

## Original Article

# Pediculosis capitis among Primary School Children and Related Risk Factors in Urmia, the Main City of West Azarbaijan, Iran

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## Abstract

**Background:** Pediculosis capitis is cosmopolitan health problem. In addition to its physical problems, its psychological effects especially on pupils are more important. This study was conducted to determine the Pediculosis capitis among primary school pupils and also find out the role of probable related risk factors in Urmia city, Iran 2010.

**Methods:** 35 primary schools of Urmia City according to the defined clusters randomly have been selected during 2010. 2040 pupils (866 boys and 1174 girls) were included and examined individually and privately by experts. Presence of adult or immature lice or having nits less than 1 cm from the hair basis were defined as positive.

Data about demographic features and factors which their effect should be determined were recorded in standard questionnaire. Data were analyzed by SPSS software with proper statistical test.

**Results:** Infestation was determined around 4%. Girls show significantly greater infestation. The availability of suitable warm water for bathing and hair length (separately in girls and boys) are significantly related to infestation load as well as infestation among different age groups.

There was no significant relation between parent's education and job and infestation as well as bathing repetition per week and the kind of energy source which they have. Also there is no significant correlation between educational grades and head lice infestation.

**Conclusion:** The head louse pediculosis is a health problem and remains a health threatening for school children. Effective risk factors should be determined carefully and regionally. Proper training plays a great role in order to prevent and control the problem.

**Keywords:** *Pediculus capitis*, primary schools, Urmia, head louse infestation

## Introduction

*Pediculus capitis* as one of the most important human obligate ectoparasite which infests human beings called head lice. It is a common health problem mainly in children below 15 years old and infests the hair and scalp (Nutanson et al. 2008). Except for the common cold, the head louse infestation among elementary-school-age children is the most prevalent communicable disease rather than all other communicable diseases combined (Hensel 2000). Some of patients with

louse infestation are asymptomatic but pruritus is most common symptom which is because of sensitization to louse salivary and fecal antigens. Excoriations and secondary bacterial infections could be occurred (Malcolm et al. 2006). In addition, in hypersensitive infested persons, cervical lymphadenopathy and conjunctivitis could be occurred (Ko et al. 2004, Scott et al. 2005). Allergic reactions such as nasal obstruction, rhinorrhea, and nightly whistles which could be

seen in chronic infestation (Fernandez et al. 2006). The patients show not only physical symptoms but also psychological distress occurred and this could be more important point in head louse infestation especially in children (Oh et al. 2010). Infestation also can affect concentration or could be a reason for stigmatization which detrimentally influences children's learning quality.

During the last decades a significant increase has been reported in pediculosis "infestation with louse" worldwide as a result of louse resistance to routine insecticides, improper application, formulation changes, and misdiagnosis (Burgess 2004). Another concern in head louse infestation is misguided use of caustic or toxic substances to eliminate the lice (Pollack et al. 2000).

Head louse still remains an important health problem and is endemic in both developing and developed countries. Several studies worldwide showed various prevalence from 0.7% to 29.7% (Cazorla et al. 2007, Jahnke et al. 2008, Soultana et al. 2009, Toloza et al. 2009). In Iran the prevalence of head louse infestation has been reported frequently from several parts of the country. In two recent studies the prevalence ranged between 0.2% to 0.49% in Fars Province (Davaranpanah et al. 2009) to 4.8% in Khajeh City in east Azarbaijan Province (Shayeghi et al. 2010) whereas another study report a higher prevalence (27.1%) in Iran-shahr, Sistan and Baluchistan Province (Alempour-Salemi et al. 2003).

Despite the previous thoughts, pediculosis affects school children of all socioeconomic strata and not just the poor, uneducated or those living in unhygienic conditions (Speare et al. 1999, Downs et al. 2000).

Current study was conducted to determine the prevalence of head lice infestation in primary school children in the main city of West Azarbaijan (Urmia) and some probable effective factors.

## Materials and Methods

### Study area and design

The main city of West Azarbaijan "Urmia" has been chosen and divided in two regions according to official and geographical conditions. Several clusters have been determined. 35 pre-primary and primary schools were selected randomly according to defined clusters. The study was conducted during October–December 2010. Finally 2040 pupils (866 boys and 1174 girls) were included and examined in this study.

