What's Eating You? Pubic Lice (*Pthirus pubis*)

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The 3 major lice species infesting humans are *Pediculus humanus* var *corporis* (body louse), *Pediculus humanus* var *capitis* (head louse), and *Pthirus pubis* (pubic louse)(Table). All 3 are sucking lice of the phylum Arthropoda, living in close association with the host and depositing their eggs on human hair shafts or in the seams of clothing.[1-3] Pediculosis pubis is an infestation of the hair-bearing regions with *P pubis*, or the pubic louse (Figure 1). The pubic louse was first described and named in 1758 by Linnaeus as *Pediculus pubis*,[4] though evidence of infestation in pre-Columbian America dates back at least 2000 years.[5] In 1815, Leach established the genus *Pthirus* and included therein a single species, *Pediculus pubis* Linnaeus.[4] The letter *h* unintentionally was dropped from the Greek word *Phthirus* as a typographic error. Two years later, Leach referred to this species as *Phthirus pubis* (Linnaeus).[6] Until 1958, the genus was spelled both ways. However, in 1958, the genus was fixed as *Pthirus*,[6] thus the binomial name for the pubic louse is *Pthirus pubis*.[6,7]

Classification and Characteristics of Pubic Lice

The pubic or crab louse gets its name because its body and enlarged pincerlike second and third pair of legs give it the appearance of a crab (Figure 2). The pubic louse ranges in size from 0.8 to 1.2 mm in length and resides in pubic and perineal hair, as well as the hair of the legs, abdomen, chest, and back. It also can be seen in the eyelashes, axillary hair, and scalp. Scalp infestation is more common in individuals with thick curly scalp hair and is more prevalent in black individuals.[2,8-10] When pubic lice are found on the eyelashes, the condition is termed *pediculosis ciliaris*. Individuals testing positive for HLA-A11, HLA-B5, and HLA-B27 are more susceptible to infestation with *P pubis*.[11] The life cycle of the pubic louse consists of 3 stages: nit (egg), nymph (immature louse), and adult louse. Each female lays about 25 eggs in batches of 2 to 3 during her 30-day life cycle.[2] The eggs are attached at the base of coarse hairs. Scanning electron microscopy of pubic louse eggs reveals a complicated aeropyle system within the operculum. This network is important for gaseous exchange and also may be important for penetration of pediculicides or occlusion of the operculum.[12] Nymphs hatch in 6 to 8 days and usually begin feeding within the first few hours. Once the nymphs begin to feed, they usually remain stationary, grasping the hair shaft with their crablike legs and embedding their mouthparts into the skin. Nymphs are similar in appearance to adult lice but are smaller and sexually immature. First instar nymphs feed for about 5 to 6 days before molting. The second instar lasts 9 to 10 days, and the third instar lasts about 13 to 17 days. Visualization of ova at the hair-skin junction establishes active infestation. Nit cases on more distal portions of the hair shaft may relate to a recent infestation but are not diagnostic of current infestation. The entire life cycle of the pubic louse from nit to adult is 4 to 6 weeks, with adults living approximately 2 weeks. Adult pubic lice can crawl up to 10 cm/d but usually remain stationary.[2,3]

Epidemiology

Few epidemiologic studies of pubic lice have been done, and the exact incidence of infestation is unknown. Pubic lice usually are spread by sexual contact and commonly are seen on teenagers and young adults. Infestation should prompt evaluation for the presence of other sexually transmitted

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Classification of Phthiraptera (Lice)

