conditions (5-7).

The increasing prevalence of active pediculosis among school and preschool age children prompted us to conduct a head louse prevalence survey among school children in urban and rural areas of Shiraz, southern Iran. This is the first study in Fars

Province, southern Iran reporting pediculosis prevalence in schoolchildren.

Material and Methods

This school-based, cross-sectional study was conducted at all cities of Fars Province, southern Iran during 2005 and 2006. All grade 1–5 primary school children in all urban and rural areas of the province were screened for head louse infestation. In autumn, 113,828 primary schools students (59,778 females and 54,050 males), in winter, 136,018 primary school students (70,682 females and 65,336 males) and in spring, 98,364 primary school students (50,637 females and 47,727 males) were inspected. Specially trained school health nurses from the study areas examined the children's hair and scalps for lice. The hair and scalp were examined twice weekly for *P. capitis* by hand separation of the hair every 1-2 cm. The presence of either live or dead eggs, or nits, regardless of morphologic features or localization, was considered infestation with *P. capitis*. The average visual inspection time for each subject was five minutes. Where there was any suspicion of head lice, the child's hair was examined by an expert physician and any symptom of pruritus were recorded. In addition, parents of all infested children were examined for head lice infestation. This study was repeated in different seasons (autumn, winter, spring) at the same areas. Moreover, infested children were treated with 5% permethrin-shampoo for five minutes, then rinsed and re-examined one week later for relapse of any evidence of head lice infestation. Chi Square test (SPSS software, version 11.5, Chicago, IL, USA) was used to compare infestation rates of boys and girls, and pediculosis prevalence rates among rural and urban areas and between different seasons.

Results

In fall, among participants, 46,609 were from urban schools (25,185 females, 21,424 males) and 67,219 were from rural schools (34,593 females and 32,626 males). Among female students from urban and rural regions, 73 out of 25,185 (0.29%) and 482 out of 34,593 (1.39%) had head pediculosis, respectively. Infestation rate among male students from urban and rural regions were 1 out of 21,424 (0.004%) and 5 out of 32,626 (0.015%), respectively. Infestation rate between both genders in rural and urban areas in different seasons is demonstrated in Table 1.

In winter, of participants, 50,657 were from urban schools (26,435 females and 24,222 males) and 85,361 were from rural schools (44,247 females and 41,114 males). The prevalence of head pediculosis among female students from urban and rural regions was 0.35% (92 out of 26,435) and 0.84% (373 out of 44,247), respectively, while this was 0.06% (15 out of 24,222) and 0.05% (22 out of 41,114) among male students from urban and rural regions, respectively.

In spring, among participants, 39,636 were from urban regions (20,371 females and 19,265 males) and 58,728 were from rural regions (30,266 females and 28,462 males). The prevalence of head pediculosis among female students from urban and rural regions were 53 out of 20,371 (0.26%) and 139 out of 30,266 (0.46%), respectively, while it was 0 out of 19,265 and 3 out of 28,462 (0.011%) among male students from urban and rural regions, respectively.

The general prevalence of head louse infestation in primary school students was 0.49% in autumn, 0.37% in winter and 0.20% in spring. As demon-

strated in Table 1, in all three seasons, the prevalence was higher among females compared to males and the difference was statistically significant. Head pediculosis was also significantly ($P=0.001$) more prevalent among students in rural areas compared to urban regions.

In this study, the family members of students with head pediculosis were also investigated. In autumn, 35 and 123 family members of infected females from urban and rural regions were infected, respectively. While there were 2 and 7 infected individuals in family members of male students with head pediculosis from urban and rural regions, respectively. In winter, head pediculosis was detected in 31 and 111 family members of infected females from urban and rural regions, respectively, while these were 2 and 3 for the males. In spring, the numbers of infected family members of urban and rural female students with head pediculosis were 7 and 21, respectively. No family members of infected male students of either urban or rural region had head pediculosis.

Students with head pediculosis were treated with permethrin shampoo. In autumn, treatment failed in 16.4% (12 out of 73) and 12.25% (59 out of 482) of infected females from urban and rural regions, respectively, but it was successful in all infected males from both regions. In winter, treatment failure was observed in 4.3% (4 of the 92) and 4.5% (17 of the 373) of females from urban and rural regions, respectively and in 4.5% (1 of the 22) of rural male students. In spring, treatment with permethrin shampoo was failed in 11.3% (6 of the 53) and 13.0% (18 of the 139) of infected females from urban and rural regions, respectively, but it was successful in all infected males from both regions.

