

PEDICULOSIS CAPITI: A REVIEW ARTICLESayyadi M¹, Sayyad S², and Vahabi A^{3*}¹Kermanshah University of Medical Sciences, Ghods Hospital, Paveh, Iran²Kermanshah University of Medical Sciences, School of Medicine, Kermanshah, Iran³Department of Public Health, School of Health, Kurdistan University of Medical Sciences, Sanandaj, Iran*Corresponding Author: vahabiahmad@gmail.com

Abstract: human head louse, *Pediculus humanus capitis*, or pediculosis capitis, is a common health problem in the world. Pediculosis capitis is the most prevalent parasitic infection of children in many countries. This problem remains confined to the scalp. Scalp itching is a common symptom in the infested people to head lice, although infested patients to pediculosis can be asymptomatic. Any pruritus scalp in children should be examined by physicians or entomologists. All of the children that have close contacts should be examined. The people should be treatment when lice or ova observed. There are three fundamental methods that are effective to treatment of pediculosis; topical pediculicides, wet combing and oral therapy. The used pediculicides should be had no hazards and they must be safe to human. We don't recommended spraying or fogging of home with pediculicides. [Sayyadi M, Sayyad S, and Vahabi A. **Pediculosis Capitis: A Review Article.** *Life Sci J* 2014;11(3s):26-30]. (ISSN:1097-8135). <http://www.lifesciencesite.com>. 6

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Introduction

Insects are the biggest classes of Animalia Kingdom. According to scientific findings, 80% of the known animal's specimens in the world are insects (Salehzadeh, 1992; Vahabi et al., 2007). The human head louse, *Pediculus humanus capitis*, De Geer, 1778, is a flat, wingless insect with 3 pairs of legs is an obligate parasite of human which affect millions of people especially schoolchildren around the world in both developed and developing countries (Burgess, 2004; Meinking, 1986; Taplin et al., 1986; Meinking & Taplin, 1990). The insect feed on human blood and live on human hair. Pre-school and elementary children, aged 5-13, and their families are infested most often (Janniger and Kuflik, 1993; Leung et al., 2005). The greater incidence of head louse infestation in school age children could be due to their increased physical contacts with each other and the sharing of objects such as common comb (Vahabi et al., 2012; Vahabi et al., 2013). *Pediculus humanus capitis* is not a vector of human disease but it is a health problem especially in the poor countries (Angel et al., 2000). Severe itching caused by louse feeding is the first major symptom of a louse infestation. The infection can lead to enormous itchiness, skin inflammation, hives, exudations, lymph node bulges, eczema, scars, hair glue-up to "plica polonica", ending in pain and restlessness especially in children (Alempoor Salemi, 2003; Fathy et al., 2010). There are many factors that lead to increasing of head louse infestation, i.e., poor hygiene, socioeconomic status, lack of medical treatments are some of them (Koch et al,2001 & AL-Shawa, 2008).

Historical overview on Pediculosis

The story of Pediculosis dates back to biblical times, when Aaron is recorded as having "stretched out his hand with his rod and smote the dust of the earth and it became lice in men and in beast" although lice existed in prehistoric times (Pernet, 1918). Pediculosis as a human problem dates back to the earliest Homo sapiens. Researchers at the Max Plank Institute for Evolutionary Anthropology used Molecular Clock Analysis (MtDNA) to date the origins of human lice to approximately 72, 000 years ago in Africa. Expansions of lice into other parts of the world follow the expansion of modern man out of Africa approximately 50, 000 years ago. Lice were known to be a health problem severe when the public baths were closed in ancient Egypt (Driver, 1974). Throughout antiquity in Greek and Roman period, was thought that the louse have developed naturally in tumors of the body and afterwards to have flee to the surface (Hebra and Kaposi, 1880). Francesco described the *Pediculus pubis* in 1668 and Carl De Geer described *Pediculus capitis* in 1778. The louse would be confused with the scabies mites for many years. Joseph Jakob Plenck (1732-1807) described five kinds of phthiriasis: capitis, pubis, supercilliorum, totius corporis, and intema. In 1842, Wilson wrote a textbook that lice and pediculosis were described in fairly contemporary terms (Wilson, 1857). By 1865, Ferdinand Hebra (1816-1880) had demonstrated that lice could not live in closed cavities (Herba, 1880). The role of lice in typhus and other communicable diseases remained another story and described by Hans Zinsser in his book (Zinsser, 1935). The louse studied by Entomologists through

