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Head Lice: Identification, Biology, and Integrated Pest Management

Shujuan (Lucy) Li, Dawn H. Gouge, Shaku Nair and Alfred J. Fournier

This publication is for medical care providers as well as parents and guardians of dependent children and adults

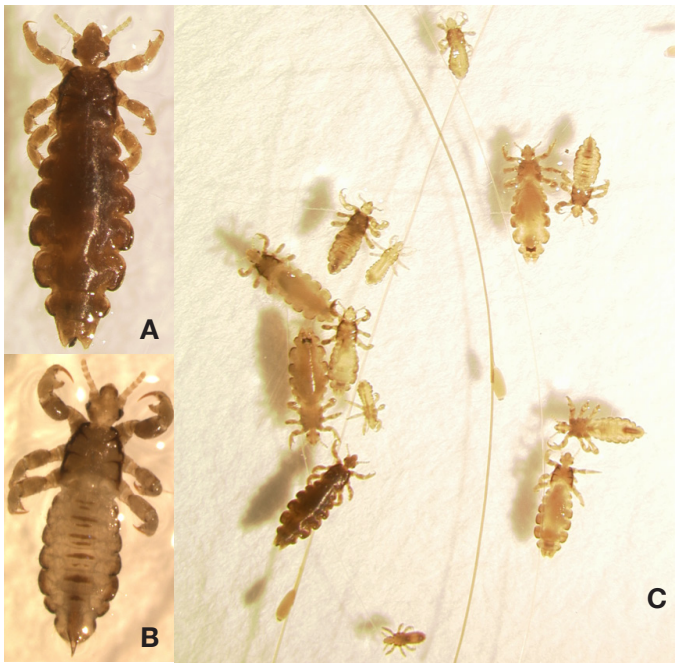

Figure 1. Adult head lice are about the size of a sesame seed (2-3 mm or 1/16-1/8 inch long). A. Adult female head louse. B. Adult male head louse. C. Head Lice eggs, nymphs and adults. Images: Shujuan Li.

Introduction

The head louse, *Pediculus humanus capitis*, is a tiny insect about the same length as a sesame seed (Fig. 1). It can crawl rapidly across the scalp but cannot fly or jump. Head lice live on people and cannot survive on pet animals. The entire life cycle of this insect occurs on the human head, because they are well adapted to the temperature and humidity conditions on the surface of the scalp. They feed by piercing the skin to take small blood meals and are generally found associated with hair on the scalp and close to the neck.

This human ectoparasite (parasite that lives on the surface of a host) causes scalp itching, and scratching that can lead to secondary skin infections causing impetigo and dermatitis. More noteworthy is the impact of related stress that includes excoriation (scratching that leads to lesions) of the scalp and subsequent infections, sleepless nights, school days missed by students, and workdays missed by parents and guardians.

Pediculosis, or "lousiness", is one of the most prevalent communicable conditions in the United States (U.S.). Head lice infestation is common and the ectoparasites are globally prevalent (Falagas et al. 2008; Toloza et al. 2009). Head lice can infest people of all ages, but children are more prone to infestations due to their play activity and close physical

Figure 2. Head lice populations have developed a high level of resistance to some of the most common head lice treatments. Red dots indicate 100% of the tested head lice were resistant. Orange indicates 50 - 90% of head lice were resistant. Green indicates none of the tested head lice were resistant. Blue indicates no population analyzed. Image from Gellatly et al. 2016.

contact. It has been estimated that up to one in every 10 school-aged children acquires head lice at some time during their years in school. It is possible that girls acquire head lice more frequently than boys due to close physical contact habits e.g., head-to-head "selfie" image capture and sharing of apparel habits. Adults in care homes and those living with chronically infested children carry the highest adult infestation burdens (Falagas et al. 2008).

The direct health impacts of head lice feeding on the scalp may be negligible, but indirect impacts are considerable and inappropriate treatments can pose unnecessary health hazards to those being treated and caregivers administering treatments. According to the Centers for Disease Control and Prevention (CDC) (CDC 2020), an estimated 6 million to 12 million infestations are suspected each year in the U.S. among children 3 to 11 years of age (http://www.cdc.gov/parasites/lice/head/gen_info/faqs.html). The economic impact of head lice in the U.S. is estimated at $1 billion dollars annually, which includes direct costs (treatments and tools used to manage lice and nits) and indirect costs (missed school and work days, misdiagnosis, misuse of pediculicides, and unnecessary expenditures) (Hansen and O'Haver 2004).

