

Head Lice

Life Cycle and Characteristics

Clinical Presentation



- Identification of live louse.
- Identification of nits on the hair shaft.³
- Itching, scratching caused by an allergic reaction to the bites.^{4,7}
- Allergic reaction begins 1–2 weeks after infestation (1 to 5 lice). This is a reaction to the anti-coagulant products that the louse injects locally as it takes its blood meal. Others may be asymptomatic.²
- In long standing cases a roseo-like exanthema on the body may accompany lice infestation.^{4,7,2}
- May be excoriation and crusting with secondary bacterial infection and regional lymphadenopathy.^{4,7}
- Tickling feeling of something moving in the hair.

Infectious Agent

Head lice are insects from the arthropod family and are of the order of the Anoplura. The adult lice are obligate blood sucking ectoparasites that require warmth and a source of human blood to survive. Although infestation generally occurs close to the scalp, behind the ears and the back of the neck, it has been reported to occur anywhere on the scalp.^{4,9,11,12}

Reservoir

Humans^{4,11,13}

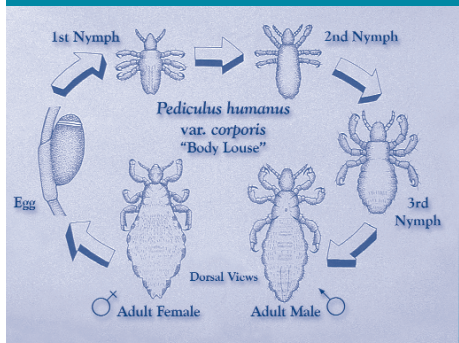
Occurrence/Susceptibility

Worldwide. Head lice are more common in children and the literature indicates the prevalence is higher in females. Caucasians are more frequently infested than other ethnic groups irrespective of social economic class. Any person may become louse infected under suitable conditions of exposure.^{13,5,2}

Transmission

- Primary mode of transmission is direct person to person contact.
- Infestations are more commonly spread within families than within schools. because of close personal contact and shared brushes and combs.¹⁶
- Secondary mode of transmission is fomites or indirect through personal belongings, i.e. hats, bedding, combs, and hair accessories.
- Head lice crawl but do not fly or jump.^{5,9,13}
- Although lice can crawl relatively quickly, they rarely travel far from a preferred habitat, such as the warmth of the scalp.¹⁷

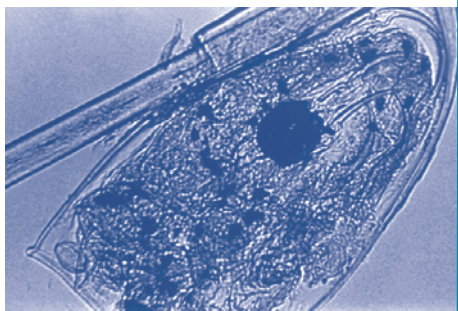
Incubation Period



- Egg to egg cycle averages 3 weeks
- Life cycle composed of 3 stages (see diagram):
 - Eggs
 - Nymph⁹
 - Adult
- Egg to nymph stage 6 – 12 days
- Nymph to adult 7 – 14 days⁹
- Adult 7 – 10 days
- Most suitable temperature for incubation 32° C
- Most suitable humidity 70%
- Eggs do not hatch at < 20° C or >38° C^{3,9,14}

Life Cycle of Head Louse

1. Eggs or Nits



Description:

- Eggs are laid in their shells (the nits).
- **Shape:** oval, teardrop or flask shaped and have a lid (operculum) that covers the free end.^{4,11}
- **Colour:** documented as grayish-white, pearly or silvery white and even yellow-white; transparent, glistening or opalescent in nature.
- **Size:** 0.3 mm – 0.8 mm, looks like grains of sand.^{9,11}
- Easier to detect than adult lice.
- After hatching, empty white to dull yellow and almost clear colored nit casing or shells are left behind. They remain tightly adhered to hair shaft.^{3,9,11}
- Often confused with dandruff or hair spray droplets, which easily come off of hair.
- Viable nits are always found close to the scalp (1 – 4 mm).
- Human hair grows slowly at an average rate of approximately 0.37 mm/ day. Nits found several millimetres from the scalp are now empty egg cases.
- Duration of infestation can be estimated by the distance of nits from the scalp.^{4,9,11}
- Egg is tightly glued to the base of the hair shaft, nearest the scalp with a special cement bond called chitin.
- Eggs are usually deposited 1 – 4 mm from the scalp.
- Eggs are difficult to dislodge.
- Eggs hatch within 6 – 12 days.
- 2 – 12% of eggs do not hatch.
- Only eggs deposited by inseminated female lice will hatch.
- May persist on hair for months, even after successful treatment, if not removed.^{3,5,6,7,9,11,13}

