



A REVIEW ON: EVALUATION OF FILARIASIS ACTIVITY BY USING TRADITIONAL MEDICINAL PLANTS

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Abstract

A persistent parasitic infection spread by mosquitoes is the cause of the disease filariasis. Long-term infection can cause testicular masses, hydroceles, and extremity swelling. After leprosy, it is the second leading cause of permanent deformity and disability globally. At the moment, lymphatic filariasis (LF) is regarded as a neglected tropical illness. In an effort to end lymphatic filariasis, the Global Programme to Eliminate Lymphatic Filariasis is mass drug administering (MDA) to populations in endemic areas. There are numerous initiatives to promote MDA participation. Filariasis is spread by five genera of mosquitoes, namely *Aedes*, *Anopheles*, *Culex*, *Mansonia*, and *Ochlerotatus*, and is caused by at least three species of nematode parasites, namely *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*.

Key words: *Wuchereria bancrofti*, *Brugia malayi*, *Brugia timori*, and filariasis.

INTRODUCTION

An infection with roundworms of the filaridea species results in the symbiotic ailment filariasis. These are dispersed by insects that cater for blood, like mosquitoes and black flies. They belong to the group of diseases called helminthiasis. In subtropical regions of southern Asia, Africa, South Africa, and portions of South America, these parasites can be found in the wild. In temperate regions such as Europe or the US, they are not acquired. Humans are the Definitive Host for eight known filarial worm species. Based on the area of the body they impact, these are separated into three groups:¹

- The worms *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori* are the culprits behind lymphatic filariasis. These worms live in the lymphatic system, including the lymph nodes; in long-term infections, they cause the elephantiasis syndrome.
- *Mansonella streptocerca*, *Onchocerca volvulus*, and *Loa loa* (the eye worm) are the causes of subcutaneous filariasis. These worms live in the area directly beneath the skin. River blindness is caused by *O. volvulus*, whereas *Loa loa* filariasis is caused by *L. loa*.
- The worms *Mansonella ozzardi* and *Perstans*, which live in the serous cavity of the abdomen, are the cause of serous cavity filariasis. Human infections with dog heartworm, *Dirofilaria immitis*, are rare.²

The "gold standard" finger prick test is typically used to diagnose filariasis by looking for microfilariae on thin and thick blood film smears stained with Giemsa. The finger prick test takes a sample of blood from the capillaries in the tip of the finger; larger veins can also be used, but specific

times of day need to be followed. Blood must be extracted at times that correspond to the vector insects' feeding cycles. Examples include *W. bancrofti*, which is primarily transmitted by mosquitoes; blood collection is best done at night. The deer fly is the vector of loa loa; collection should occur during the day. Only microfilariae that use blood as a means of transportation from the lungs to the skin can be diagnosed using this method.³ Certain filarial worms, like *M. streptocerca* and *O. volvulus*, create microfilariae that live only in the skin and do not utilize blood. Skin snips are used for diagnosis of these worms and can be done at any time. For those living outside of the US, albendazole plus ivermectin is the advised course of treatment. Albendazole and diethylcarbamazine together also work well. Headaches, nausea, and vomiting are some of the medication's side effects. Since these treatments are all microfilaricides, the adult worms are unaffected by them. Although medications are essential for the patient's treatment, good hygiene is also necessary. .. There is strong evidence that the removal of adult worms or microfilaria from blood circulation is not significantly impacted by either albendazole used alone or in combination with diethylcarbamazine or ivermectin. Salt that has been medicated with diethylcarbamazine is useful in preventing lymphatic filariasis while keeping community coverage at 90% for six months.⁴

2. FILARIASIS ACTIVITY OF VARIOUS MEDICINAL PLANTS

2.1. *Azadirachta indica* A. Juss.