- Order: Phthiraptera
  - Suborder: Amblycera (mainly parasites of birds)
  - Suborder: Anoplura (bloodsucking louse)
    - Family: Pediculidae (body louse)
      - Species: *Pediculus humanus* var *corporis* (body louse)
      - Species: *Pediculus humanus* var *capitis* (head louse)
    - Family: Pthiridae (pubic louse)
      - Species: *Pthirus pubis* (pubic louse)
  - Suborder: Ischnocera (parasites of birds and mammals)

diseases (STDs). A prospective 14-year study conducted at an STD unit in Gijón, Spain, providing care to a population including male and female prostitutes showed that infestation was slightly more common in males than females, with a ratio of 1.8:1, and there was a higher incidence of infestation and reinfestation in homosexual men. The yearly infestation rate ranged from 1.3% to 4.6%, with a mean age of 30.3 years.[13] Of 481 men with pubic lice, there was a negative association between the number of years of formal education and the incidence of infestation, suggesting that pubic lice infestation in adults is more common in individuals of lower socioeconomic status.[14] Risk factors for infestation include close physical or sexual contact with affected individuals, bedding or clothing that is shared with an infested individual, and multiple sexual partners. Up to 30% of patients will have a concurrent STD and should undergo screening for human immunodeficiency virus, syphilis, chlamydia, gonorrhea, herpes, human papillomavirus, trichomoniasis, and scabies.[3,15,16] Pediculosis pubis is highly contagious and the probability of acquiring pubic lice by sexual exposure to an infested partner is extremely high. Infestation can be spread by contact with an infested individual's bed linens, towels, or clothes. Although infestation with *P humanus* var *capitis* is more common in the warmer months, the incidence of *P pubis* seems to be greater in the winter.[17] The risk of transmission by a toilet seat is quite low because pubic lice prefer a warm environment and are not designed to ambulate on or attach to smooth surfaces.[18]

Reactions

The primary complaint of individuals infested with *P pubis* is pruritus. The itch frequently is worse at night and the patient may detect nodularity (nits or eggs) in the hair when scratching. Erythematous macules and papules with excoriations and secondary infection may be seen, but the cutaneous findings usually are less severe than those seen in patients with pediculosis capitis and pediculosis corporis. When excoriations are present, the patient also may have associated inguinal lymphadenopathy.[3] The nits, and occasionally the adult pubic lice, can be seen attached to the hair base. Diagnosis usually can be made with the naked eye, but magnification of the affected area provides easier visualization of the nits or adult lice. Small gray to bluish macules measuring less than 1 cm in diameter may be seen on the lower abdominal wall, buttocks, and upper thighs. These lesions, known as maculae ceruleae (blue spots), are thought to be caused by hemosiderin deposition from the bites.[3,19] Although much less common, infestation of the eyelashes may occur.[20] Eyelash infestation can cause crusting and edema of the eyelid margins, as well as conjunctivitis, and nits are readily seen at the lash base.[21] Pediculosis ciliaris may be a sign of childhood sexual abuse but more commonly results from transfer from chest and other body hair of affected individuals holding the child. Nits on pubic hair may be incorrectly diagnosed as trichomycosis pubis or white piedra. Other conditions to consider in the differential diagnosis include atopic dermatitis,

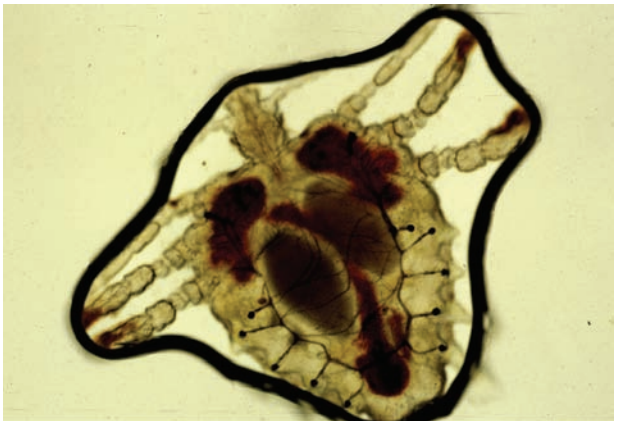

Figure 1. *Pthirus pubis* (pubic louse).