the nineteenth century and some of their articles were published; however, the definitive works appeared in 1919 by L. L. Lloyd of Northern Rhodesia (Lloyd, 1919). In the 1930's and 1940's, Kenneth Mellanby and James Busvine of London published extensively on lice, and in 1943, an exhaustive bibliography appeared (Grinnell and Hawes, 1943). Many studies were conducted around the world about pediculosis and they are continued.

Head Lice Characteristics

The head louse, *Pediculus humanus capitis*, is an ectoparasite of human that is 1-3 mm long and is grayish-whitish in color (Fig.1B). The insect has the narrow sucking mouthparts hidden within the head, consist of three piercing stylets that are normally carried withdrawn into a stylet Sac in the head (Borror & Delong, 1963; Ko & Elston, 2004). They have short antennae, and three pairs of clawed legs adapted to grass into the hairs. Head lice move speed of up to 23 cm/min and they cannot jump or fly (Ko & Elston, 2004; Nutanton et al., 2008; Maunder, 1985). The egg's name of head lice is nit. It is 0.8 mm in length and is laid within 1-2 mm of the scalp surface. The eggs, can be seen along the length of the hair shaft, rarely (Fig.1A). The female of head louse can lay about 150 eggs during a 30- day of her life cycle. The eggs grow and after 1 week, turn into the nymphs. They have 3 nymphal instar stages. After 7 days, the nymphs mature to adults. The first and the second stages of the nymphs don't move and are not easily transmitted between persons but the third instar of the nymphs and adults are easily transmitted between individuals, therefore they are important in head lice infestation.

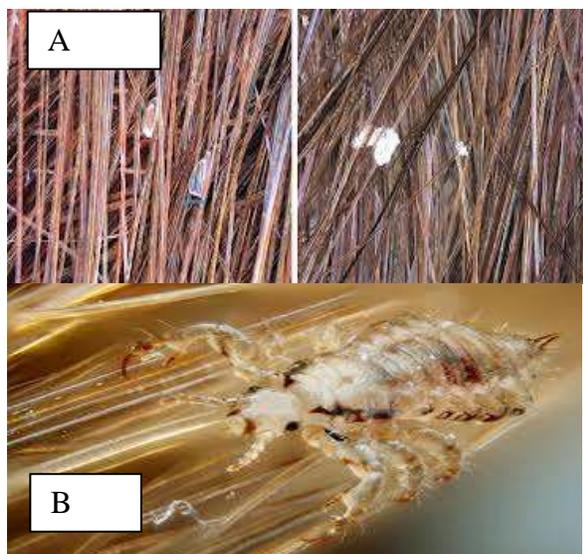


Figure 1. A. Egg , B. Adult of head louse

The nits can survive for 10 days without host but the adults can endure for up to 3 days off the host (Ko & Elston, 2004; Dodd, 2001; Witkowski & Parish, 1997).

