

Pediculus Capitis :An overview

Asmaa.S.Abdel Raouf, Osama.H.El Fady, Samah.E.Sherif and Nagat.A.El Azab

Dermatology, Venereology and Andrology Dept., Faculty of Medicine, Benha University

E-mail: dr.asmaasamir@gmail.com

Abstract

Background: The head louse, also known as *Pediculus humanus capitis*, is a parasitic insect that infects millions of people, primarily children, across the world. Lice infestations can cause severe health problems, including social and psychological repercussions. **Objectives:** This review provides an overview of *Pediculus humanus capitis*, including its prevalence, distribution, and transmission. In addition, we cover the biology and morphology of head lice, the epidemiology of head lice infestations, and the numerous diagnostic and treatment procedures. Finally, we examine ways for avoiding and treating head lice infestations, as well as the ramifications of this parasitic illness for public health. **Conclusions:** Infestations of head lice are a severe public health issue with considerable social and economic ramifications. To address this issue and enhance the health and well-being of individuals and communities, effective diagnosis and treatment, as well as preventative and control initiatives, are required.

Keywords: *Pediculus Humanus Capitis*; Diagnosis; Epidemiology; Treatment and Prevention; Public Health Implications.

1. Introduction

Worldwide, *Pediculosis capitis* is the most prevalent ectoparasitosis. *Pediculus humanus capitis* (head lice) is responsible for the infestation, which affects the hair, scalp, and skin. Rarely does it manifest with other symptoms, and in the majority of instances, when correctly treated, it has a benign course [1].

Lice infestations are a prevalent and chronic condition that affects millions of people worldwide, mainly children between the ages of 3 and 11. These tiny, wingless insects feed only on human blood and are spread by direct physical contact or the sharing of personal items such as hats, combs, and

hairbrushes. The major species that infests the human scalp is *Pediculus humanus capitis*, often known as the head louse [2].

The flattened, elongated body of the head louse is roughly the size of a sesame seed. Each of its six legs possesses a hooked claw that enables it to adhere to human hair. The head louse feeds by piercing the skin and sucking blood from the scalp with its mouthparts [3]. The female head louse deposits eggs, called nits, on the hair shaft near to the scalp after feeding. These nits are around the size of a pinhead and oval in form. They hatch within seven to ten days, and the nymphs begin eating immediately [4].

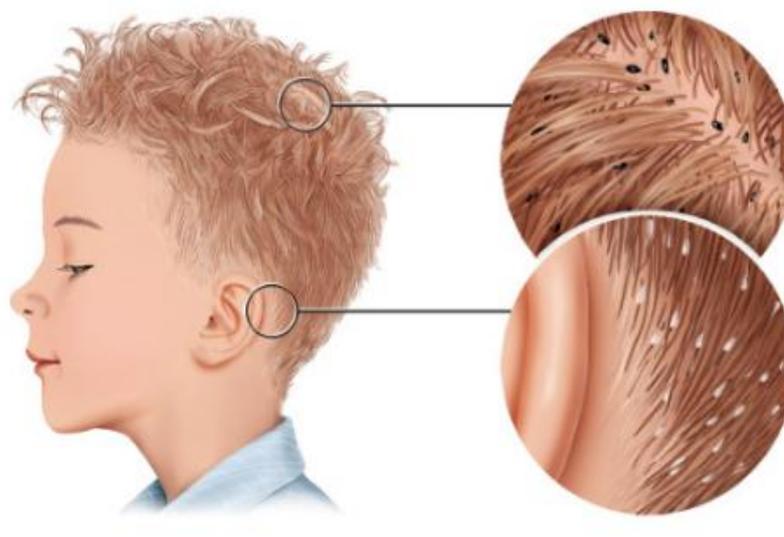


Fig. (1) Head lice and nits in hair.

Lice infestations are a major public health concern, especially among school-aged children. They are capable of causing severe itching, skin irritation, and subsequent

bacterial infections [5]. Infestations of head lice can also have substantial social and economic effects, resulting in missed school days, decreased productivity, and expensive treatments [6].