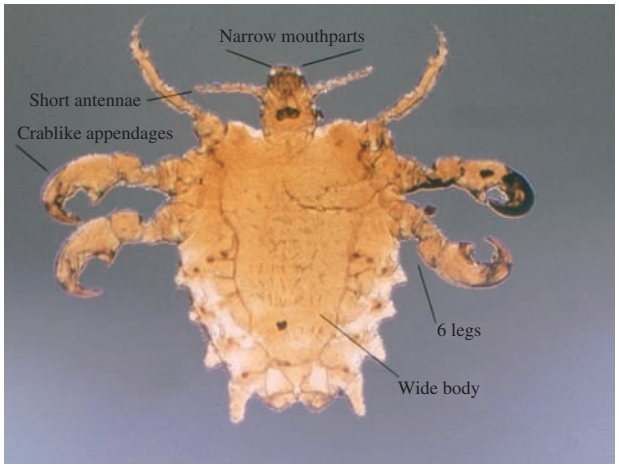

Figure 2. Anatomy of a pubic louse.

seborrheic dermatitis, tinea cruris, folliculitis, molluscum contagiosum, and scabies. Self-treatment with various home remedies may produce irritant or allergic contact dermatitis and complicate the initial evaluation.

Treatment

The treatment of pubic lice can be difficult and involves eradication of all live lice, removal of viable ova, and treatment of secondary infection. The efficacy of any therapeutic agent is dependent not only on the active ingredient but also on the vehicle and proper application of the agent. Permethrin, lindane, pyrethrins, and malathion have all been used effectively in the treatment of pubic lice, but resistance may be a problem. The most permeable areas of the ovum are the operculum and the protective outer layers of the developing embryo of the louse.[22-24] Permethrin is a synthetic pyrethroid that disrupts sodium transport in the arthropod, resulting in respiratory paralysis. Permethrin, unlike pyrethrins, has a residual effect for up to 3 weeks.[3] However, waning levels may be ineffective at killing all hatching lice and may contribute to the emergence of resistance. Re-treatment at 1 week with the same therapy or a complementary agent is highly recommended. Permethrin has a favorable safety profile and the extent of systemic exposure following external therapeutic administration of permethrin is very low. Thus, permethrin usually is well-tolerated by the patient.[25,26] In addition, the use of permethrin products during pregnancy appears to be relatively safe. Of 113 pregnant females that had used permethrin during their first trimester, there were 106 live births, 6 spontaneous abortions, 1 therapeutic abortion, and 1 major malformation. There were no statistically significant differences between the exposed and control groups in any of the pregnancy outcomes.[27] In extremely high doses, permethrin has the potential to cleave the mixed-lineage leukemia gene, *MLL,* causing a translocation that has been associated with leukemia.[28]

Lindane is an organochloride that kills lice by causing respiratory paralysis. It has been associated with human neurotoxicity in high doses.[29] Pyrethrins, derived from an extract of chrysanthemums, have the same mechanism of action as permethrin.[30] Malathion is a relatively weak organophosphate cholinesterase inhibitor that causes respiratory paralysis in arthropods.[31] Malathion lotion 0.5% topically applied at therapeutic doses is about 98% ovicidal for head lice, and resistance, at least among head lice, currently does not appear to be a substantial problem in the United States.[31,32] Although it is uncertain how far these data can be extrapolated, data on efficacy for head lice may give a rough indication of the efficacy for pubic lice. One study showed that a 20-minute application of malathion 0.5% may be just as effective at the recommended 8- to 12-hour application for the treatment of head lice. In addition, malathion was significantly more pediculicidal and ovicidal (98%) compared to permethrin cream rinse 1% (55%) at day 15 ($P<.0001$).[31] The lack of resistance to malathion likely is related to the fact that it was unavailable in the United States for several years and still has a relatively small market share. The vehicle marketed in the United States contributes to the efficacy of the agent but is flammable.[33]

The Centers for Disease Control and Prevention recommends the following treatment regimen: permethrin or lindane shampoo 1% applied to the affected areas and thoroughly washed off after 10 minutes or 4 minutes, respectively, or pyrethrins with piperonyl butoxide applied to the affected areas and washed off after 10 minutes.[18]