The common name of *Azadirachta indica* A. Juss is *Neem*. It belongs to the family of Meliaceae. The chemical constituents are nimbin, nimbanene, himbolide, ascorbic acid, nimbandiol, amino acid, hexalosanol, 7-desacetal-7-benzoylazadiradione, nimbiol. The pharmacological activities are antibacterial, antifungal, anthelmintic, antiparasitic, anticancer, antidiarrheal, antimicrobial, antihiv, antipyretic, immune modulation. It is extracted from aqueous extraction. Its invitro method effect is invitro antibacterial activity against both staphylococcus aureus and LARSA with greatest zones of inhibition noted at 100% concentration.^{5,6}

2.2 *Acacia auriculiformis*

The common name of *Acacia auriculiformis* is *auri*. It belongs to the family Fabaceae. The chemical constituents are 35.3% furfural, 34.80% free fatty acid, 11.41% alcohol, 8.53% nitrogen compound, 4.94% alkane, 4.02% glucose, 0.5% alkanone, 0.27% ether and 0.23% alkane. Pharmacological activities include anti-inflammatory, hepatoprotective, wound-healing, antioxidant, antimicrobial, antimalarial, anti-filarial, cestocidal, antimutagenic, chemopreventive, spermicidal, and antidiabetic effects. It is extracted from ethanolic and aqueous extraction. Aqueous extracts of *auriculiformis* show inhibitory effects on *Bactrocera cucurbitae* (the melon fly).^{7,8}

2.3 *Butea monosperma*

The common name of *Butea monosperma* is *palash*. It belongs to family Fabaceae. The chemical constituents are alkaloids, flavonoids, phenolic compounds, amino acids, glycosides, resin, saponin, and steroids, gallic and tannic acids. The pharmacological activities of *palash* are anti-diabetic and anti-oxidant activity. A dose-dependent anti-inflammatory effect was demonstrated by the methanolic extract of BM at 600 and 800 mg/kg. Process optimization for extraction & isolation of dye: Different amounts (2–12 gm) of powdered flowers of *Butea monosperma* were placed in beakers containing 100 ml of distilled water and each was extracted for one hour over a gentle flame maintaining a temperature of 95 – 97°C, filtered and made to 100 ml. The bark only slightly activated α -glucosidase and sucrase enzymes and significantly inhibited α -amylase, while *monosperma* leaves inhibited α -amylase, α -glucosidase, and sucrase enzymes in that order.⁹

2.4 *Calotropis procera*

The common name of *Calotropis procera* is *small crownflower* or *giant milkweed*. It belongs to Apocynaceae family. Numerous biologically active chemical groups, such as cardenolides, steroids, tannins, glycosides, phenols, terpenoids, sugars, flavonoids, alkaloids, and saponins, were present in *Calotropis procera*. A variety of pharmacological activities, including cytotoxic, antidiabetic, and

antioxidant properties, have been demonstrated by pharmacological studies conducted on aqueous and organic extracts of different parts of *Calotropis procera* and its phytoconstituents, including flavonoids, cardenolides, terpenes, enzymes, and other chemical constituents. Flavonoids, steroids, saponins, and tannins are among the phytochemicals that may be responsible for the α -amylase and α -glucosidase inhibition observed in the ethanolic and aqueous extracts of *Calotropis procera*, respectively.^{8,9}

2.5 FICUS RACEMOSE LINN

The common name of *Ficus racemose linn* is cluster fig tree. It belongs to the family of Moraceae. Sterols, flavonoids, tetracyclic triterpene-glucan acetate alkaloids, triterpenoids (Lanosterol), and tannins make up the chemical components. A plant called *Ficus racemosa* is mentioned in the ancient Siddha, Unani, Ayurvedic, and homeopathic traditions. It has a number of medicinal properties, including the ability to act as an antioxidant, anthelmintic, antibacterial, antipyretic, antidiuretic, antitussive, antiulcer or gastro-protective, and potentially inhibit the growth of cancer. Using steady state and time-resolved techniques like stopped-flow spectrophotometric analysis and nanosecond pulse radiolysis, free radical scavenging was applied to the ethanol extract (FRE) and water extract (FRW) of *Ficus racemosa* (family: Moraceae). *F. racemosa* bark is used in the treatment of leucorrhoea, piles, burns, diabetes, dysentery, hemoptysis, and menorrhoea. It is also applied as a wound wash.^{10,11}

