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TRADITIONAL MEDICINAL PLANTS FOR MANAGING HEAD LICE: A REVIEW ON THEIR ROLE IN SCALP AND HAIR HYGIENE

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ABSTRACT

This study examined the use of antiparasitic medicinal plants to treat head lice (Pediculus humanus capitis), a common health issue, especially in areas with high population densities and among children. It emphasizes the importance of traditional medicine in using these plants as a safe, all- natural way to maintain good skin and hair hygiene. This review examines the mechanisms by which these medicinal plants support the general health of the skin and hair. According to the analysis, Lamiaceae, Myrtaceae, and Arecaceae are the main families of medicinal plants used to treat head lice. Leaves were the most used plant part (54.55%), and decoction was the most popular preparation method (50%). These results demonstrate the value of traditional medicines, including the use of leaf-based remedies and decoctions, in the treatment of head lice. It assesses the effectiveness of these plants, including specific examples like Green Tea (*Camellia sinensis*), chamomile (*matricaria chamomilla*), and Pomegranate (*Punica granatum*), for their antiparasitic and ovicidal properties using methodologies such as the Filter Paper Bioassay and Hair Tuft Bioassay. These findings underscore the value of traditional medicines and suggest that a comprehensive understanding of their constituents, supported by *in vitro* assessment methods, can enhance traditional therapeutic approaches.

KEYWORDS: Medicinal plants, head lice, traditional medicines, decoction, Lamiaceae.

INTRODUCTION

Environmental health is critical to the prevention and treatment of diseases linked to environmental factors, including lice infestation. Head lice are spread through direct contact or sharing the personal items combs, hats, and pillows. Keeping living spaces clean, washing clothes and linens in hot water, and cleaning oneself and surroundings on a regular basis are all particularly effective ways to prevent lice from spreading. Human head lice are a common ectoparasite that has long been regarded as a public health issue. By feeding the host blood and laying eggs near hair roots, this insect spreads swiftly and is very common, especially in children and teenagers. Head lice can be treated at *home*, with mechanical, pharmaceutical, and preventive methods. Commonly used in medical treatments are shampoos and topical solutions containing lice eradicating agents. Another method is regular combing of hair. Treatments are an option based on the individuals' conditions. Nowadays, the most popular approach to lice control is chemical treatments. However, because of the worries about the potential adverse effects and parasite resistance to these substances, people become interested in traditional medicine and medicinal plants. By reviewing the literature on traditional medicine and its application to the skin and hair, this study sought to determine how well medicinal plants treat head lice.[1,6]

Camellia sinesis (green tea)

Ancient times, peoples have been drinking large amount of tea or camellia sinesis L. It has gained great significance because of its numerous medicinal benefits, which are mostly attributable to its polyphenol compounds. Just the young leaves are usually used for drinks and extracts, despite the fact that many parts of these plants have been studied for their potential benefits in humans. Depending on how it's prepared, tea is mainly categorized as either green or black. Green tea has no harmful side effects and is safe. Evaluating the potential of various unrefined extracts of camellia sinesis as head lice repellents activity.[7,10]

Matricaria chamomilla (chamomile)
The annual plant chamomile has thin, spindly roots that bury themselves flat in the ground. The erect, heavily ramified, branched stem reaches a height 10 to 80 cm. bi or tripinnate leaves are long and narrow. The flower heads are pediculate, heterogamous, and arranged separately. They range in diameter from 10 to 30 cm. The white flowers of 11 to 27 plants are grouped concentrically and measure 6 to 11 mm in length and 3.5 mm in width, the receptacle 6 to 8 mm wide, flat first, later conical and cone shaped hollow. The fruit is achene that is yellowish brown.[11]

Mentha pulegium (pennyroyal)
The tern pennyroyal refers to both plants that belongs to the mint family (lamiaceae) while M. Pulegium is found in some regions of Europe, H. pulegioides, also known as American pennyroyal, grows in forecast across most northern regions. The perennial herb pennyroyal has tiny lilac blossoms at the tips of its stems. It has a 30 to 50 cm growth potential. Grayish green leaves are very fragrant just like mints.[12]

Punica granatum (pomegranate)
Pomegranates (punica granatum) are found all over India and are members of the punicaceae family, which is now part of lythraceae. They are evergreen in tropical and subtropical regions but are deciduous, spreading shrubs or small trees that only grow in temperate climate. The inedible peel of pomegranates is often thrown away after they are used to make grape juice.

Grapes are rich in flavonoids, polyphenols, tannins, and some anthocyanin's including cyanidins and delphinidins. P. granatum extracts and compounds have been shown in numerous studies to possess anti-inflammatory, ant carcinogenic, anti-parasitic properties.[13,16]

Table 1: Medicinal Plants Against Head lice.

English name	Scientific name	Herbal family	Parts used	Type used
Green Tea	Camellia sinesis	Theaceae	Leaf	Decoction
Chamomile	Matricaria chamomilla	Asteraceae	Flower	Decoction
Pennyroyal	Mentha pulegium	Lamiaceae	Aerial parts	Decoction
pomegranate	Punica granatum	Lythraceae	Leaf	Decoction

METHODOLOGY
The major aim of this study was to review the effectiveness of medicinal plants and their application for skin and hair health by examining the body of research.