Epidemiology of Head Lice

Head lice are most common between children 3-13 years of age. All groups of socio economic status are affected. In the United States (US), 6-12 million of people infested to *Pediculus humanus capitis*, annually but African-Americans, rarely infested to head louse, most likely because they have oval-shaped hair shafts that head lice can not to grasp into them. In Africa, head lice have adapted claws for grasping this type of hair (Chosidow, 2000; Ko & Elston, 2004; Frankowski & Weiner, 2002, Parish, 1995). In the United Kingdom (UK), despite all efforts at control, the prevalence rate of head louse infestation has remained high (Plastow et al., 2001). Over Figure 1A. Eggs of head louse on the hair hundreds of million cases of this problem are estimated worldwide (Roberts, 2002). *P.humanus capitis* is the most prevalent parasitic infection among children in the United States (Steen et al., 2004).The most important mode of head louse infestation and transmission is head to head contact. *P.humanus capitis* can be transmitted by infested clothing, hairbrushes, combs, hats, towels, bedding, and Padding (Nutanson et al., 2008; Elewski, 2005). Studies in Iran and some countries, have showed different prevalence rates of head lice infestation among children (Vahabi et al., 2012; Vahabi et al., 2013; Sayyadi et al., 2013; Ewasechko 1981; Slonka et al., 1976; Shayeghi et al., 2010; Alempour Salemi et al., 2003; Edalatkhah et al., 2005; Hodjati et al., 2008; Kamiabi & Nakhaei, 2005; Ramezani Awal Riabi et al., 2012). The prevalence rate in some countries was different: 33% in Australia (Speare et al., 1999), 35% in Brazil (Borges & Mendes, 2002), 48.7% in France (Courtaide et al., 1993) and 49.7% in Ghana (Kwaku-Kpikpi, 1982).

Diagnosis

The gold standard method for diagnosing head louse infestation is identification of a live louse, nymph, or a viable nit on the head. It is difficult to find head lice without combing because they avoid light and crawl quickly into the hairs (Ko & Elston, 2004; Frankowski & Weiner, 2002; Nutanson et al., 2008). Using of comb is one of the most important methods to finding live lice on the head (Mumcuoglu et al., 2001; De Maeseneer et al., 2000). The diagnosis lice with lice comb is more efficient four fold than direct visual examination.

We can find tiny nits at the nape of the neck or behind the ears. The observation of nits on the head indicated that the child or the man has been infested to head lice but nits by themselves are not diagnostic

of active infestation. Using a magnifying glass can help us to recognize head lice, easily. Using of Wood's lamp examination reveals yellow-green fluorescence of the lice and their nits. Another method to head lice diagnosis and follow-up of pediculosis capitis is dermoscopy; a non-invasive, *in vivo* technique for the diagnosis and management of hair and scalp disorders (Badri et al., 2010; Tostia & Torres, 2009). Removing of nits is more difficult, because they are glued on hairs. Dead eggs can remain glued on the hair shafts for about 6 months. Most people cannot diagnose and differentiate between viable and empty eggs, and guess that if eggs are presented, the child must also have lice (Mumcuoglu et al., 2006). Therefore, the importance of recognition a viable nit, nymph or a live moving louse for correct diagnosis cannot be stressed enough.

Table1. Differential diagnosis of nits

Diagnosis	Comment
Dandruff	Scales throughout the scalp; may attach to hairs; easily removed
Hair casts	Keratin protein that encircles the hair shaft; may be multiple; easily removed
Piedra	Fungal hair infection; firm nodules attached to hair shafts; usually white or black in color
Hair products	For example, hair spray, mousse, gel
Psoriasis	Thickened scaly plaques usually present in scalp

Source: Dermatology Nursing © 2010 Jannetti Publications, Inc.



Figure 3. Dermoscopy: gray, translucent, ovoid eggs, firmly attached to the hair shaft, corresponding to nits. (Source: *Acta Dermatoven APA Vol 19, 2010, No 3*).

Treatment and Control

All of family members and other close contacts should be examined. Only if viable nits or live lice are observed, treatment is necessary and should be considered (Nutanson et al., 2008). Towels, garments and other things made of linen, stuffed animals, all clothing and cloth of toys that used by an infested person within two days prior should be washed in water hotter than 50°C or machine dried at the highest heat settings for at least 30 minutes.