In the U.S. the number of head lice cases peaks each year during the early weeks of the academic year. Head lice are now more difficult to control using many commonly used over-the-counter products as documented in publications by Yoon et al. (2015) and Gellatly et al. (2016). In fact, 42 U.S. states are documented to have head lice populations that are highly resistant to lice shampoo treatments containing pyrethrins and the synthetic pyrethroid insecticide, permethrin (Fig. 2).

Because of the occurrence of pesticide resistance, it is more important than ever to use an integrated pest management (IPM) strategy to battle this "lousy" pest. Using multiple complementary control tactics including educational and policy measures and paying careful attention to the result are critical. Medical staff, parents, caregivers, teachers, childcare and eldercare professionals should be aware of this insect pest and understand safe and effective ways to prevent and manage it.

Identification and Biology

Head lice do not have wings or legs adapted for jumping. They can crawl rapidly across the surface of the scalp and move around in hair using specially adapted claw-like structures at the ends of their legs (Fig. 3).

Head lice will move quickly away from light so can be a challenge to observe. They prefer to live on the hair of the head on the scalp, neck, and behind the ears, although they can occur in eyebrows and eyelashes. Head lice feed every 4 - 6 hours and remain in close contact with the host. They are unable to survive away from a human host for more than 48 hours. They cannot live in rugs, carpets, furniture, or on the upholstery of vehicles.

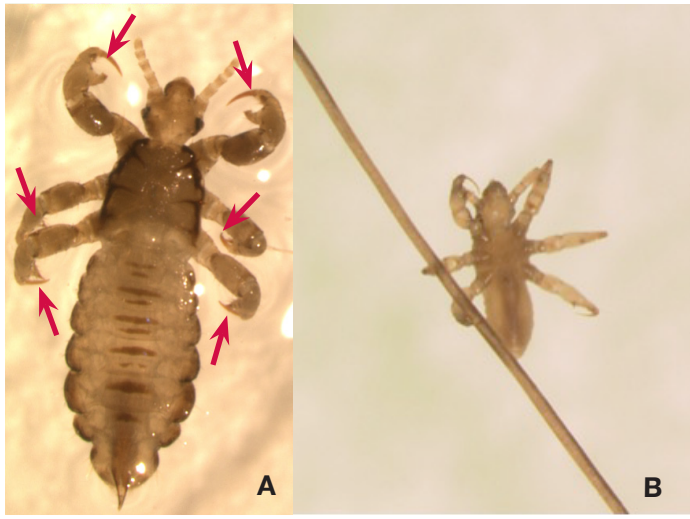

Figure 3. The tarsal claw at the end of each head louse leg. A. Notice the claws on legs of a male head louse; B. A head louse is grasping on a hair. Both images: Shujuan Li.

Lice eggs are called nits. Nits are oval in shape. They are very small, about the size of a knot in thread, and are often camouflaged with the host's own hair pigment. They are usually glued to hair close to the scalp by the female louse (Fig. 4). Nits are quite often easier to see in the hair behind a person's ears and back of the head close to the neck. Eggs will hatch in 7 - 10 days and once a nit hatches, a nymph (immature) leaves the shell casing that then turns white in color. The empty nits are far more obvious to the observer and unless physically removed they can remain attached to the hair and eventually grow out over time as the hair grows.