2. Nymph

- Looks like adult louse, but smaller and immature.
- **Size:** 1 mm in length, size of pinhead.
- Matures in 3 stages.
- They grow by molting or shedding their skin 3 times before reaching adulthood.
- Nymphs mature after three molts and become adults (able to reproduce) about 7 – 14 days after hatching.^{5,11}
- Nymphs tend to remain on the head where they hatch.^{3,8,9}

3. Adult Lice Physical Characteristics

- Wingless, elongated body with 3 segments (head, thorax and abdomen).
- Short antennae with 4 segments.
- Small head with anterior piercing mouthparts that are used to pierce the scalp and feed on blood.

(continued on next page)

	<ul style="list-style-type: none"> • 6 short and stubby legs with single tarsal segments, with powerful hook-like claws at the end of each leg. These claws are used to grasp the hair shaft. • Dorsoventrally flattened. • Size: 2 – 4 mm in length – approximate size of a match head or sesame seed (females usually larger than males). • Do not leave head until nearly fully grown. • Mating only occurs once fully grown. • Colour: have been documented as grey, tan, brown, red or black. • Colour changes to rust coloured after a blood meal. • Elusive and well camouflaged. • Darker in color in dark hair. They tend to reflect the colour of their surrounding.
Feeding habits:	<ul style="list-style-type: none"> • The louse injects a local anaesthetic through their saliva into the scalp to prevent their host from feeling any pain and an anticoagulant to prevent the blood from clotting, thus making it easier to feed. • They blood feed several times each day. • They move rapidly and are difficult to spot. • Lice are not able to burrow into the scalp. • Usually found close to the scalp to maintain its body temperature. • Adult female lays 3 – 10 eggs per day. • Adult female may deposit 100 – 300 nits in her lifetime.^{3,4,5,11,13}
Period of Communicability	
	<ul style="list-style-type: none"> • As long as lice or viable eggs remain alive on the infested head. • Nits will not hatch off the head as they are extremely temperature and humidity sensitive. • Lice that fall off the head and are without a blood meal have been noted to die within 20 – 48 hours. • Lice are capable of surviving 24 hours immersed in H₂O.^{5,11}
Diagnosis	
Active or Recent Infestation	<ul style="list-style-type: none"> • Live nymphs or adults. • Viable nits 1 – 4 mm from scalp^{1,11} <u>Highly Suggestive of Active Infestation:</u> • Numerous nits within 6 mm (1/4") from scalp.¹¹
Previous or Old Infestation	<ul style="list-style-type: none"> • Nits only; more than 6 mm (1/4") to 12 mm (1/2") from scalp. • Nearly always hatched, when located at this distance.^{1,5}
Helpful Hints for Diagnosis	<ol style="list-style-type: none"> 1. Duration of infestation can be estimated by the distance of the nits from the scalp: human hair, on average, grows at a rate of 0.37 mm / day. 2. Infested heads can carry anywhere from 8 – 24 lice at any given time. They have a high natural mortality rate; heads may have hundreds of viable, dead or hatched eggs.
Detection	
Method 1	<ul style="list-style-type: none"> • Dampen hair (to decrease static electricity that can cause lice to be repelled from the comb). • Bend head over a plain sheet of paper. • Comb hair with a fine toothed comb (teeth about 0.2 mm apart). • Observe for lice to drop. • Part hair and look for moving lice. • Magnifying glass may be useful. • Use illumination, bright light – they scurry to hide making it easier to spot.^{1,13}

Method 2	<ul style="list-style-type: none"> • White hair conditioner may be applied to the dry hair, covering root to tip. Immediately after application, a head lice comb is used and the combings wiped onto tissue paper and examined for lice or eggs.¹⁷ However this conditioner should be thoroughly removed if lice treatment is necessary.
Method 3	<ul style="list-style-type: none"> • Tap head with piece of transparent adhesive tape. If there are lice, they will stick to the tape. It then becomes a convenient coverslip for a microscopic slide.

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