

Prevalence and risk factors of *Pediculus (humanus) capitis* (Anoplura: Pediculidae), in primary schools in Sanandaj City, Kurdistan Province, Iran

Vahabi, A.¹, Shemshad, K.², Sayyadi, M.³, Biglarian, A.⁴, Vahabi, B.⁵, Sayyad, S.⁶, Shemshad, M.⁷ and Rafinejad, J.^{8*}

¹Environmental Health Research Centre and Department of Public Health, School of Health, Kurdistan University of Medical Sciences, Sanandaj, Iran

¹Department of Nursing and Midwifery, Islamic Azad University, Sanandaj Branch, Sanandaj, Iran

²Department of Entomology, Science and Research Branch, Islamic Azad University, Tehran, Iran

³Kermanshah University of Medical Sciences, Ghods Hospital, Paveh, Iran

⁴Department of Biostatistics, University of Social Welfare and Rehabilitation (USWR), Tehran, Iran

⁵Islamic Azad University, Sanandaj Branch, Sanandaj, Iran

⁶Kermanshah University of Medical Sciences, School of Medicine, Kermanshah, Iran

⁷Department of Agricultural Extension and Education, Science and Research Branch, Islamic Azad University, Tehran, Iran

^{8*}Evaluation Management and Development Center, Deputy of Research Ministry of Health and Medical Education, Tehran, Iran

^{8*}Department of Medical Entomology, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

*Correspondence author email: jrafinejad@tums.ac.ir

Received 21 November 2011; received in revised form 10 January 2012; accepted 14 January 2012

Abstract. Human head lice, *Pediculus (humanus) capitis*, infest people worldwide and are most prevalent in children. The aim of this study was to determine the prevalence of head lice, in relation to socioeconomic status of the family and hygienic practices in the home. The prevalence rate was determined in 27 primary schools that had 810 students in Sanandaj city who were selected by multistage, systematic random sampling. A total of 38 students from all grades were infested with different rates of infestations. In addition, standard questionnaire recorded information about demographic features of each student were fulfilled. Children aged 10–11 years were the most frequently affected, there was a significant relationship between head louse infestation, family income and parents education level ($\alpha=5\%$). Pediculosis is a public health problem in many parts of the world. Pediculosis was found to be more prevalent among children of fathers with lower level of education and socioeconomic status, it is necessary to give health education to families in order to prevent pediculosis in this area.

INTRODUCTION

The human head louse, *Pediculus humanus* var. *capitis* De Geer, 1778, are wingless, obligate ectoparasites of humans, which affect millions of children worldwide, especially teenagers in both developed and developing countries generally, rates are heavier among girls (Burgess, 2004). Although head lice are not known to be vectors of human disease, pediculosis causes scalp pruritis which occurs due to

sensitization to both louse saliva and fecal antigens and may be so intense that lead to excoriations, secondary bacterial infection (Malcolm & Bergman, 2007), sleep loss, disturbances and scratching (Suleman & Jabeen, 1989; Downs *et al.*, 1999; Burgess, 2004). Acute glomerulonephritis caused by nephritogenic strains of streptococci is a famous complication, especially in the tropical countries (Svartman *et al.*, 1973). Severely affected patients may even develop anaemia (Linardi, 2002). Pediculosis may

detrimentally influence schoolchildren's learning performance by negatively affecting concentration, or through stigmatization by peers following detection. Pediculosis is contagious and transmission occurs mainly by head to head contact. It affects schoolchildren of all socio-economic status and not just the poor, uneducated or those living in unhygienic conditions (Speare & Buettner, 1999). The role of head lice in transmitting human disease is not well understood but it has received increased concern due to bioterrorism threats (Robinson *et al.*, 2003). There are many factors related to the host that can be associated to head lice prevalence: race, age group, sex, social-economical conditions and hair characteristics (Sinniah *et al.*, 1981; Arene & Ukaulor, 1985; Chungue, 1986). Overcrowded living conditions and development of resistance to insecticides have contributed to the increase of head lice in the last few years (Linardi *et al.*, 1988; Pollack *et al.*, 1999; Lee *et al.*, 2000). Head louse infestations are common in different parts of Iran but its epidemiology in Sanandaj is unknown. The main objective of this study was to determine whether factors such as age group, socioeconomic condition, hair characteristics as well as children's health facility including using private comb and frequency of hair washing in a week influence the distribution of head lice in the children.