Table 1: Head lice among primary school students in Fars Province - Iran

Season	Region	Examined student	Infested students No. (%)	Treatment Failure No. (%)	Infested family members No.	<i>P</i> value (Sex)	<i>P</i> value (region)
Autumn	Urban area	F=25185 M=21424	73 (0.29) 1 (0.004)	12 (16.4) 0 (0)	35 2	0.001	0.001
	Rural area	F=34593 M=32626	482 (1.39) 5 (0.015)	59 (12.2) 0 (0)	123 7	0.001	
Winter	Urban area	F=26435 M=24222	92 (0.35) 15 (0.06)	4 (4.3) 0 (0)	31 2	0.001	0.001
	Rural area	F=44247 M=41114	373 (0.84) 22 (0.05)	17 (4.5) 1 (4.5)	111 3	0.001	
Spring	Urban area	F=20371 M=19265	53 (0.26) 0 (0)	6 (11.3) 0 (0)	7 0	0.001	0.001
	Rural area	F=30266 M=28462	139 (0.46) 3 (0.011)	18 (13.0) 0 (0)	21 0	0.001	

Discussion

The total prevalence of head pediculosis among primary schoolchildren in Fars Province, southern Iran was 0.49%, 0.37% and 0.20% in autumn, winter and spring, respectively. The above-mentioned figures are lower than in Hamadan, western Iran, where 847 schoolchildren aged 6-12 yr showed a prevalence of 6.85% (8). In another study in Kerman, central Iran, 3.8% of 1200 primary school pupils were infected with *P. capitis* (9). The difference between our findings with other studies might be due to the differences in climate and also in the sample size. The cold weather in Hamadan, for example, necessitates warmer clothing that might increase the risk of pediculosis.

The best treatment of choice for head lice depends on the patterns of regional resistance (10). One percent permethrin and 0.33% pyrethrins synergized with 4% piperonyl butoxide are FDA approved pediculocides. Pyrethroid pediculicides including permethrin and synergized pyrethrin were reported to kill the non-resistant lice, but synergized pyrethrin was shown to be significantly more ovicidal than permethrin (10). Treatment failures are common with the pyrethroids due to emergence of resistant strains (11). Resistant infestations were

treated with rescription-strength permethrins (5% Elimite) which were commonly used for treatment of infestations in scabies (12). The administration of 5% permethrin is based on the rules reported by the Ministry of Health in Iran.

The prevalence of *P. capitis* also varies in other parts of the world. In one study from Barberton, South Africa at a multiracial primary school, serving a relatively affluent community, 175 pupils in Grades 1 to 7 comprising 101 (57.7%) girls and 74 (42.3%) boys (mean age 9.6 years) were examined. Only 15 (8.6%) children showed evidence of active pediculosis and all were from the white ethnic group (13). Studies from different countries in Africa showed relatively high prevalence of *P. capitis* among schoolchildren: 17.1% in Kenya (14), 5.3% in Tanzania (15), 64% among children in an orphanage in Egypt (16), 16.4% among schoolchildren in Egypt (17), 32% in Cameroon (18), 48-66.5% in Ethiopia (19, 20), 49% in Ghana (21). In another study in Victoria, Australia, 13% of children (239 among 1838) had an active infection (95% CI, 10.9–15.1) while 3.3% (61 among 1838) had an inactive infection (95% CI, 2.0–4.6). Females were 2.2 times more likely to have active in-

fection than males (95% CI 1.7-2.9) and there was no significant difference for the other risk factors investigated (including metropolitan or rural residence, school grade, gender and hair length) (22).

Our results are similar ($P=0.001$) to some studies showing the preponderance of *P. capitis* among females (23-25). Gender-related behavioral differences such as close contact in small groups, in particular pairs among girls and the tendency of girls to wear their hair long are reasons cited for gender differences in head louse infestation (5, 26).

We found that *P. capitis* was more common in rural regions ($P=0.001$). This was to be expected, since factors such as crowded families, living in a shanty house, lack of in-house bathroom and lower levels of income and socioeconomic status which are all associated with pediculosis (23, 27), are more frequent in rural regions.

In conclusion, head louse infestation is uncommon among Fars Province schoolchildren and although it is not possible to generalize these findings to the other parts of Iran, survey results suggest that in rural and urban areas of Fars, pediculosis should not be considered a public health priority. However, since pediculosis is largely related to the low socioeconomic status and as observed in our study, to rural habitat, health promotion, particularly early detection and effective management strategies, should target this group.

Acknowledgements

The authors would like to thank the Office of Vice Chancellor of Health Affairs for their cooperation to perform this study. The authors declare that there is no conflict of interests.

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