### Study procedure

At the first the Urmia city was divided into two regions and several clusters were defined in each region. According to the randomized sample selection method, in all defined clusters and determined sample size, 1000 pupils should be observed and examined but in order to increase the border of study and getting better picture, more than 2040 pupils were observed and examined. All selected pupils were examined individually and privately by an expert person. Girls were examined by female experts for all stages of lice or their nits. Presence of adult lice or immature stages of them or having nits less than 1 cm from the hair basis were defined as positive. Infestation and its load were documented in specific forms.

### Data collection and analysis

A standard questionnaire were designed to record data about sex, parents' education and their job, school grade, bathing repetition per week, availability of suitable energy source and other related factors.

All pupils were asked to fulfill in the standard questionnaire containing questions to find out their living style and probable risk factors.

Obtained data were deposited in to the SPSS data sheets and based on study questions were analyzed using proper statistical tests and parameters.

## Results

Observation on 2040 pupils by experts showed that the total prevalence of head louse infestation among them is 4%. Girls have a significantly greater infestation with 5.5% in comparison to the boys infestation 1.8 ( $P < 0.05$ ) (Table 1).

Analyzing the correlation between some socio-economic factors and head louse infestation revealed that some of them such as length of hair and availability of suitable warm water for bathing and hygienic use could affect head louse infestation significantly ( $P < 0.05$ ) (Table 2) but other factors such as parent’s education level and job, bathing repetition per week and the kind of energy source which they have did not show

significant correlation with head louse infestation ( $P > 0.05$ ). Table 2 represents the details properly.

The data also showed that the majority of infested pupils have had more than 10 nits on their hair (Table 3).

The additional analysis of probable relationship between class grade and infestation load revealed no significant difference between different grades and infestation load ( $P = 0.443$ ) (Table 4).

To determine the statistical difference between age groups, all observed pupils were classified into 4 age groups (Table 5) and statistical analysis showed that there is significant difference between age groups ( $P < 0.000$ ).

**Table 1.** Observed pupils according to sex and the prevalence of head louse infestation among them in primary schools, Urmia, Iran, 2010

Sex	Observed pupils		n of infested pupils	Prevalence (%)	Exact Sig.
	n	%			
Male	866	42.5	16	1.8	(P < 0.05)
Female	1174	57.5	65	5.5	
Total	2040	100.0	81	4.0	

**Table 2.** Head louse infestation in primary school pupils according to some socio-economic factors in Urmia, Iran, 2010

Characteristics		n of Observed pupils	n of Infested pupils	P Value.
Mother Education	Un-Educated	351	7	P > 0.05
	Under-High school	984	41	
	Finished high school	375	15	
Mother Job	university degree	314	17	P > 0.05
	Housewife	1692	65	
	Works outside	337	16	
Father Education	Deceased	29	1	P > 0.05
	Un-Educated	187	7	
	Under high school	932	33	
	Finished high school	476	21	
	University degree	405	19	
Father Job	un-employed	25	1	P > 0.05
	worker	440	9	
	official employee	585	24	
	Private section	924	46	
	sick and old	25	0	
	Deceased	31	1	

**Table 2.** Countinued ...

Length of hair	Girls	shaved completely	0	0	P< 0.05
		less than 1 cm	30	1	
		Until ear	68	4	
	Boys	less than shoulder	385	23	P< 0.05
		until shoulder and more	689	31	
		shaved completely	25	1	
Gas plumbing	Boys	less than 1 cm	261	9	P< 0.05
		Until ear	420	3	
		less than shoulder	159	4	
Having water boiler at home		until shoulder and more	1	0	P> 0.05
		Yes	1734	64	
Weekly bath Number		No	305	17	P< 0.05
		Yes	1982	73	
Weekly bath Number		No	57	8	P> 0.05
		once per week	900	29	
		twice per week	824	39	
		three and more	315	13	

**Table 3.** Infestation load amon/ g pupils of primary schools of Urmia, Iran, 2010

Infestation Load	Average infestation with Nits		Average infestation with Adults	
	n	%	n	%
Less than 5	21	1.0	2	0.1
Between 5–10	13	0.6	2	0.1
More than 10	42	2.1	2	0.1

**Table 4.** Infestation load of head Lice among observed pupils according to their educational grade, Urmia, Iran, 2010

School grade	Average number of Nits				Total
	Negative	Less than 5	Between 5–10	More than 10	
pre-school	35	1	0	2	38
Grade 1	403	7	3	10	423
Grade 2	404	2	3	12	421
Grade 3	360	2	1	5	368
Grade 4	399	4	6	5	414
Grade 5	363	5	0	8	376
Total	1964	21	13	42	2040