Both nymphs (immatures) and adults (Fig. 1C) have piercing-sucking mouthparts that are used to pierce the skin and take a blood meal. Within an hour of hatching, a newly emerged nymph will take its first blood meal. Lice pass through three immature stages during the next 10 - 12 days

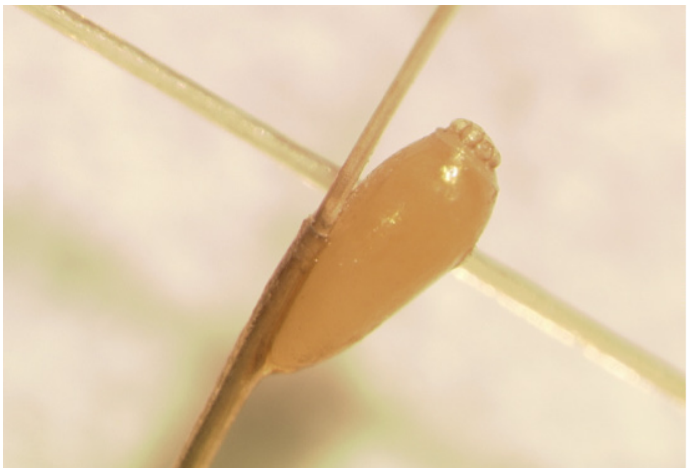

Figure 4. Egg of the head louse on a hair. Image: Shujuan Li.

before reaching the adult stage measuring 2-3 mm in length (about 1⁄16 - 1⁄8 inch). The female louse can mate and begin to lay eggs soon after becoming an adult. Females can live up to 40 days, laying 3 - 7 eggs per day once mature, generating 50 - 100 eggs during their lifetime. A new generation of head lice can occur every 3 weeks.

The reaction of individuals to louse bites can vary considerably. Most often, people previously unexposed to lice may experience little irritation for the first few weeks. But most individuals become sensitized to the lice saliva that is injected when they feed, and itching is a common reaction to the constant biting. Reactions include reddening of the skin, itching, and overall inflammation. Broken skin due to constant scratching may lead to further complications and secondary infections so catching infestations early is important. Individuals who experience multiple infestations over time are often sensitive to the feeding immediately so itching and irritation begins as soon as they arrive.

Integrated Pest Management

Inspection and Identification - Checking for Head Lice

Periodic inspection for head lice makes resolution easier and the irritation and spread within the family less likely. On occasions, head lice can be persistent on preschool and school-aged students so schools must work in conjunction with families to control an infestation. During the early fall months (August to November), children should be inspected weekly by parents or guardians (Fig. 5). Follow these steps to inspect for head lice:

1. Shampoo and condition hair. Heavy hair conditioners and detangling brushes help greatly.
2. Remove tangles with a comb or hairbrush.
3. Use good lighting for your inspection. A lamp or good natural light from a window works.
4. Divide the hair in sections and fasten the hair that is not being inspected on using clips.

Figure 5. Check for head lice. Image: Shujuan Li.

5. Use a hand lens or magnifying glass to help verify what you find are indeed nits or lice. There is often "debris" in hair that can be mistaken for nits and lice. Dandruff, sand and solidified droplets of hairspray are commonly mistaken for nits.
6. Look for nits near the scalp. Eggs that are further than 1⁄4 inch (or 6 mm) from the scalp are usually hatched, not viable or dead and do not, by themselves, indicate an active infestation or a need for treatment.
7. When head lice and/or groups of nits (more than 5 nits occurring in the area of a dime) are found close to the scalp, this is a call to action.
8. Check for nits and head lice on everyone in the household, including adult family members.
9. If head lice are found but the scalp is irritated and lesions are evident, using over-the-counter antihistamines for a few days will reduce the irritation allowing the scalp to heal.
10. Shampoo containing 1% coal tar helps to reduce dandruff and dry flaky scalp that can cause additional confusion and misidentification.
11. If nit combing is not possible for some reason use proven options found to be effective without the need to nit comb.

Head lice and nits can be seen without magnification, but in order to differentiate hatched and unhatched nits, use a magnifying lens and a bright light. An empty nit casing can be distinguished from a flake of dandruff because it sticks to the hair, while other particles can be easily removed or washed off.

Nits further than 1⁄4 inch away from the scalp have probably already hatched. Unhatched nits can be found further from the

scalp if the hair is particularly thick, braided, or on individuals who constantly wear hats. In warmer climates, nits may be attached further out on the hair shaft.