Effective management of head lice infestations needs a thorough grasp of the parasitic disease's biology, epidemiology, diagnosis, treatment, and public health consequences [7]. This review provides an overview of *Pediculus humanus capitis*, including its prevalence, distribution, and transmission. In addition, we cover the biology and morphology of head lice, the epidemiology of head lice infestations, and the numerous diagnostic and treatment procedures. Finally, we examine ways for avoiding and treating head lice infestations, as well as the ramifications of this parasitic illness for public health.

2. History:

Lice infestations have been a continuous issue throughout human history. Lice infestations have been documented in ancient societies, including the Greeks, Egyptians, and Romans. Hippocrates, a Greek physician, recorded lice infestations and suggested several treatments, including shaving the head and applying oil to suffocate the lice [8]. Also familiar with head lice infections, the ancient Egyptians represented them in their artwork [9].

Throughout history, humans have employed a range of potentially hazardous treatments for head lice infestations. In the Middle Ages, for instance, individuals attempted to kill head lice using a combination of mercury and vinegar. This procedure was exceedingly hazardous to health and might result in organ damage or even death [7].

At the beginning of the 20th century, new treatments for head lice infestations emerged. One of the earliest successful treatments was to drown lice with kerosene or gasoline. However, these therapies were hazardous and might cause skin irritation and other health complications [3].

The first insecticide-based treatments for head lice were created in the 1940s. These treatments used poisons such as DDT and lindane that were successful at eradicating head lice but posed major dangers to human health and the environment [10]. Over time, safer and more effective therapies were created, such as shampoos and lotions containing pyrethrin and, more recently, silicone-based products [11].

There is still a great demand for effective head lice treatments in the present day. There have been reports of pesticide resistance, and

there is minimal evidence that alternative therapies, like as essential oils and herbal cures, are effective [12]. Researchers continue to investigate novel therapies and preventative techniques to combat this pervasive and chronic issue [13].

3. Epidemiology:

Infestation prevalence varies by area, population, and socioeconomic standing. In affluent nations, head lice infestations are most prevalent among school-aged children aged 3 to 11 years, with females infected more frequently than boys. In poorer nations, head lice infestations are more prevalent across all age categories, affecting up to 60 percent of the population [14].

Within a particular community, the incidence of head lice infestations can vary widely, with some studies finding rates as low as 1-2 percent and others as high as 40-50 percent. Close physical contact, sharing personal things such as combs and hairbrushes, and poor hygiene are all risk factors for infestation. Infestations of head lice can also be more prevalent in crowded living environments, such as homeless shelters and refugee camps [6].

Infestations of head lice can have major economical effects, particularly in affluent nations. Infestations can result in missed school days, decreased parental productivity, and expensive therapies. The stigma associated with head lice infestations can have a severe effect on affected individuals and their families, resulting in feelings of shame and isolation [15].

4. Biology and morphology:

Head lice are little blood-feeding parasites. They are closely related to body lice and pubic lice and belong to the species *Pediculus humanus capitis*. Lice attach their eggs, known as nits, to individual hairs on the scalp, behind the ears, and at the nape of the neck [5].

Head lice have a distinct morphology that may be utilized to differentiate them from other forms of lice. Adult head lice are petite, wingless insects measuring between 2 and 3 millimeters in length. They have six legs with claws that enable them to attach to hair shafts. Their bodies are flattened and elongated, and their heads contain two huge complex eyes and two antennae. Head lice are typically light brown or gray in appearance, but if they have recently dined on blood, they may seem darker.

There are three phases in the life cycle of head lice: egg (nit), nymph, and adult. Adult female head lice deposit their eggs close to the scalp, where the temperature is appropriate for

incubation, on hair shafts. Nits are oval and adhere to hair shafts with a glue-like material generated by female head lice. Approximately eight to ten days later, the eggs hatch into nymphs, which are smaller replicas of the adult

head lice. Before maturing into adults, nymphs undergo three molts over the course of 9–12 days. Adult head lice may survive on a human host for up to 30 days, during which time they mate and produce new eggs [16].