2.6 ECLIPTA ALBA

The common name of *Eclipta alba* is false daisy. It belongs to Asteraceae family. Coumestan derivatives such as wedololactone [1.6%], demethylwedololactone, and desmethyl-wedololactone-7-glucoside are the main constituents of *Eclipta alba*. Other constituents include ecliptal, β -amyrin, luteolin-7-O-glucoside, hentriacontanol, heptacosanol, and stigmaterol. Numerous pharmacological effects are demonstrated by it, such as those related to hair growth, immunomodulation, hypotension, hypocholesterolemic, analgesic, antinociceptive, antileprotic, antihemorrhagic, diuretic, hypotensive, antiviral, antihepatotoxic, hair growth, and antioxidants. It is extracted from methanolic extract. According to a number of scientific investigations, *Eclipta alba* protects rats and mice's livers from CCl₄-induced damage. The effects on subcellular levels were caused by its protective action against inflammation and liver injury.^{12,13}

2.7 HIBISCUS SABDARIFFIA LINN

The common name of *Hibiscus sabdariffa linn* is Roselle, Jamaica Sorrel, Red Sorrel, Sorrel, Indian Sorrel, Asam Susar. It belongs to Malvaceae family. The plant *Hibiscus sabdariffa* Linn. contains a number of important chemical components, including flavonoids, hibiscin, tannins, carbohydrates, and steroids. The pharmacological actions include anthelmintic and ant-diuretic properties. One can treat high blood pressure and cough with its decoction. The outcomes showed that the optimal extraction conditions involved extracting 700 W for 8 minutes and then extracting again in an acidic aqueous solution for 6 hours. The contents of anthocyanins, total phenolics, and antioxidant activity were 1.63 mg g⁻¹, 29.62 mg g⁻¹, and 133.25 μ mol g⁻¹, respectively. Our findings demonstrated that the parasite population growth rate had been effectively inhibited by the *H. sabdariffa* extract.^{14,15}

2.8 DELONIX ELATA

The common name of *Delonix elata* is white gul mohur, creamy peacock flower and yellow gul mohur. It belongs to family Fabaceae. Several phytoconstituents, including alkaloids, carbohydrates, saponins, protein, fixed oils and fat, phenolic compounds, flavonoids, terpenoids, anthocyanins, and beta-cyanins, are found in *Delonix Elata*. Pharmacological activities are anti-inflammatory, anti-arthritic, immune modifying potentials and anti-oxidant activities. It is extracted by ethanolic extraction. According to the studies' findings, zinc oxide nanoparticles made from *Delonix Elata* leaves' ethanolic extract may have anti-inflammatory and antioxidant qualities.^{16,17}

2.9 CASSIA ALATU LINN

The common name of *cassia alatu linn* is candle bush, craw-craw plant, acapulo, ringworm bush, or ringworm plant. It belongs to Legumes family. The phytoconstituents are flavones, flavonols, flavonoids glycosides, alatinon, alanonol and β -sitosterol- β -D-glucoside. The pharmacological activities are antibacterial, antidiabetic, antilipogenic, antifungal, antioxidant, dermatophytic, antihyperlipidemic, and anthelmintic activities. Four solvents with varying polarities are used in extraction: n-hexane, ethanol, ethyl acetate, and distilled water. For each of the three categories of fungal strains examined in this study, the invitro effects exhibit strong antifungal characteristics.^{18,19}

2.10 CARAPA PROCERA

The common name of *Carapa procera* is African crabwood. It belongs to Meliaceae. The presence of alkaloids, tannins, saponins, and steroids all of which are known for their synergistic antimicrobial effects may account for the antimicrobial activity of the bark extract from *C. procera*. The ability of *C* to inhibit.^{20,21}