MATERIALS AND METHODS

The survey was conducted in Sanandaj City, Kurdistan province, Iran. The study was carried out in 27 schools with 810 primary girls students. In each school 2 classes with the sample size of 15 students were investigated for head lice using cluster random selection. For the diagnosis of head lice, the entire head was examined carefully after parting the hair; special attention was paid to the nape of the neck and behind the ears. A child was considered infested if living lice, eggs either live or dead or nits were detected. After carefully examining, these lice were collected by hand and if necessary, with a small hair brush dipped in 70% alcohol.

A questionnaire was given that included questions relating to the following: school grade, socio-economic status, age, parent's job, level of parents' education and family income. Public health questionnaire focusing on demographic information and head lice manifestation were completed during the interview. Data were analyzed by computer using Statistical Package for Social Science (SPSS).

RESULTS

During this study, a total of 810 students were examined and 38 (4.7%) were found to be infested with a single species of louse (Tables 1-3). In the study, the social status and living standard of human being significantly ($\alpha=5\%$) affected the prevalence of pediculosis. Analysis of social-economical profile indicated that children with lower socioeconomic status had the most infestation rate (89.4%). Parents' professions of the students were diverse including working for government, small business owners and hard labour workers (Table 2). Age of the individuals had an effect on the prevalence of pediculosis. The prevalence of pediculosis was significantly ($p<0.01$) higher in population of 10-11 years old (50%) group. Age had a significant effect on the incidence of infestation, students above the age of 12 years had the least (5.4%) chance of being infested compared to younger ones. Special factors such as sharing of bed and combs ($\alpha=5\%$) and taking bath in a common place, helps in the dissemination of lice infestation. There was a negative correlation between the frequency of hair washing and head lice infestation, pupils who wash their hair once or twice a week had more chances of infestation and risks of infestation when compared to those who wash their hair three times weekly ($\alpha=5\%$) (Table 3).

DISCUSSION

The prevalence of head lice in children found in this study was 4.7%. Children aged 10-11 years were most frequently infested with head

Table 1. Correlation between head lice infestation with different variables

Variable	df	χ^2	p-value
Age	3	3.1	0.38
Level of education	4	8.33	0.08
Father's job	2	4.9	0.08
Father's education	2	9.23	0.01
Mother's job	1	0.68	0.4
Mother's education	2	8.59	0.01
Frequency of hair washing	2	0.57	0.75
Length of hair	2	1.18	0.56
Having hygiene teacher	1	0.5	0.32
Using common comb	1	5.59	0.01

$\alpha=5\%$

Table 2. Prevalence of head lice infestation in relation to sociodemographic status of parents and age of the children

Variable	infestation	
	Number of infestation/ Total	%
Age		
6-7	4/147	7.9
8-9	14/415	36.8
10-11	19/427	50
12 \geq	2/41	5.4
Total	48/810	100
Children's grade school		
I	4/148	7.9
II	9/140	24.7
III	5/187	14.2
IV	11/144	28.9
VI	10/201	26.4
Total	48/810	100
Father's job		
Government	4/184	10.6
private	24/475	60.5
Labour	11/151	28.9
Total	48/810	100
Father's education		
Illiterate	7/110	18.4
Initial education	26/406	68.4
University education	5/294	13.2
Total	38/810	100
Mother's job		
Employed	2/73	5.3
housewife	36/737	94.7
Total	38/810	100
Mother's education		
Uneducated	14/185	36.8
Initial education	22/446	57.9
University	2/179	5.3
Total	38/810	100