Environmental Interventions

Remove head lice and nits from the household environment. Once an infestation is detected, all clothes worn by the person should be laundered or dry cleaned. Towels, pillowcases, sheets, blankets and other bedding should be laundered. Washing, soaking, or drying items at a temperature greater than 130°F will kill head lice and nits. Dry cleaning also kills all life stages.

Only items that have been in contact with the head of the infested person in the previous 48 hours require cleaning.

Non-washable items may be dry-cleaned or sealed in a plastic bag and placed in the freezer at 5 °F or lower for a week. Vacuuming the home will remove shed hair that may have nits attached. Remember that head lice removed from the host will die within 48 hours, so simply placing things that cannot be laundered (very large stuffed animals, duvets, furniture, etc.) in a plastic bag or "off-limits" for 48 hours will eliminate any live head lice on those items.

There are rarely benefits to treating homes or classrooms in schools and childcare centers with pesticides. Exceptional circumstances occur in medical facilities and indoor environments that are crowded or in near constant use.

Head Lice Treatment

Only initiate a head lice treatment when there is a clear diagnosis including identification of living adult or immature lice present. Parents, childcare professionals, caretakers and pediatricians should be informed regarding which products and methods are effective, and most importantly, **safe**.

Figure 6. Follow label directions.

Head lice shampoo products (pediculicides)

Both prescription and over-the-counter lice shampoo products are dispensed or sold in pharmacies and supermarkets. The products must be used exactly according to the label directions or they can be hazardous (Fig. 6). When using a pediculicide shampoo, minimize body exposure by confining the product to the head hair. Wash the infested person's hair in a basin or sink so the insecticide does not contact other parts of the body. **Never apply treatments to children in the bath or shower!**

The person helping to apply the treatment should wear chemical resistant gloves. Never apply a head lice treatment to anyone who has open cuts, scratches, or inflammations, and never use these materials on infants. Consult a doctor if you have an infested infant. **Always read and follow label directions completely and carefully.**

As previously discussed, widespread resistance has been developed by head lice to some commonly used pediculicides

Figure 7. Locate the active ingredient information.

Figure 8. Contact Poison Help.

containing pyrethrins and permethrin. If a pediculicide is effective, lice should die within 30 minutes of a treatment. If live lice are found after 30 minutes, discontinue use of that product. Switch to a different kind of product that **does not** contain the same **active ingredient** (Fig. 7).

Pediculicidal products are for external use only and should only be applied to the scalp unless the label directions indicate otherwise. These products may be harmful if swallowed or inhaled. If accidental ingestion occurs, contact poison control immediately at (800) 222-1222 (Fig. 8).

Prescription head lice treatments

Treatment options vary over time and some examples of current common prescription products and approaches are listed in Table 1. Effective prescription products include Xeglyze™ (abametapir), Natroba™ (spinosad) and Sklice® (ivermectin). Be informed before you visit your pediatrician, avoid high risk and poorly performing control options.

Xeglyze™ Lotion (abametapir 0.74% plus benzyl alcohol as an excipient ingredient) is a relatively new prescription head lice treatment approved by the U.S. Food and Drug Administration (FDA) (https:// www.accessdata.fda.gov/ drugsatfda_docs/ label/2020/206966lbl.pdf). Unlike most other head lice treatments, the instructions for use indicates a single treatment as effective. This product has been shown through clinical and in-vitro studies to kill both live lice and their eggs in a single treatment. After Xeglyze™ is rinsed off, a fine-tooth comb (nit comb) may be used to remove dead head lice and nits from the hair and scalp. Xeglyze™ lotion is not for use on infants below the age of 6 months. The most common side effects of Xeglyze™ Lotion are skin redness, rash, skin burning sensation, skin inflammation, vomiting, eye irritation, skin itching, and hair color changes.

Natroba™ Topical Suspension (spinosad 0.9% plus benzyl alcohol as an excipient ingredient) is a FDA approved prescription head lice treatment (https:// www.accessdata.fda.gov/drugsatfda_docs/ label/2011/022408lbl.pdf) that does not require nit combing and in clinical trials demonstrated superior efficacy to Nix® (permethrin 1%). This product has been shown through clinical and in-vitro studies to kill both live lice and their eggs in a single treatment. Natroba™ Topical Suspension is not for use on babies below the age of 4 years. The most common side effects of Natroba™ Topical Suspension are skin or eye redness and irritation, application site dryness and exfoliation, alopecia and dry skin.