DISCUSSION

The parasitic illness known as filariasis is brought on by an infection with roundworms of the Filarioidea species. Blood-feeding insects like mosquitoes and black flies spread these. They are members of the helminthiase disease group. Annual mass regimen with drugs thus diethylcarbamazine can practically eliminate the pool of microfilariae and much reduce the occurrence of clinical lymphatic abnormalities due to bancroftian filariasis.^{22,23,24} Extermination may be possible in areas with middling rates of passing on, but long haul of treatment or additional control measures may be obligatory in areas with extravagant of transmission. Elephantiasis edema, or thickening of the skin and underlying tissues, is the most noticeable symptom of lymphatic filariasis and was the first illness to be linked to mosquito bites. When the parasites spread through the lymphatic system, elephantiasis develops. The life cycles of human filarial nematode worms are intricate and comprise five main stages.^{25,26} After the male and female worms mate, the female gives birth to live microfilariae by the thousands. The microfilariae are taken up by the vector insect (intermediate host) during a blood meal. In the intermediate host, the microfilariae molt and develop into third-stage (infective) larvae. Upon taking another blood meal, the vector insect, such as *Culex pipiens*, injects the infectious larvae into the dermis layer of the skin.^{27,28} After about one year, the larvae molt through two more stages, maturing into the adult worms. Neem has been considered to have an astringent, antiseptic, insectial, antiulcer properties. *Azadirachta indica* or neem has been used widely in the indian sub continent for decades of years as a remarkable tool for maintaining healthy periodontium. It is considered as an useful alternative for maintaining healthy periodontium because of its chemopreventive action.. When *Butea monosperma* roots extracts are used at such nanoconcentrations, they help build a database of potential new drugs for treating human lymphatic filariasis. These extracts significantly reduced the motility of microfilariae in a dose-dependent manner.^{29,30,31} Because of its anthelmintic qualities, the medicinal plant *Calotropis procera* was investigated for the presence of putative phytochemicals. The plant *carapa procera* has been found to have nematicidal properties, which means it can kill nematodes^{32,33}. *Cassia alatu linn* is used in traditional medicine to treat a wide range of illnesses, particularly skin conditions. Application of the paste reduces swelling and pain in glandular swellings and filariasis. The chronic and infected wounds get cleansed and heal better with application of its paste. *Delonix elata* has mosquito repellent properties and adulticidal efficacy against filariasis vector mosquitoes. *Ficus racemosa Linn* is a plant species that has been used in traditional medicine to treat various ailments, including filariasis. The plant's bark, leaves, and fruits have been used to treat various diseases, including inflammation, diabetes, and liver disorders.^{34,35} The main phytochemical constituents used as anti filariasis are flavonoids, glycosides, terpenes and phenolic acids which is present in the above mentioned plants.³⁶

CONCLUSION

This literature emphasizes the significance of natural products, particularly plant-derived test substances, in the treatment of a variety of disease conditions. The pharmacological exploitation of these medicinal plants has remained limited despite the rich biodiversity of India and the traditional knowledge gleaned from Ayurveda, Unani, and homeopathy. While some plants have undergone extensive research, others still require in-depth study. Furthermore, extensive research is required to support the traditional use of medicinal plants in science. Researchers have studied a variety of bioactivities, such as those related to cancer, inflammation, bacteria, antioxidants, and health adjuvants, as well as applications in the treatment of skin conditions, diabetes, arthritis, and epilepsy. Nevertheless, limited attention has been paid to the medicinal plant's ability to treat lymphatic filariasis. There is limited information on significant plants that can help with filariasis. Our results highlight the significance of thoroughly researching herbal remedies for protecting the antifilarial therapeutic range. When it comes to fighting filariasis, this conventional treatment option might really win out in terms of patient satisfaction and cost effectiveness.

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