Table 3. Prevalence of head lice infestations in relation to personal hygiene

Variables	infestation	
	Number of infestation/ Total	%
Number of hair washing		
Once a week	14/278	36.8
Twice a week	18/365	47.4
Three times a week or more	6/167	15.8
Total	38/810	100
Length of hair		
Short*	16/291	42.1
Medium	15/314	39.5
Long	7/205	18.4
Total	38/810	100
Having hygiene teacher		
Yes	34/749	89.5
No	4/61	10.5
Total	38/810	100
Sharing common comb		
Yes	19/259	50
No	19/551	50
Total	38/810	100

* The length of the hair

lice, which could be explained because of their age and their head to head contact (Downs *et al.*, 1999; AL-Shawa, 2008). The total prevalence of head pediculosis among primary school children 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%. In a study in Kerman, central Iran, 3.8% of 1200 primary school students were infected with *P. capitis* (Kamiabi & Nakhaei, 2005; Nazari *et al.*, 2006; Moradi *et al.*, 2009). Demographical results showed that there was a significant decrease in children's infestation with increasing father's education. As regards mother's education, significant difference was found in prevalence and mother's education. This is because educated mothers have more information about head lice due to their social communication (Toloza *et al.*, 2009; Moradi *et al.*, 2009; Bibi *et al.*, 2011). The impact of socioeconomic status upon the infestation rate detected in our study agreed with other

studies, and low socioeconomic status significantly increased the rate of infestation (Kamiabi & Nakhaei, 2005; Nazari *et al.*, 2006; AL-Shawa, 2008; Toloza *et al.*, 2009; Bibi *et al.*, 2011). In spite of this, frequent shampooing, brushing of the hair and examination the hair for lice were found to be important factors in the prevention of lice infestation. A strong correlation was found between infested children and shampooing the hair besides using louse comb in examination the hair ($\alpha=5\%$). The head lice infestation rate was more prevalent in children sharing common comb because head lice infestation may be transmitted by sharing infested instruments including hats, scarves, sweaters, sharing common pillows, etc. Such results have been reported by other researchers (Toloza *et al.*, 2009; Bibi *et al.*, 2011). A lower prevalence were seen by increasing awareness of hygienic, health promotion, early detection and effective management strategies by medical and health center staffs (Heukelbach *et al.*, 2005). Physical contacts, especially head-to-head contact are the most important factors in transmission of head lice infestation (Toloza *et al.*, 2009). Head lice infestations are more prevalent in poor socioeconomic status, and length of hair, family size, age, level of education and personal hygiene are important factors affecting its epidemiology (Sinniah *et al.*, 1981; Suleman & Jabeen, 1989; Muhammad Zayyid *et al.*, 2010; Kamiabi & Nakhaei, 2005; Nazari *et al.*, 2006; AL-Shawa, 2008). Results show that screening and treatment for head lice among children need to be done continuously in order to decrease the infestation rates (Muhammad Zayyid *et al.*, 2010).

Acknowledgments. This study was financially supported by Kurdistan University of Medical Sciences. We thank the students, teachers, health center staffs, who so willingly agreed to participate in this survey.

REFERENCES

- AL-Shawa, R.M. (2008). *Pediculus capitis*, infestation according to sex and social factors in Gaza Governorate. *The Islamic University Journal* (Series of Natural Studies and Engineering) **16**(1): 75-83.
- Arene, F.O.I. & Ukaulor, A.L. (1985). Prevalence of head louse (*Pediculus capitis*) infestation among inhabitants of Niger Delta. *Tropical Medical Parasitology* **3**: 140-142.
- Bibi, F., Tasawar, Z. & Ali, Z. (2011). The prevalence of human pediculosis in kot addu district muzzaffargarh (Punjab) Pakistan. *The Journal of Animal And Plant Sciences* **21**(2): 364-367.
- Burgess, I.F. (2004). Human lice and their control. *Annual Review of Entomology* **49**: 457-481.
- Chunge, R.N.A. (1986). Study of head lice among primary schoolchildren in Kenya. *Transaction Royal Society of Tropical Medicine and Hygiene* **80**: 42-46.
- Downs, A.M., Stafford, K.A. & Coles, G.C. (1999). Head lice: prevalence in school-children and insecticide resistance. *Parasitology Today* **15**: 1-4.
- Heukelbach, J., Wilcke, T., Winter, B. & Feldmeier, H. (2005). Epidemiology and morbidity of scabies and pediculosis capitis in resource-poor communities in Brazil. *British Journal of Dermatology* **153**: 150-156.
- Kamiabi, F. & Nakhaei, F.H. (2005). Prevalence of pediculosis capitis and determination of risk factors in primary-school children in Kerman. *Eastern Mediterranean Health Journal* **11**: 988-992.
- Lee, S.H., Yoon, K.S., Williamson, M.S., Goodson, S.J., Takano-Lee, M., Edman, J.D., Devonshire, A.L. & Clark, J.M. (2000). Molecular analysis of *kdr*-like resistance in permethrin-resistant strains of head lice, *Pediculus capitis*. *Pesticide Biochemistry and Physiology* **66**: 130-143.

