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Head lice

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Cause

Head lice are small wingless insects (*Pediculus humanus capitis*) that live on and suck blood from the scalp. Infestation may remain unnoticed for several weeks until an allergic response to lice saliva begins to cause intense itching, or perhaps until parents are alerted to an epidemic at their child's school.

The female louse lays a daily batch of tiny pale eggs (nits), attached to the hairs close to the scalp. Adult lice may live for up to several weeks. Infection is spread by direct head-to-head contact, and possibly by transfer through contact with infected hairbrushes, hats, pillows, etc., although lice cannot survive for long away from the scalp.

The condition is most common in children aged 4–11 years and is more common in girls than boys; anybody can be infected, however. The length or state of cleanliness of the hair makes little difference to the likelihood of becoming infected.

Treatment

Two insecticides (pediculocides) are available for the eradication of head lice, in presentations including aqueous lotions, a shampoo and a cream rinse. All are licensed as Pharmacy medicines. Some of these preparations are also licensed for the treatment of crab lice and scabies (see Chapter 36 Scabies). Products containing carbaryl were also Pharmacy medicines until 1995, when they were reclassified as Prescription-only medicines because it was found that carbaryl was carcinogenic when fed to laboratory animals at high doses

over long periods. Non-insecticidal treatments containing dimeticone became available from 2006.

Head lice can also be removed by a mechanical method – wet combing or ‘bug busting’ – without the use of any chemical-based preparations.

Insecticides

The insecticides (pediculocides) available without prescription for the treatment of head lice are:

- malathion
- permethrin.

Malathion

Mode of action

Malathion is an organophosphorus compound. It is a potent cholinesterase inhibitor, preventing the breakdown of acetylcholine and interfering with neuromuscular transmission in the head louse, paralysing it and preventing it from feeding. Malathion is oil-soluble and is absorbed by a process of passive diffusion through the lipid coat of both insect and egg; achieving a lethal dose depends on the concentration of the product and the duration of contact. Malathion is poorly absorbed through human skin, and it is also much more efficiently detoxified by human metabolic processes than by those of insects. It is therefore safe for occasional or intermittent use at low concentrations as a pediculocide.

Administration

Aqueous solutions are rubbed gently into the scalp until all the hair and scalp is thoroughly moistened; application should extend to the neck area and behind the ears. Treatment failure often occurs because the insecticide does not reach all of the scalp. The hair should be allowed to dry naturally, as malathion is inactivated by heat. The solution is left on for 12 hours, usually overnight, and the hair is then shampooed in the normal way. The hair should be combed with a fine-toothed comb while it is still wet, to remove dead and dying lice from the scalp and empty egg cases attached to the hair shafts. A second application after 7 days is recommended to kill any lice emerging from eggs that may have survived the initial treatment.

Contraindications, cautions and side-effects

There are no contraindications to the use of malathion, apart from known sensitivity. Preparations are not contraindicated in pregnant or breastfeeding women, although manufacturers recommend caution.

Malathion preparations may affect permed, coloured or bleached hair. The only reported side-effect is very rare skin irritation.

Products

- Aqueous lotions (0.5%)
 - Derbac-M liquid
SSL International
 - Quellada M liquid
GlaxoSmithKline Consumer

Both products are licensed for use in patients aged from 6 months.

Permethrin

Mode of action

Natural pyrethrum, extracted from pyrethrum flowers (*Chrysanthemum cinerariaefolium*, Compositae), has been used as a horticultural pesticide for many years. Pyrethrins are effective insecticides with low mammalian toxicity, but the naturally occurring compounds are unstable when exposed to light. Photostable synthetic pyrethroids have been developed in recent years, and the first pyrethroid pediculocide product was introduced in the UK in 1990. Pyrethroids are rapidly absorbed across the insect cuticle and exert their action on the sodium channels of louse nerve axons, causing initial excitement and then paralysis. Permethrin is now the only pyrethroid insecticide used for treatment of head lice infestation.

Administration

Permethrin is available as a cream rinse. It is applied after the final rinse after using an ordinary shampoo. The hair is towel-dried, and cream rinse is applied in sufficient quantity to coat the scalp and hair fully. The preparation is rinsed off after 10 minutes and the hair wet combed.

Contraindications, cautions and side-effects

The manufacturers recommend that permethrin cream rinse is avoided in pregnancy and during breastfeeding.