**Table 5.** Infestation load of head Lice among observed pupils according to their age groups, Urmia, Iran, 2010

Age groups	Average number of Nits				Total
	Negative	Less than 5	Between 5–10	More than 10	
Pre-School [5–6]	43	2	0	2	47
[7–9]	1108	10	6	27	1151
[10–12]	797	9	7	13	826
[13–16]	14	0	0	0	14
Total	1962	21	13	42	2038

## Discussion

This study showed that 4% of examined pupils of primary schools were infested with head louse. Other studies conducted around the world revealed different prevalences. In Australia the prevalence has been reported 33% (Speare et al. 1999), 35% in Brazil (Borges et al. 2002), 48.7% in France (Courtiade et al. 1993), 4.1% in Korea, throughout the country (Oh et al. 2010), and between 0.48 to 1.59% in boys, 29.7% in Buenos Aires, Argentina (Tolozza et al. 2009) and more than 50% in girls of Lublin Province, eastern Poland (Buczek et al. 2004). In Iran, a study reported the infestation prevalence 27.1 % in Iranshahr, south-east of Iran (Alempour-Salemi et al. 2003), in a recent study in Khajeh City in East Azarbaijan the total prevalence was reported 4.8% and in Fars province the prevalence ranged between 0.2% to 0.49% (Davaranah et al. 2009).

The statistical analysis showed that girls have significantly greater infestation prevalence ( $P < 0.05$ ). This difference could be because of the different behaviors between girls and boys and their living and playing patterns. Also maybe some cultural aspects such as girls clothing plays effective role.

Analysis of infestation among age groups showed significant correlation between head lice infestation and some of age groups ( $P = 0.000$ ) especially the lower age group (7–9 years old). Results revealed higher significance in mentioned age group in comparison with other age groups which could reflect the ability of older pupils to act hygienic and using their personal equipments properly.

There is no significant relationship between infestation and parent's education as well as their job ( $P > 0.05$ ). Father's and mother's education and job were analyzed separately and no significant differences have been seen. Parent's education and job could be assumed as a representative of their

socio-economic level and having no significant differences between the socio-economic level and head louse infestation could approve the hypothesis that head louse infestation is not limited to uneducated or poor strata (Speare et al. 1999, Downs et al. 2000). The educational system should clarify that all parents from all families “not only the poors” should play a more effective role then more communication between school and families is necessary. On the other hand simple and effective health training courses related to the head lice will be useful for parents to examine their children periodically and carry out preventive programs and also train their children properly about the infestation routs and prevention measures.

Analysis of relationship between hair length and head lice infestation has been done separately between girls and boys. Results showed significant relationship between infestation and hair length in both groups ( $P < 0.05$ ) Longer hairs harbor heavier head louse infestation. Bathing carefully and with longer hairs could be difficult for children as well as inspection for infestation by parents and health officers. Also pupils from families with water boiler which produce warm water for bathing significantly have lesser infestation ( $P < 0.05$ ). Bathing with warm and suitable water would be gracious and could increase bathing quality. Similarly the bathing repetition per week has no significant role in infestation and it could be assumed that the quality of bathing is more important than its quantity.

All studied families have suitable energy source (gas, oil and electricity) for preparation of warm water and the kind of energy could not affect the infestation significantly ( $P > 0.05$ ).

The results of this study and similar studies show that the head louse pediculosis is a cosmopolitan health problem with various prevalences regionally but it remains a

noticeable pediatric problem. The main factors which significantly are related to the head louse infestation are cultural and conceptual. According to acquired results it seems that training courses in order to help school staffs and parents to know the symptoms and transmission routes of head louse infestation are necessary. This knowledge will help them to discover the infestation and design simple and effective preventive and control programs. Management of infested cases without psychological side effects is very important and in all cases delicate facts and unique personality of each infested pupil should be minded. Despite of the simple face of the head lice problem, several concerns should be calculated and based on them, proper training, surveillance and control programs should be designed and carried out.