Personal appliance including combs, headgears, headphones, towels, helmets and underwear cloths should be washed and cleaned and then disinfected with a proper pediculicide or isopropyl alcohol (Frankowski & Weiner, 2002; Bloomfield, 2002; Izri & Chosidow, 2006). To eliminate any shed hairs with viable nits, floors, rugs, pillows, play areas, carpet squares and upholstered furnitures should be vacuumed (Nutanson et al., 2008; Frankowski & Weiner, 2002; Bloomfield, 2002; Izri & Chosidow, 2006). The treatment of pediculosis should be consist killing of lice and the ova. To effective treatment of head lice infestation, three methods can be used: topical pediculicides, wet combing and oral therapy. The most effectiveness method to pediculosis capitis treatment is using of pediculicides. Weekly checks by wet combing are the most effective option for detection of head lice by parents. The used comb should be fine enough (with flat-faced teeth 0.2-0.3 mm apart) to catch the head lice. Pediculicides are not recommended for children younger than 2 years old (Nutanson et al., 2008). The treatment of pediculosis by pediculicides can be done by DDT (10%), Lindane (1% - 2%), Malathion (0.5%), Permethrin (5%), Crotamiton (10%), Carbaryl, 0.5% (Nutanson et al., 2008). After treatment the infested children, they should be checked to ensure that treatment has been effective and if there is any re-infestation, detect it. Using of pediculicides can be harmful to people especially children, thus the used pediculicides should be had the lowest hazards and they must to be safe.

References

1. Alempoor Salemi J, Shayeghi N, Akbarzadeh K, Basseri H, Ebrahimi B, Rainezhad J, et al. (2003). Some aspects of head lice infestation in Iranshahr areas. *Iranian J Pub Hlth* 32: 60-63.
2. 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.
3. Angel TA, Nigro J, Levy ML. (2000). Infestations in the pediatric Patient. *Pediatr Clin North Am* 47(4): 921-935,viii.