Filter Paper Bioassay
The filter paper diffusion method, commonly known as the disk diffusion method, is widely used in vitro assay for evaluating antimicrobial activity.

Procedure
The test organism lice were divided into groups, with each group containing a specific number of lice in a defined ratio of nymphs to adults.

The selected lice were placed in petridish containing filter paper.

A measured volume of the prepared substances was applied to the lice, forming a thin layer over a specific area.

A control group should be included, treated with the solvents used to dissolve the test substances.

Standard treatments known for antilice activity can also include for the comparison (e.g. benzyl benzoate 25 %) petri dishes containing lice and treatments were placed in a dark room where the room was maintained at specific temperature.

After an initial treatment ta period an additional solvent can be added to petridishes. The dishes were returned to the dark room.

After a specified observation period, the lice observed under the microscope. Lice that were immobile were considered dead.

Ovicidal activity
Oval eggs with intact opercula that were brown ion color were used to evaluate the impact on eggs.

Each petridish with filter paper is filled with a predetermined number of eggs.

Following same procedure for applying test samples, controls, and standard to the eggs, the viability of the eggs was assessed through follow up observations.[17,20]

Artificial membrane feeding method
Procedure
Lice are usually kept in ventilated plastic jars on small pieces of black cotton cloth.

The relative humidity was maintained between 70 and 80%, and the temperature was maintained between 29 and 30 ℃.

The first stage larvae that has just hatched and were not yet fed were used in the experiments, feeding took place every 48 hours.

Hemotek device
Metallic blood reservoirs, such as OR37-25, are cleaned with 10%bleach and then rinsed with sterile water.

The blood reservoirs were covered with a parafilm membrane.

Two milliliters of human blood were added, and plastic stoppers were used to plug the reservoirs.

The readymade reservoir was preheated to 37℃ and screwed into a FU1 feeder unit. On a hot plate was kept at 37℃, a sterile Petridish was set up.

Water was added to the Petridish interior, after the lid was in place, two milliliters of human blood were added. The blood meal was enclosed between the lid and a parafilm membrane that was stretched over it.

To draw lice to the membrane, apply urea and synthetic sebum.

Support for blood meals
Various supports like cotton discs or sponge wipes for cleaning can be used in raring systems. After soaking theses supports in blood, a stretched parafilm membrane was placed over them, being careful to eliminate any trapped air bubbles.

The lice were able to move more easily because of the uneven surface the sponge offered.

Rearing evaluation
Surveillance: the date, lice development stage, and the quantity of live, dead, and engorged specimens for each condition were noted on follow up sheet.

Engorgement rate: The engorgements rate was determined by vaunting lice that exhibited a notable increase in body size following a blood meal. The activity of the lice was observed during feeding using a binocular magnifier.

Electron microscopy: to study their morphology and ultra-structure, lice from various development stages are serially dehydrated and fixed for viewing under a scanning electron microscope.[21,28]

Hair Tuft Bioassay
Procedure
The substrate for eggs deposition and subsequent treatment is human hair tufts, usually each tuft is made up of about 300 hair strands that are 5 cm long.

As an apart of the in vitro rearing system, 30 male and 30 female lice are put into feeding cups to produce eggs.

Over the course of 48 hours, lice are permitted to deposit their eggs in these hair tufts. The adult lice extracted from, the tufts following 48 hours oviposition periods.

Then according to the age of the eggs, the hair tufts with attached eggs are split into three equal groups.

Group 1: eggs that are 0-2 days old Group 2: eggs that are 3-5 days old Group 3: eggs that are 6-8 days old.

Following oviposition, these eggs groups receive treatment on days 2,5 and 8 respectively.

Test formulations
A negative control, distilled, deionized water, is always included in bioassays.

Additionally, positive control is employed, such as the commercially available formulation (permethrin 1%).

Egg-attached hair tufts are submerged in 0.5 milliliters of the test's solutions.

To make sure that formulation covers eggs, the tufts are twirled in circular motion for 30 seconds.

The treated tufts are put on the glass petridishes after being submerged.

Typical exposure time are 10 minutes, 30 minutes, 1 hour and 8 hours, though they can vary. Petri dish is controlled environment with at temperature of 31℃ and relative humidity 70 -80%. Treated hair tufts containing eggs are agitated five seconds while submerged in ten milliliters of diethyl ether.

They are immediately put on filter paper allowed to dry for about 5 seconds under a stream of air. Accurately assess the impact of exposure times.

Evaluation
The dried tufts with treated eggs are then transferred to covered sterile glass petridish in an incubator.

The incubator is maintained c at 31℃ and between 70 - 80 % humidity. Each treatment is administered three times, with six eggs in each replicate.

Hatchability of eggs
The number of lice hatch from eggs each day is used to determine the hatchability percentage. Eggs that don't develop or larvae that are regarded as dead.[29,30]

CONCLUSION
Traditional medicinal plants present a valuable, natural and safe alternative for head lice management, crucial given emerging resistance to conventional treatments. Lamiaceae, myrtaceae, and arecaceae families are predominant, with leaves and decoctions being primary remedies.

Effectiveness is assessed by using methodologies like filter paper bioassay and hair tufts bioassay, evaluating antilice properties. Specific plants such as green tea, chamomile and pomegranate highlight their significant anti parasitic potential. A comprehensive understanding of their constituents, supported by these in vitro

assessment methods, promise to enhance traditional therapeutic approaches.

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