The skin should be cool and dry prior to application to minimize systemic absorption. Nits can be manually removed with a nit comb or tweezers. Patients who have persistent symptoms one week after treatment should be evaluated for recurrent or persistent infection. Re-treatment is indicated if lice are seen or nits are found at the hair-skin junction.[18] There have been documented cases of resistance to pyrethrins; however, in most individuals, eradication can be achieved with the use of permethrin 5%.[34]

Ivermectin, a drug first used in veterinary medicine and also in the treatment of strongyloidiasis and onchocerciasis, is a semisynthetic derivative of a macrocyclic lactone. It acts on ion channels in the cell membranes, causing paralysis in many nematodes and arthropods.[35] Two doses of oral ivermectin 250 μg/kg given one week apart have been used in the treatment of pubic lice.[36] Ivermectin has no ovicidal activity and requires the louse to obtain the drug via blood meals. Therefore, 2 doses of ivermectin administered one week apart are recommended to eradicate the infestation. It also is recommended that ivermectin not be used in children weighing less than 15 kg or in pregnant or lactating females due to the ability of ivermectin to cross the poorly developed blood-brain barrier.[36]

Crotamiton, permethrin, and an Egyptian lotion containing tetramethrin 0.6% and piperonyl butoxide 2.4% all demonstrate efficacy in eradicating *P pubis* in vitro. However, the time needed to cause 100% mortality varies. In one study, a lotion containing tetramethrin 0.6% and piperonyl butoxide 2.4% was the most potent, followed by crotamiton and permethrin.[37] Although these agents have been shown to be pediculicidal against *P pubis* in vitro, clinical data to support their efficacy is scant.[37] The incidence of resistance to pediculicides is increasing and the registration of new pesticides has become costly. As a result, few new treatments have been marketed and many infested individuals resort to home remedies that have not been scientifically tested. Vinegar, isopropyl alcohol, olive oil, mayonnaise, melted butter, petroleum jelly, and water submersion have been used with varying and generally little success. Petroleum jelly may cause substantial louse mortality but is ineffective in preventing lice from laying eggs. Depriving lice of oxygen via underwater submersion has been shown to be inefficient.[38] Topical products containing ammoniated mercury have been complicated by cutaneous eruptions. In a report by Vena et al,[39] 9 male patients presented with a generalized rash following the use of topical over-the-counter antiparasitic powder containing ammoniated and metallic mercury to treat pthiriasis. A positive reaction to a patch test of ammoniated mercury was confirmed in all 9 patients.[39] Various essential oils are marketed via the Internet for the treatment of lice. Controlled data are lacking and the agents also may act as contact allergens. Shaving is effective but may not be acceptable to the patient. Better topical agents that kill lice via asphyxiation would be attractive alternatives to chemical pediculicides.

In young children with eyelash infestation, the most practical treatment is an occlusive agent such as petroleum jelly.[40] Fluorescein dye strips have been used and produce an immediate toxic effect on the lice, though controlled studies are lacking.[41] Eyelid infestation also can be managed by mechanical removal of the eyelashes, including lice and nits with fine forceps, but there is potential for corneal damage and regrowth of the eyelashes takes at least 2 months.[42] At one time, mercuric oxide ointment was considered a viable treatment for eyelash infestation,[43] but this treatment now is discouraged because of reports of systemic mercury toxicity and contact dermatitis related to mercuric oxide ointment.[44-46]

Reinfestation is common and must be addressed. The treatment of close contacts and sexual partners can reduce cross-reinfection. Bedding and clothing should be machine washed and dried in a hot dryer. Many lice will survive a cold wash cycle and some may survive a cool dryer cycle.[47] Other causes of treatment failure include improper dilution or duration of application, differences in formulation, and emerging resistance.

A diagnosis of louse infestation can be disturbing to sensitive patients or their parents and may lead to delusions of parasitosis after the infestation is eliminated. A careful examination is critical, but if there is no evidence of infestation, healthcare providers should be careful not to reinforce the delusion.

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