Products

- Permethrin
 - Lyclear Creme Rinse (1% in a cream rinse base with 20% isopropyl alcohol)
Chefaro
 - Lythrin Creme Rinse
Kent Pharmaceuticals

Dimeticone

Dimeticone lotion does not have conventional insecticide activity. It contains 4% long-chain linear silicone (dimeticone) in a volatile silicone base

(cyclomethicone). It is applied in the same way as other lotions for head-lice infestation. Dimeticone lotion appears to act against head lice by coating the insects, disrupting their ability to manage air and water exchange across their body surface.¹

Products

- Full Marks solution
SSL International
- Hedrin lotion
Thornton & Ross
- Nyda pump spray
Pohl-Boskamp

Wet combing ('bug busting')

Wet combing has been recommended as an alternative method for tackling the problem of head lice and resistance without the use of insecticides. The technique involves combing wet hair with a fine-tooth comb for about 30 minutes after shampooing and using conditioner. If evidence of lice is found, the process should be repeated twice a week for 2 weeks in order to remove lice emerging from eggs before they can spread.

Efficacy and resistance

A Cochrane Review concluded that permethrin and malathion are effective in the treatment of head lice, although the quality of trials reviewed was very poor and only 4 of 71 studies met the inclusion criteria.²

Several trials conducted on dimeticone lotion have found it to be effective, and at least as effective or more so than malathion and permethrin.^{1,3-5}

Evidence for the effectiveness of wet combing is conflicting. A large-scale trial of over 4000 patients led to the conclusion that wet combing was much less successful than malathion in eradicating infection and that it should not be regarded as a first-line treatment.⁶ However, a more recent, smaller trial found that wet combing was four times more effective than chemical products for eliminating head lice.⁷ A literature review of five studies concluded that there is limited evidence to suggest that wet combing is an effective treatment for pediculosis capitis, although cure rates are variable; that parents prefer this treatment option over that of pediculocides; and that treatment for a longer duration than the generally recommended 2 weeks may improve success rates.⁸

In recent years, head lice have developed resistance to commonly used insecticidal pediculocides through natural selection, making it increasingly difficult to eliminate infestations. There is no direct contemporary evidence of

the comparative effectiveness of insecticidal pediculocides. Choice is probably best made on the basis of local resistance patterns. Little resistance appears to have developed to carbaryl, which seems to justify its remaining as a Prescription-only medicine of last resort.⁹

Rotational policies to limit the development of resistance, whereby health authorities recommended a specific pediculocide to be used exclusively in an area for a period of usually 3 years, followed by other compounds in rotation for 3 years each, have been abandoned in favour of the mosaic method of treatment. Here, no particular pediculocide is recommended, but as patients come forward for treatment they are each given a different pediculocide in rotation. Two applications of insecticide 1 week apart is now recommended as standard treatment. If one compound fails to effect a cure, then a different compound should be used for the next treatment. The head lice treatment policies of many local health authorities do not appear to have been revised since dimeticone lotion has become available and do not include it. Some more recently updated policies do include dimeticone lotion, and some policies also include wet combing as an alternative method of control.

A common misconception regarding the treatment of head lice infestation is that if one family member is infested, then the entire family should be treated. However, there is no point in trying to eradicate lice unless their presence is confirmed, and unnecessary treatment merely contributes towards the possibility of resistance. Lice are almost always passed on from one person to another by head-to-head contact. The way to eradicate infestations and prevent recurrences is by tracing and checking everybody with whom an infested person is likely to have had such close contact over the preceding few weeks, and then to treat all those people found to be infested.

Apparent treatment failure with pediculocides is quite frequent and is often suggested to be because of the ineffectiveness of the products. The more likely cause, however, is either incorrect use of products or rapid reinfestation following successful treatment.¹⁰ Tracing contacts in order to prevent reinfestation, as described above, is therefore extremely important.

Product selection points

- There is no clear evidence that any one insecticidal pediculocide is significantly more effective than another.
- Dimeticone lotion appears to be effective and safe for use for everyone.
- Two applications of pediculocide 1 week apart is now recommended as standard treatment.
- Wet combing ('bug busting') is an alternative method for identifying and eliminating head lice without the use of insecticides or any chemical, but it requires heavy commitment.

- A mosaic policy should be used for selection of pediculocide.
- Head-lice products should not be used for prophylaxis, as they are usually not effective and their use in this way encourages the development of resistance. Tracing infested contacts and eliminating lice from them is the most effective way to prevent reinfestation.

Product recommendations

On the balance of the evidence currently available, dimeticone lotion may be the best choice of pediculocide.

References

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