Sklice® Lotion (ivermectin 0.5%) is a prescription medication for topical use on the hair and scalp (https:// www.accessdata.fda.gov/drugsatfda_docs/ label/2012/202736Orig1s000lbl.pdf). This product is also effective as a single application treatment. Sklice® Lotion is FDA approved, but is not for use on infants below the age of 6 months. The most common side effects of Sklice® Lotion are eye redness or soreness, eye irritation, dandruff, dry skin, and burning sensation of the skin.

Table 1. Examples of prescription treatments for head lice.

Active or excipient* ingredient	Mode of action	Product example
Benzyl alcohol*	Suffocates	Natroba™, Xeglyze™
Ivermectin	Disrupts nervous system	Stromectol and generics
		Sklice® Lotion
Spinosad*	Disrupts nervous system	Natroba™
Abametapir*	Metalloproteinase (enzyme) inhibitor	Xeglyze™
Pyrethroid-based[1,2]	Disrupts nervous system	Elimite, Acticin, etc.
Malathion[2]	Disrupts nervous system	Ovide and generics
Lindane[2]	Disrupts nervous system	Kwell, Thionex

[1]Although there are pyrethroid-based products available over-the-counter, medical professionals still prescribe these. If you know which treatment you prefer explain which and why. Bringing a copy of this document may be helpful.

[2]**Widespread head lice resistance has been documented. Medical professionals may not be aware. Bringing a copy of this document may be helpful.**

*Benzyl alcohol may be listed as an active ingredient or an excipient additive and is found in some prescription and over-the-counter products. It is highly effective at killing head lice, but the following should be noted: benzyl alcohol is flammable, keep away from open flames. Allergic reaction is very rare but seek emergency medical help if a treatment causes: hives; difficult breathing; swelling of face, lips, tongue, or throat. Benzyl alcohol may cause serious injury if accidentally ingested or used in patients younger than 6 months. Systemic exposure to benzyl alcohol has been associated with serious adverse reactions and death in newborns and low birth-weight infants.

Some FDA approved prescription treatments are significantly more hazardous than others e.g., products that contain the insecticides malathion or lindane have more significant health risks associated with their use. Additionally, both active ingredients are documented as less effective relative to the newer prescription treatments previously listed.

Some available head lice treatment products have limited ovicidal activity so two treatments may be referenced on label directions. Skipping second treatments indicated in product directions can lead to re-establishment of head lice, thus necessitating additional treatments. A second treatment is sometimes required to kill lice that hatch after the first treatment. Typically, the second treatment should follow 7 - 10 days after the first, depending on the product and its instructions. Do not be tempted to repeat treatments sooner than recommended. Follow instructions for the correct timing of second treatments exactly. Do not expose children to more treatments than necessary as health hazards increase with increased exposure.

None-prescription head lice treatments

There are numerous alternative treatments for head lice, both old and new. Some have been evaluated for efficacy by scientists, many have not, and it is challenging to determine which have merit. There is no shortage of positive anecdotal reports associated with the use of readily available substances such as petroleum jelly, mayonnaise, margarine, herbal oils and olive oil, but there has been little in the way of conclusive evidence showing that these substances are effective at killing head lice directly. However, head lice are delicate insects and mechanical injury is caused by brushing, nit-combing, shampooing and conditioning the hair, all of which are undertaken during treatments using these substances. Examples of some common non-prescription products and approaches are listed in Table 2.

Suffocants – e.g., petroleum jelly, mayonnaise, olive oil, Cetaphil Gentle Skin Cleanser and benzyl alcohol* (included as an excipient ingredient in most products at the time of publication)

Suffocants smother head lice by preventing air exchange through the respiratory system of the insects. The products are massaged onto the entire scalp and hair then covered with a shower cap and many ingredients can be left on for several hours (an exception being products containing benzyl alcohol). The process is usually followed by shampooing, conditioning and nit combing.