4. Badri T, Hammami H, Benmously R, Mokhtar I, Fenniche S. (2010). Dermoscopic diagnosis of pediculosis capitis: case report. *Acta Dermatoven APA* 19(3): 45-46.
5. Bloomfield D. (2002). Head lice. *Pediatr Rev* 23(1):34-35; discussion -5.
6. Borges R, Mendes J. Epidemiological aspects of head lice in children attending day care centres, urban and rural schools in Uberlandia, central Brazil. *Mem Inst Oswaldo Cruz, Rio De Janeiro* 97(2): 189-192.
7. Borror D.J, Delong D.M. (1963). An introduction to the study of insects, Revised edition, Chapter 17: Order Anoplura. New York, Shicago.
8. Burgess IF (2004). Human lice and their control. *Annu. Rev. Entomol* 49:457-481.
9. Chosidow O. (2000). Scabeis and Pediculosis. *Lancet* 355(9206): 819-826.
10. Courtaide C, Labrieze C, Fontan I, Taieb A. Maleville J (1993) Pediculosis capitis: a questionnaire survey in 4 schools of the Bordeaux Academy 1990-1991. *Ann Dermatol Venereol.* 120: 363-368.
11. De Maeseneer J, Blokland I, Willems S, Vander Stichele R, Meersschaut F (2000). Wet combing versus traditional scalp inspection to detect head lice in schoolchildren: observational study. *BMJ* 321(7270):1187-1188.
12. Dodd C.S. (2001). Interventions for treating head lice. *Cochrane Database Syst Rev.* 3: CD001165.
13. Driver G. R. (1974). Lice in the Old Testament. *Palestine Explor. Quart.* 159.
14. Edalatkhah H, Arshi S, Sadeghi H & Sepehram V (2005). Prevalence of *Pediculus capitis* in schoolchildren in Ardebil province. *Journal of Ardebil University of Medical Sciences* 6: 36-45.
15. Elewski B.E. (2005). Clinical diagnosis of common scalp disorders. *J Investig Dermatol Symp Proc* 10(3): 190-193.
16. Ewasechko CA (1981). Prevalence of head lice (*Pediculus humanus capitis*) among children in a Rural, Central Alberta School. *Can J Public Health.* 72: 249-252.
17. Fathy AG, Semmler M, Al-Rasheid Kh, Klimpel S, Mehlhorn H. (2010). Comparative in vitro tests on the efficacy and safety of 13 anti-head-lice products. *Parasitol Res* 106: 423-429.
18. Frankowski B.L, Weiner L.B. (2002). Head lice. *American Academy Of Pediatrics* 110: 637-643.
19. Grinnell, M. E. and Hawes, I. L. (1943). Bibliography on lice and man with particular reference to wartime condition. Washington, D.C., Bibliogr. Bull. #1 U.S. Dept. Agriculture.
20. Hebra, P. and Kaposi, M. (1880). On Diseases of the Skin. Translated by Warren Tay. London, New Sydenham Soc 5: 272-289.
21. Hodjati M.H, Mousavi N & Mousavi M. (2008). Head lice infestation in schoolchildren of a low socio-economy area of Tabriz city, Iran. *African Journal of Biotechnology* 7(13):2292-2294.
22. Izri A, & Chosidow, O. (2006). Efficacy of machine laundering to eradicate head lice: recommendations to decontaminate washable clothes, linens, and fomites. *Clin Infect Dis* 42(2):e9-10.
23. Janniger CK, Kuflik AS. (1993). Pediculosis capitis. *Cutis.* 51(6): 407-408.
24. 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(5-6): 988-992.
25. Ko, C.J., Elston, D.M. (2004). Pediculosis. *J Am Acad Dermatol* 50(1): 1-12.
26. Koch, T., Brown, M., selim, P., & Isam, C. (2001). Towards the eradication of head lice: Literature review and research agenda. *Journal of Clinical Nursing* 10:364-371.
27. Kwaku-Kpikpi JE (1982). The incidence of head louse (*Pediculus humanus capitis*) among pupils of two schools in Accra. *Trans R Soc Trop Med Hyg.*76: 378-381.
28. Leung, A.K., Fong,J.H., Pinto-Rojas, A.(2005). Pediculosis capitis. *J Pediatr Health Care* 19(6):369-373.
29. Lloyd, L. L. (1919). Lice and their Menace to Man. London, Frowde.
30. Maunder, J.W. (1985). Human lice: some basic facts and misconceptions. *Bull Pan Am Health Org* 19: 194-197.
31. Meinking, T.L. & Taplin, D. (1990). Advances in pediculosis, scabies, and other mite infestations. *Adv Dermatol* 5: 131-151.
32. Meinking, T.L., Taplin, D., Kalter, D.C., Eberle, M.W. (1986). Comparative efficacy of treatments for pediculosis capitis infestations. *Arch Dermatol* 122: 267-271.
33. Mumcuoglu, K.Y., Friger, M., Ioffe-Uspensky, I., Ben-Ishai, F., Miller, J. (2001). Louse comb versus direct visual examination for the diagnosis of head louse infestations. *Pediatr Dermatol* 18(1):9-12.
34. Mumcuoglu, K.Y., Meinking, T.A., Burkhart, C.N., Burkhart, C.G. (2006). Head louse infestations: the "no nit" policy and its consequences. *Int J Dermatol* 45(8):891-896.
35. Nutanson, I., Steen, C.J., Schwartz, R.A., Janniger, C.K. (2008). *Pediculus humanus*