- Linardi, P.M. (2002). Anoplura. In: *Parasitologia Humana* (Neves D.P., de Melo A.L., Genaro O *et al.*, eds.). São Paulo: Editora Atheneu 368-372.
- Linardi, P.M., Botelho, J.R. & Maria, M. (1988). Crendices e falsos conceitos que dificultam ações profiláticas contra o piolho e a pediculose “capitis”. *Journal of Pediatrics* **64**: 248-255.
- Malcolm, C.E. & Bergman, J.N. (2007). Trying to keep ahead of lice: a therapeutic challenge. *Skin Therapy Letter* **11**: 1-6.
- Moradi, A.R., Zahirmia, A.H., Alipour, A.M. & Eskandari, Z. (2009). The prevalence of pediculosis capitis in primary school students in Bahar, Hamadan province, Iran. *Journal of Research in Health Sciences* **9**(1): 45-49.
- Muhammad Zayyid, M., Saidatul Saadah, R., Adil, A.R., Rohela, M. & Jamaiah, I. (2010). Prevalence of scabies and head lice among children in a welfare home in Pulau Pinang, Malaysia. *Tropical Biomedicine* **27**(3): 442-446.
- Nazari, M., Fakoorziba, M.R. & Shobeiri, F. (2006). Pediculosis capitis infestation according to sex and social factors in Hamedan, Iran. *Southeast Asian Journal of Tropical Medicine and Public Health* **37**(Supp): 95-98.
- Pollack, R.J., Kiszewski, A., Armstrong, P., Hahn, C., Wolfe, N., Rahman, H.A., Laserson, K., Telford, S.R. & Spielman, A. (1999). Differential permethrin susceptibility of head lice sampled in the United States and Borneo. *Archive of Pediatrics and Adolescence Medicine* **153**: 969-973.
- Robinson, D., Leo, N., Prociw, P. & Barker, S.C. (2003). Potential role of head lice, *Pediculus humanus capitis*, as vectors of *Rickettsia prowazekii*. *Parasitology Research* **90**: 209-211.
- Sinniah, B., Sinniah, D. & Rajeswari, B. (1981). Epidemiology of *Pediculus humanus capitis* infestation in Malaysian school children. *American Journal of Tropical Medicine and Hygiene* **30**: 734-738.
- Speare, R. & Buettner, P.G. (1999). Head lice in pupils of a primary school in Australia and implications for control. *International Journal of Dermatology* **38**: 285-290.
- Suleman, M. & Jabeen, N. (1989). Head lice infestation in some urban localities of NWFP, Pakistan. *Annals of Tropical Medicine and Parasitology* **83**: 539-547.
- Svartman, M., Potter, E.V., Poon-King, T. & Earle, D.P. (1973). Streptococcal infection of scabetic lesions related to acute glomerulonephritis in Trinidad. *Journal of Laboratory of Clinical Medicine* **81**: 182-193.
- Tolozza, A., Vassena, C., Gallardo, A., González-Audino, P. & Inés Picollo, M. (2009). Epidemiology of pediculosis capitis in elementary schools of Buenos Aires, Argentina. *Parasitology Research* **104**: 1295-1298.