Archives of The Medicine and Case Reports
Journal Homepage: https://hmpublisher.com/index.php/AMCR
eISSN: 2747-2051

The Potential of Natural Ingredients as Anti *Pediculosis capitis*: A Narrative Review

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ARTICLE INFO

Keywords:
Insecticide
Pediculus humanus capitis
Pediculosis capitis
Natural insecticide

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All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.37275/amcr.v3i4.217

A B S T R A C T

Head louse (*Pediculus humanus capitis*) is a small parasite that feeds itself by sucking human blood, which causes infection of the scalp so that it becomes inflamed. The most common way to kill fleas is through the use of pharmaceutical insecticides. Some insecticide products contain permethrin, lindane, and DDT which are toxic to the body and are not easily biodegradable in the environment. Uncontrolled use of insecticides can make ticks resistant to these insecticides. Lemon, kirinyuh leaves, pandan wangi, Srikaya leaves, garlic, jarak pagar, citronella leaves, papaya, and lime have potential as anti-parasitic head lice.

1. Introduction

Head lice (*Pediculus humanus capitis*) are small parasites that live by sucking blood from the human head, which is transmitted through physical contact. The disease caused by head lice is known as *pediculosis capitis*. The presence of lice can lead to iron deficiency and anemia. This parasite is very annoying because it can cause constant itching in the head. A sign that someone has lice is scratching. Scratching too hard can irritate the skin. This irritation makes it easier for bacteria to enter the scalp, causing serious infections that worsen conditions such as ringworm of the scalp.

Inflammation of the capillaries or infestation of lice is a common problem in children aged 3-11 years worldwide. The prevalence of head lice infection in several countries in the world is still quite high. In Jordan, 26.6% of primary school children have capillary pediculosis. Not much difference in Malaysia in terms of ethnicity: Indian 28.3% and Malay 18.9%, Chinese 4.6%, East Bangkok 23.32% more girls 47.12% than boys. Meanwhile, in Indonesia, pediculosis is generally experienced by school-age children. Most Indonesians treat head lice with insect venom or anti-lice medication without considering safety guidelines.[1]

The most common way to kill fleas is through the use of pharmaceutical insecticides. Some insecticide products contain permethrin, lindane, and DDT which are toxic to the body and are not easily biodegradable in the environment. Uncontrolled use of insecticides can make ticks resistant to these insecticides. These

trends in drug resistance and the risk of toxicity make it important for a safe but effective alternative treatment for head lice eradication. Therefore, before use, natural insecticides must be tested for irritation to ensure that they are safe when used and do not cause skin irritation, cause severe irritation or have the same effect as other types of pesticides, general insecticides.[2] This literature review aims to discuss Indonesian plants that have the potential to anti pediculosis capitis.

Plants with natural insecticide potential for *pediculosis capitis*

Indonesia has many plants that can be used as natural pesticides. Lemon leaves, kirinyuh leaves, pandan wangi, srikaya leaves, Moringa leaves, betel leaves, bay leaves, cassava leaves, kepayang, and basil leaves are believed to be able to eradicate head lice (Table 1). These plants are rich in compounds with insecticidal effects, such as cyanides, saponins, tannins, flavonoids, alkaloids, steroids, and essential oils. This compound is often active in reducing the flea population because it acts as a flea repellent, reduces flea appetite, interferes with flea digestion, causes infertility, and inhibits lice growth.[3] There are many forms of flea control, such as the form of shampoo, hair conditioner, lotion, and spray. Preparations for lice in the form of a spray are considered safer because they are sprayed directly onto the scalp without the need to be applied to the hands, as is known in commercial products in circulation.[4,5]

Table 1. Plants with anti-parasitic potency for head lice

NO	Name of plant	Plant Part	Dosage/concentration Extract	Result	Active Compound
1.	Lemon *(Citrus aurantifolia)*	Fruit	25%, 50%, 75%, 100%	At a concentration of 100% can kill head lice for 2 minutes with a squeeze of lime juice and lemons.	Citric acid
2.	Kirinyuh leaf	Leaf	0%. 2%, 4%, 6%, 8%	A concentration of 100% can kill head lice as much as 100% with kirinyuh leaf extract.	Saponins, flavonoids, alkaloids
3.	Pandan Wangi *(Pandanus amaryllifolius)*	Leaves	60%: 40%	Can only kill 41, 67% of head lice with pandan extract.	Citric acid
4.	Srikaya leaf	Leaf	28%	Can kill lice within a span of 19 minutes with srikaya leaf extract	Flavonoids, saponins
5.	Garlic	Fruit	8%	Can kill lice with a time span of 0.0630 with extracted garlic	Aliixin, saponins, Flavonoids
6.	Jarak pagar (*Jatropha curcus L*)	Leaves	5%,10%,15%,1%	Can kill as many as 5 head lice with presentation within 30 minutes	Flavonoids, saponins
7.	Citronella leaves (*Cymbopogon citrates*)	Leaves	1:1, 1:2, 2:1	Can kill head lice, lice death 0.00%, 6.25%, 15.41%	Flavonoids
8.	Papaya	Seeds	25%,50%,70%, 100%	Can eradicate lice in hair	Alkaloids carpain, Linalol, Papaya oil
9.	Lime	Leaves	1 ml	Can eradicate lice in hair	Citric acid