While head lice cannot develop resistance to suffocation in the same way as resistance has developed to some of the toxicants affecting the nervous system, head lice (like many insects) can close off the entry ports into their respiratory system (the spiracles) and remain inactive for several hours. Closing the spiracles effectively prevents the substances from entering the respiratory system. This is often why seemingly dead insects can recover once the suffocant substance is removed. The additive benzyl alcohol prevents head lice from closing their spiracles causing relatively effective and rapid asphyxiation.

Diligent shampooing is necessary for at least the next several days to remove the residue of thick gloopy suffocants. The combination of applying a suffocant, shampooing, combing and drying is undoubtedly beneficial in killing and removing lice and nits. In fact, early infestations can sometimes be eliminated by daily shampooing, conditioning, nit combing and hair drying with a dryer.

The use of Cetaphil Gentle Skin Cleanser can be an effective treatment if used as follows: The cleanser is massaged on to the entire scalp and hair, the excess product removed using a comb. The hair is then completely dried using a hair dryer, and left on the hair for 8 hours. The hair can then be washed, and the process should be repeated several times over the next couple of weeks. Researchers (Pearlman 2004) have demonstrated a high success rate (> 94% lice reduction) even without nit combing.

Dimethicone (also spelled dimeticone) is a silicone-based polymer that lubricates the hair, making removal of nits and lice easier. The polymer also causes physical blockage of the respiratory system of the louse and has been documented as highly effective at killing head lice. Published studies have confirmed the efficacy of 4% dimethicone in the treatment of head lice. Dimethicone is available in several products available without a prescription online and in some pharmacies, examples include LiceMD, Rapunzel's Lice Neutralizer, Hedrin Dimeticone Head Lice Lotion, and KaPOW! Lice Attack Solution. Since it is an effective treatment (particularly when used in conjunction with manual nit removal), and non-toxic to people, many consider this an ideal first line treatment for head lice. Like other treatment protocols, the head should be inspected closely for 10 days, and a second treatment after 7 days is advisable.

Enzymes - LiceLogic, Lice B Gone, Lice R Gone

Treatment products containing enzymes dissolve or soften the glue that attaches the nit to the hair shaft, promoting nit removal during combing. Some head lice may also be eliminated by the treatments.

Desiccation using heat treatment – AirAllé™ (formerly known as LouseBuster™) and hair dryer

The AirAllé™ (formerly known as LouseBuster™) is a machine that uses hot air to desiccate lice and eggs (Fig. 9). Research showed that the heat treatment caused high mortality of eggs and hatched head lice (Bush et al. 2011). The device is used primarily by professionals in schools, clinics, and places where head lice are commonly treated.

A home hair dryer may not be as effective as the AirAllé™, however, hair drying with a home hair dryer will desiccate some lice and nits each time it is used. Drying hair using a hair dryer on a warm heat setting with a diffuser attached, hair-brushing and combing are effective ways of killing lice mechanically.

Figure 9. The machine uses hot air to desiccate lice and eggs. Image: AirAllé™.

Figure 10. An example of a great nit comb.

Manual removal

An IPM strategy that uses multiple tactics is critical to controlling head lice because a portion of head lice and/or nits can survive initial treatments. Head louse survival can be significant if pesticide resistant lice are present. Nits, especially those within a 1⁄4-inch of the scalp, can be removed manually.

Manual removal of nits can be difficult and tedious, but it will help to rapidly resolve infestations, diminish the social stigma and isolation a child can experience in school. This form of caregiving is known to enhance the relationship between a dependent and caregiver, and decrease diagnostic confusion.

Special combs are needed and can be effective for nit removal when used diligently each day. It is recommended that frequent combing continue for 10-14 days. Nit combs (Fig. 10) come in many forms and all are helpful to remove nits. The LiceMeister® or Nit Free Terminator combs are all effective choices. Some useful tips follow:

1. Use nit combs on wet hair.
2. Conditioners help the comb move through the hair easier.
3. Metal combs with stiff tines (teeth) and narrow slots between tines are the best (e.g., Nit Free Terminator Stainless Steel Lice Comb).
4. Short-tined combs work best on short hair, long-tined combs work best on long hair.
5. Use **electrocution** combs e.g., RobiComb® on **dry hair.**

Table 2. Examples of treatments for head lice that do not require a prescription.