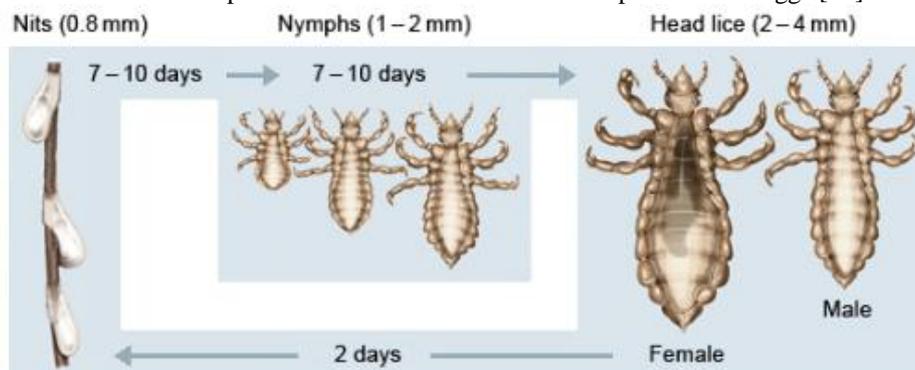


Fig. (2) The life cycle of head lice

Head lice consume only human blood, which they get by piercing the skin and injecting an anticoagulant to prevent the blood from clotting. Typically, they feed once or twice a day for roughly 30 minutes. Head lice can cause extreme itching and discomfort when feeding, and their saliva might trigger allergic responses [17].

Lice are transferred mostly through head-to-head contact with an infected individual. In addition, they can be spread via shared personal objects like combs, brushes, and caps [7].

5. Diagnosis and treatment:

Typically, a visual check of the scalp and hair is used to determine the presence of adult lice or their eggs when diagnosing a head lice infestation (nits). This may be accomplished by combing the hair with a comb with fine teeth and checking the strands and scalp for lice or nits. Wet combing, which includes putting conditioner to the hair and combing through it with a comb with very tiny teeth, is

an additional effective way for identifying head lice infestations [18].

Differential diagnosis

Inner root sheath remains (hair casts) and black and white piedra, generated by *Piedraia hortae* and *Trichosporon beigeli*, are included in the differential diagnosis. On physical examination, trichodystrophies such as monilethrix and trichorrhexis nodosa as well as scalp disorders such as psoriasis and eczema have been mistaken for nits. Nits can also be mistaken for debris on the hair shaft caused by hairspray, dandruff, or accumulated seborrheic dermatitis flakes [19].

Unlike nits, hair casts and flakes may move freely down the hair shaft. Microscopic inspection helps establish the proper diagnosis. Psocids are lice-like insects (booklice) that seldom infest human scalps; they may be distinguished from human lice by their bigger heads, larger mouthparts, larger hind legs, and longer antennae [20].

Table (1): Pediculosis capitis differential diagnosis [21]

No.	Diagnosis
1.	Inner root sheath remnants (hair casts)
2.	Black piedra
3.	White piedra
4.	Trichodystrophies (monilethrix and trichorrhexis nodosa)
5.	Psoriasis
6.	Hair spray debris
7.	Seborrheic dermatitis
8.	Psocids (book lice)

After a diagnosis of a head lice infestation, numerous treatment methods are available. Common treatments for head lice infestations

include pyrethrin and permethrin-based over-the-counter (OTC) drugs. These drugs function by interfering with the neurological system of

lice and killing them. Nonetheless, certain strains of head lice have acquired resistance to these treatments, which can diminish their efficacy [3].

Malathion and ivermectin are also available by prescription for the treatment of head lice infestations. Malathion is a pesticide that is applied to the scalp and hair, whereas ivermectin is an orally administered drug that kills lice. In circumstances when over-the-counter therapies have failed or if the infestation is especially severe, these drugs may be useful [22].