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## References

- Alempour-Salemi J, Shayeghi M, Zeraati H, Akbarzadeh K, Basseri H, Ebrahimi B Rafinejad J (2003) Some Aspects of Head Lice Infestation in Iranshahr Area (Southeast of Iran). *Iranian J of Pub Health*. 32(3): 60–63.
- Borges R, Mendes J (2002) Epidemiological aspects of head lice in children attending day care centres, urban and rural schools in Uberlandia, central Brazil. *Mem Inst Oswaldo Cruz*. 97 (2): 189–192.
- Buczek A, Markowska-Gosik D, Widomska D, Kawa IM (2004) Pediculosis capitis among schoolchildren in urban and rural areas of eastern Poland. *Eur J Epidemiol*. 19(5): 491–495.
- Burgess IF (2004) Human lice and their control. *Annu Rev Entomol*. 49: 457–81.
- Cazorla D, Ruiz A, Acosta M (2007) Clinical and epidemiological study of pediculosis capitis in schoolchildren from Coro, Venezuela. *Invest Clin*. 48 (4): 445–457.
- Courtiade C, Labrèze C, Fontan I, Taïeb A, Maleville J (1993) Pediculosis capitis: a questionnaire survey in 4 schools of the Bordeaux Academy 1990–1991. *Ann Dermatol Venereol*. 120(5): 363–368.
- Davarpanah M, Mehrabani D, Khademolhosseini F, Mokhtari A, Bakhtiari H, Neirami R (2009) The prevalence of *Pediculus capitis* among School Children in Fars Province, Southern Iran. *Iranian J Parasitol*. 4(2): 48–53.
- Downs AM, Stafford KA, Stewart GH, Coles GC (2000) Factors that may be influencing the prevalence of head lice in British school children. *Pediatr Dermatol*. 17(1): 72–74.
- Fernandez S, Fernandez A, Armentia A, Pineda F (2006) Allergy due to head lice (*Pediculus humanus capitis*). *Allergy*. 61(11): 1372.
- Hensel P (2000) The challenge of choosing a pediculicide. *Public Health Nurs*. 17 (4): 300–304.
- Jahnke C, Bauer E, Feldmeier H (2008) Pediculosis capita in childhood: epidemiological and socio-medical results from screening of school beginners. *Gesundheitswesen*. 70(11): 667–673.
- Ko CJ, Elston DM (2004) Pediculosis. *J Am Acad Dermatol*. 50(1): 1–12, quiz 13–4.

- Malcolm CE, Bergman JN (2006) Trying to keep ahead of lice: a therapeutic challenge. *Skin Therapy Lett.* 11(10): 1–6.
- Nutanson I, Steen CJ, Schwartz RA, Janniger CK (2008) *Pediculus humanus capitis*: an update. *Acta Dermatovenerol Alp Panonica Adriat.* 17(4): 147–154, 156–157, 159.
- Oh JM, Lee IY, Lee WJ, Seo M, Park SA, Lee SH, Seo JH, Yong TS, Park SJ, Shin MH, Pai KS, Yu JR, Sim S (2010) Prevalence of pediculosis capitis among Korean children. *Parasitol Res.* 107(6): 1415–1419.
- Pollack RJ, Kiszewski AE, Spielman A (2000) Overdiagnosis and consequent mismanagement of head louse infestations in North America. *Pediatr Infect Dis J.* 19(8): 689–693, discussion 694.
- Scott P, Middlefell LS, Fabbroni G, Mitchell DA (2005) Interesting case: cervical lymphadenopathy, induced by head lice. *Br J Oral Maxillofac Surg.* 43(6): 515.
- Shayeghi M, Paksa A, Salim Abadi Y, Dehkoordi AR S, Ahmadi A, Eshaghi A, Bazrafkan S (2010) Epidemiology of Head Lice Infestation in Primary School Pupils, in Khajeh City, East Azerbaijan Province, Iran. *Iran J Arthropod-Borne Dis.* 4(1): 42–46.
- Soultana V, Euthumia P, Antonios M, Angeliki RS (2009) Prevalence of pediculosis capitis among schoolchildren in Greece and risk factors: a questionnaire survey. *Pediatr Dermatol.* 26(6): 701–705.
- Speare R, Buettner PG (1999) Head lice in pupils of a primary school in Australia and implications for control. *Int J Dermatol.* 38(4): 285–290.
- Tolozza A, Vassena C, Gallardo A, González-Audino P, Picollo MI (2009) Epidemiology of Pediculosis capitis in elementary schools of Buenos Aires, Argentina. *Parasitol Res.* 104(6): 1295–1298.