Active or excipient* ingredient or strategy	Mode of action	Product example
Dimethicone (dimeticone)	Disruption of water homeostasis and suffocation	Dimethicone LiceMD gel, Nix Ultra® Solution, Rapunzel's Lice neutralizer, Hedrin Dimeticone Head Lice Lotion, KaPOW! Lice Attack Solution
Natrum muriaticum (sodium chloride) (plus benzyl alcohol*)	Dehydrates or suffocates lice	Vamousse Lice Treatment, Licefreee!
Pyrethroid-based[1]	Disrupts nervous system	Nix, Pronto, Rid, etc.
Enzymes (vegetable extracts)	Helps to dissolve or soften the glue that attaches the nit to the hair shaft	LiceLogic, Lice B Gone, Safe Solutions Lice R Gone®
Heat	Desiccates lice and nits	AirAllé™

[1]Widespread head lice resistance has been documented.

*Benzyl alcohol may be listed as an active ingredient or an excipient additive and is found in some prescription and over-the-counter products. It is highly effective at killing head lice, but the following should be noted: benzyl alcohol is flammable, keep away from open flames. Allergic reaction is very rare but seek emergency medical help if a treatment causes: hives; difficult breathing; swelling of face, lips, tongue, or throat. Benzyl alcohol may cause serious injury if accidentally ingested or used in patients younger than 6 months. Systemic exposure to benzyl alcohol has been associated with serious adverse reactions and death in newborns and low birth-weight infants.

Figure 11. A set of effective nit combing tools. Image: Dawn H. Gouge.

Figure 12. Comb hair at a 45° angle to the scalp. Image: Al Fournier.

6. Use a magnifying glass and good lighting.
7. Be gentle. If the comb gets tangled in the hair, it will be less effective at destroying and removing nits.

The thickness, length and curliness of hair and the experience of the caregiver will determine the length of time required to comb out nits. A set of effective tools is shown in Fig. 11. To remove nits (and to some extent head lice) use the following steps:

1. Wash and condition hair. An over-the-counter coal tar shampoo will help to sooth the scalp and reduce dandruff and flakes of skin that can generate confusion. A heavy detangling conditioner will help the nit comb move through the hair easier.
2. Have the infested person sit comfortably under a bright light. A movie or good book may help to keep them entertained.
3. After gently removing tangles, comb the hair from the scalp to the ends, dividing hair into manageable sections. Infested heads can be extra sensitive so take the extra time to be gentle and thorough.
4. Dip the nit comb in a container of warm water, then place the tip of the tines on the surface of the scalp. Holding the comb at a 45° angle to the scalp (Fig. 12), slowly pull the comb from the scalp to the ends of the hair, and re-dip the comb in the water. Wipe the comb with tissue to remove lice and nits. When done, discard the tissue.
5. Look through that same section of hair for remaining nits. Repeat if necessary.
6. Systematically comb through all hair.
7. Nit combs remove nits primarily and only a proportion of active head lice, which generally stay on the surface of the scalp and move away from light quickly.
8. Clean the nit comb with hot soapy water. An old toothbrush can help dislodge nits and head lice that get caught in the teeth of the comb. If you are still concerned that you may have missed something place the nit comb in a sealed plastic bag for a few days before using again.

Daily head checks and nit removal are advisable until the infestation is gone. Follow with weekly head checks for the whole family to detect any reestablishing head lice.

Policies And Control Measures In Schools

When parents of elementary school-aged children are surveyed as to what childhood health issues concern them most, head lice usually rank higher than more serious conditions (http://www.health.mo.gov/living/families/schoolhealth/pdf/HEADLICE.pdf). However, head lice can be easily taken care of if you use effective strategies and take the right management steps.

Three things everyone should know

1. In any school classroom a 1% head lice incidence is common.
2. If classrooms report >20% infestation levels, verification is prudent as high infestation levels are usually due to a misdiagnosis.
3. There are no benefits to the application of pesticide treatments in classrooms, school buses or homes.