- capitis: an update. *Acta Dermatoven APA* 17(4): 147-159.
36. Parish, L.C., Witkowski, J.A., Vassileva, S. (1995). Superficial parasitic infections. In: *Color atlas of cutaneous infections*. Cambridge: Blackwell Scientific: 149-159.
 37. Pernet, G.: An historical note on the nits of the body-louse. *Br, J. Dermatol.* 1918; 30:208.
 38. Plastow, L., Luthra, M., Powell, R., Wright, J., Russell, D., Marshall, MN. (2001). Head lice infestation: bug busting vs. traditional treatment. *J Clin Nurs.* 10(6): 775-783.
 39. Ramezani Awal Riabi, H., & Atarodi, A.R. (2012). Epidemiological and Clinical Study of Infested Cases with *Pediculus capitis* and *P.corporis* in Khorasan-e-Razavi, Iran. *Iranian Journal of Parasitology* 7(1): 85-91.
 40. Roberts, RJ. (2002). Head lice. *N Engl J Med* 346(21): 1645-1650.
 41. Salehzadeh A. (1992). An investigation on Insects and determination of their sensitivity to Faykam and Lindan's pesticides in Hamadan. *J.Sci. and Research affair of Hamadan Uni. Med. Sci.* Second year, 2:32-36.
 42. Sayyadi, M; Vahabi, A; Sayyad, S. (2013). An Epidemiological Survey of Head Louse Infestation Among Primary School children in Rural Areas of Ravansar County, West of Iran. *Life Sci J* 10(12s):869-872.
 43. Shayeghi, M., Paksa, A., Salim abadi, Y., Sanei dehkoordi, A., Ahmadi, A., Oshaghi, M., & Bazrafkan, S. (2010). Epidemiology of head lice in primary school pupils, in Khajeh city, East Azerbaijan Province, Iran. *Iranian Journal of Arthropod-Borne Disease* 4(1): 42-46.
 44. Slonka GF, McKinley TW, McCroan JE, Sinclair SP, Schultz MG, Hicks F, et al. (1976). Epidemiology of an outbreak of head lice in Georgia. *Am J Trop Med Hyg.* 25(5):739-43.
 45. Speare R, Buettner PG (1999). Head lice in pupils of a primary school in Australia and implications for control. *Int J Dermatol.* 38: 285-290.
 46. Steen, C.J., Carbonaro, P.A., Schwartz, R.A. (2004). Arthropods in dermatology. *J Am Acad Dermatol* 50(6): 819-842.
 47. Taplin, K., Meinking, T.L., Castillero, P.M., Sanchez, R. (1986). Permethrin 1% cream for the treatment of *Pediculus humanus var. capitis* infestation. *Pediatr Dermatol* 3:344-348.
 48. Tostia, A., Torres, F. (2009). Dermoscopy in the diagnosis of hair and scalp disorders. *Actas Dermosifiliogr* 100(1): 114-119.
 49. Vahabi A, Shemshad K, Sayyadi M, Biglarian A, Vahabi B, Sayyad S, Shemshad M and Rafinejad J (2012). Prevalence and risk factors of *Pediculus (humanus) capitis* (Anoplura: Pediculidae), in primary schools in Sanandaj City, Kurdistan Province, Iran. *Tropical Biomedicine* 29(2):207-211.
 50. Vahabi A, Rafinejad J, Mohammadi P, Biglarian F. (2007). Regional evaluation of bacterial contamination in hospital environment Cockroaches. *Iran. J. Environ. Health. Sci. Eng.* 4(1): 57-60.
 51. Vahabi B, Vahabi A, Gharib AR, Sayyadi M, Sayyad S (2013). Prevalence of head louse infestations and factors affecting the rate of infestation among primary schoolchildren in Paveh City, Kermanshah Province, Iran in the years 2009 to 2010. *Life Sci J* 10(12s): 360-364.
 52. Wilson, E. *On Diseases of the Skin*. Philadelphia, Blanchard & Lea. 1857: 254-257.
 53. Witkowski, J.A. & Parish, L.C. (1997). What's new in the management of lice. *Infect Med* 14: 287-316.
 54. Zinsser, H. (1934). *Rats, Lice and History*. Boston, Little Brown.