Lemon *(Citrus limon)*

Based on research that has been carried out, juice of lime and lemon with a concentration of 100% has been shown to have the potential to kill adult head lice within 2 minutes. The death of head lice depends on the concentration. The higher the concentration of lime and lemon juice, the death of head lice will be faster. Oranges also contain the active substance citronellol contained in the water. The mechanism of citronellol is a poison that can kill lice.[6]

Kirinyuh leaves

Based on research shows that head lice will die with a concentration of 8% with an average mortality

rate of 100%. The higher the concentration is believed to provide a better effect in killing lice. The groups of compounds that have an effect are saponins which work to interfere with the insect's digestive system, flavonoids, which can affect the insect's respiratory system and alkaloids, which can inhibit the insect's nervous system. The presence of this content in kirinyuh can give a pungent odor and bitter taste that can cause death to lice.[7]

Pandan wangi *(Pandanus amaryllifolius)*

The results of the study of the combination of lime leaves and pandan wangi 60%:40% were able to kill 41.67% of lice. Fragrant pandan leaves are believed to work as poison, reduce appetite, inhibit egg-laying, inhibit the growth of lice, and as an insect repellent.[8]

Srikaya Leaf

A study showed that a 28% concentration of srikaya leaf extract was able to kill fleas within 19 minutes from the time it was first used. The ability of sugar apple leaves to eradicate lice is believed to be due to the content of flavonoids and saponins, which are quite often found in sugar apple leaves.[9]

Garlic

A study showed that garlic extract was able to kill head lice. Garlic is rich in allicin, flavonoids, and saponins. The compound is believed to have the potential to be a poison and effective head lice egg exterminator. Garlic extract 8% is believed to be able to kill head lice very effectively.[10]

Jarak pagar (*Jatropha curcus L*)

Jarak pagar extract is believed to have the potential as an anti-parasitic head louse. This plant is rich in flavonoids, triterpenoids, and tannins. This compound is a complex of compounds that are toxic and can affect the digestion of insects. The flavonoids in fleas and other parasites act as an inhibitor of the respiratory process so that they will kill the parasite. Triterpenoids work by inhibiting the growth of larvae, while tannins act on this damage to the cell membrane of larvae and interfere with metabolic processes in the insect's body. Tannins enter the body of insects and larvae by inhibiting protease enzymes, causing reduced intake of nutrients and forming protein complexes by insect larvae, and inhibiting larval growth.[11]

Citronella leaves (*Cymbopogon citrates*)

Citronella leaves have a potential anti-parasitic effect on head lice. Lemongrass is rich in citronella and alkaloid compounds. Citronella is an essential oil that has the potential to cause the death of head lice through the process of destroying or lysis of the lice cell membrane, which leads to the death of head lice. Alkaloid compounds have the potential as poisons that inhibit the respiratory process of head lice, where if the respiration process is inhibited, it will interfere with the living function of head lice.[12]

Papaya

Papaya has a potent anti-parasitic effect on head lice. Papaya is rich in calpain and alkaloid compounds. Calpain is a digestive enzyme that has the potential to cause the death of head lice through the process of destroying or lysis of the lice cell membrane, which leads to the death of head lice. Alkaloid compounds have the potential as poisons that inhibit the respiratory process of head lice, where if the respiration process is inhibited, it will interfere with the living function of head lice.[11.12]

Lime (*Citrus aurantifolia*)

Lime has a potential anti-parasitic effect on head lice. Papaya is rich in citronella and alkaloid compounds. Citronella is an essential oil that has the potential to cause the death of head lice through the process of destroying or lysis of the lice cell membrane, which leads to the death of head lice. Alkaloid compounds have the potential as poisons that inhibit the respiratory process of head lice, where if the

respiration process is inhibited, it will interfere with the living function of head lice.[13]

2. Conclusion

Lemons, kirinyuh leaves, pandan wangi, srikaya leaves, garlic, jarak pagar, citronella leaves, papaya, and lime have potential as anti-parasitic head lice.

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