Manual removal of lice and nits can be useful in addition to medication-based therapies. This requires combing the hair with a comb with very fine teeth and physically eliminating the lice and nits. This procedure is successful and does not rely on potentially hazardous chemicals, although it is time-consuming [23].

The most effective treatment for head lice infestations depends on the degree of the infestation and the particular situation. It is essential to follow the directions included with the chosen treatment and to take measures to prevent reinfestation by carefully cleaning personal belongings and avoiding head-to-head contact with affected persons [24].

6. Prevention and control:

Prevention and management of head lice need a complex strategy involving personal hygiene practices, environmental cleanliness, and community actions [23].

The following are some strategies that can be effective in preventing and controlling head lice infestations:

a) Personal hygiene measures:

Promoting excellent personal hygiene practices, such as frequent hair and body washing, can aid in preventing head lice infestations. Sharing personal things like combs, brushes, caps, and towels can further increase the likelihood of infection [2].

b) Environmental sanitation:

Vacuuming and meticulously cleaning the home, particularly the beds and upholstered furniture, can help prevent the spread of head lice. In addition, washing clothing, bedding, and personal things in hot water and drying them on high heat helps eliminate lice and nits if they are present.

c) Community-based interventions:

Community-based initiatives, such as school-wide screenings and treatment programs, can be beneficial in preventing and treating head lice infestations in some instances. This might include educating parents, teachers, and children about the dangers of head lice infestations and offering

tools for treatment, such as combs and shampoos.

d) Ongoing surveillance:

Regular monitoring and surveillance for head lice infestations can aid in the early detection of instances and the prevention of their spread. This may entail visual examinations of the scalp and hair, as well as more sensitive detection techniques such as wet combing [13].

7. Public health implications:

Infestations of head lice can have major effects on public health, including the potential for disease transmission, negative effects on school attendance and academic performance, and psychological effects on people and families [25, 26].

Disease transmission: Lice are capable of transmitting illnesses such as trench fever, typhus, and relapsing fever, despite the fact that head lice infestations do not often constitute a major health danger. However, the danger of disease transmission is regarded as minimal, and head lice infestations may be treated to lessen this risk [27].

Impact on school attendance and academic performance: Lice infestations can result in significant school absences, which can negatively affect academic performance and socializing. Children with head lice may also be stigmatized and excluded from school activities, which can have detrimental effects on their mental health and self-esteem [28].

Psychological impact: Lice infestations can also have major psychological effects on people and families. The stigma associated with head lice infestations can result in emotions of humiliation, shame, and social isolation. In addition, persistent discomfort and difficulties in eliminating head lice can cause severe worry and stress [29].

To address the effects of head lice infestations on public health, it is necessary to take a comprehensive strategy to prevention and treatment. This may involve educating the public on the hazards of head lice infestations and effective preventative methods, increasing access to effective treatments, and decreasing the stigma associated with head lice infestations. We can lessen the burden of head lice infestations on people, families, and communities by addressing the public health consequences of these infestations.

8. Conclusion

In conclusion:

- Lice infestations are a widespread concern, especially among youngsters. This article examined the history, epidemiology, biology and morphology,

diagnosis and treatment, prevention and control, as well as the public health consequences of head lice infestations.

- Effective diagnosis and treatment of head lice infestations are essential for preventing the transmission of illness and mitigating the negative effects on school attendance, academic performance, and mental health. While over-the-counter and prescription drugs have been helpful in treating head lice infestations, the emergence of resistance to some treatments has underscored the need for continued research and the development of novel remedies.
- Prevention and control methods, such as personal hygiene practices, environmental cleanliness, and community-based activities, are also essential for lowering the incidence of head lice infestations.
- Future head lice research should concentrate on the development of innovative treatments and preventative techniques, as well as the identification of risk factors for infestation and the socioeconomic consequences of head lice infestations.
- In conclusion, head lice infestations are a major public health problem with considerable social and economic ramifications. To address this problem and promote the health and well-being of individuals and communities, a comprehensive approach that combines effective diagnosis and treatment with preventative and control techniques is required.

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