Currently, many school districts have "no nit" policies that exclude students from school because of the presence of nits whether or not live lice are present. Such a policy has

not been supported by research and is not recommended by experts, including both the American Academy of Pediatrics (AAP) and the National Association of School Nurses (NASN) (https://www.cdc.gov/parasites/lice/head/schools.html), because:

1. Nits do not transfer between heads (CDC 2020) (http://health.mo.gov/living/families/schoolhealth/pdf/HeadliceGuidelines.pdf).
2. The over-reaction to nits leads to unproductive use of time by school staff and parents, school days missed by students, and workdays missed by parents and guardians (National Association of School Nurses 2020; Devore et al. 2015).
3. Nits more than a 1/4 inch from the scalp are not viable. They are likely dead, empty shells or unlikely to hatch.
4. The misdiagnosis of nits is common during nit checks conducted by nonmedical personnel, and even some medical personnel.
5. Misdiagnosis may lead to unnecessary use of pediculicides and inappropriate exclusion from school.

"No nit" policies contribute greatly to the social stigma of lice infestations and have absolutely no impact on preventing additional infestations in the community.

Schools are advised to create a lice management plan and promote an IPM strategy to battle this pest. Screening for nits alone is not an accurate way of predicting which children will become infested. Children having 5 nits or more within 1 cm^2 of the scalp are significantly more likely to develop an infestation, but even then only 1/3 of these higher-risk children convert to having an active infestation. Providing information to families on the diagnosis, treatment, and prevention of head lice is a helpful and useful plan. Parents and guardians should be encouraged to check their children's heads for lice if the child is symptomatic.

If your child has a head lice infestation, it is important to inform anyone your child has had close contact with in the recent past. If the sources, or other recently infested people, are not treated, your child can become re-infested when contact is renewed, which means you will need to go through all of the treatment procedures again. Synchronized treatment; that is, all infested individuals are treated at the same time, interrupts transmission and prevents re-infestation, particularly in school or childcare-based control programs.

Important Do's:

1. Do take an integrated pest management approach (monitor, vacuum home furniture, launder bedding, towels and clothes, treat the head, nit-comb, and evaluate results).
2. Do follow pediculicide product directions exactly as written.
3. Do second pediculicide treatments as directed on product labels.
4. Do use gloves when applying treatments if the label directions indicate their use.
5. Do invest time in manual nit removal and infestations will be resolved faster.
6. Do try to relax and relax your child, head lice can be dispatched completely.

Important Do not's:

1. Do not treat with a pediculicide if there is no evidence of live nymphs or adult head lice.
2. Do not use a pediculicide shampoo as a routine shampoo, the products do not prevent a person from getting head lice.
3. Do not assume a one-step treatment will be 100% effective at killing lice and eggs.
4. Do not have a child rinse out treatments in the shower or a bathtub, aim to prevent any other part of the child from exposure to the pesticide.
5. Do not leave products on the head for longer than directed.
6. Do not retreat sooner than directed.
7. Do not resort to dangerous practices such as aerosol insecticide sprays or total release foggers (bug bombs), or highly flammable materials such as kerosene or gasoline!

In Summary, implement an IPM strategy:

1. Conduct on-going head lice monitoring of family members.
2. Launder bedding, towels, clothing and stuffed animals and throw-pillows.
3. Vacuum couches and carpeted floor areas where children lay down.
4. Wash hair accessories, brushes, combs, etc. Items that cannot be washed can be placed in the freezer or placed "off-limits" for 48 hours.
5. Regular washing, conditioning, drying, and wet or dry-hair brushing.
6. Use the most effective and least-hazardous prescription treatments and nit removal when necessary.

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THE UNIVERSITY OF ARIZONA
Cooperative Extension

The University of Arizona
College of Agriculture and Life Sciences
Tucson, Arizona 85721

AUTHORS

Shujuan (Lucy) Li
Associate in Extension - Public Health IPM, Department of Entomology

Dawn H. Gouge
Specialist and Professor - Public Health IPM, Department of Entomology

Shaku Nair
Associate in Extension - Community IPM, Department of Entomology

Alfred J. Fournier
Associate Specialist - IPM Evaluation, Department of Entomology

CONTACT
Shujuan (Lucy) Li
lisj@cals.arizona.edu

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