A Review on Anthelmintic Potential of Herbs Mentioned in Siddha Medicine

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Abstract
Synthetic medicines are very effective in curing disease but also cause a number of side effects. A large variety of medicinal plants were used in ancient Siddha system of medicine. Now a day’s researches are mainly concentrates on that due to its efficacy, safety and easily accessibility. A large number of medicinal plants are claimed to possess anthelmintic activity in Siddha medicine. The current review focuses on the phytochemical screening and various in-vitro and in-vivo studies on some of the major plants such as Kuppaimeni (Acalypha Indica), poondu (Allium sativum), Madhulai (Punica Grantum), Malaivembu (Melia Azederach), Palasu (Butea Monosperma), Karum Seeragam (Nigella Sativa), Agathi (Sespania Grandiflora), Alinjill (Allingium Salvifolium), Veliparuthy (Pergularia Daemia) and Vaividangam (Embelica Ribes) which were claimed in Siddha system for its Anthelmintic activity. The review validates all the plants possess very effective anthelmintic potential based on Siddha literatures and recent researches.

Keywords: Siddha herbs, anthelmintic, helminthiasis, herbals, siddha medicine, Siddha literature.

INTRODUCTION
Humans are appears to be affected with more diseases than any other species. At present living an entire life without any disease in a life span is difficult to an individual. Since our changed life style, food habits, physical activity etc. had been changed a lot than earlier. Helminths infections are one of the most common infections in man which affects the large proportions of the world population especially in developing countries. Helminths are also known as parasitic worms or also referred as intestinal worms even though not all helminths reside in intestines. Infection by the helminths is called as Helminthiasis. Now a day it increases the mortality and morbidity day by day. This includes intestinal nematodes (Round worm), Trematodes (flukes) and cestodes (tape worms). Low income countries and developing countries are victims of this. In which children’s and women’s are get more affected. Helminthes have plugged humans since before the era of earliest history. In siddha literatures siddhars had mentioned a lot of herbs and simple herbal preparations with anthelmintic activity. About 70-80% of whole population still uses herbals as main source of medicine for primary health care, because of better acceptability, compatibility and no side effects with human body. This article is to simply evaluate some remedial plants mentioned in Siddha literature for their proclaimed anthelmintic efficacy.
1. **Acalypha Indica**  
   Tamil Name: Kuppaimeni  
   English: Indian Acalypha  
   Bot. Name: Acalypha indica  
   Family: Euphorbiaceae.  
   Parts used: Leaves

Siddha literature ‘Gunapadam’ it’s described that *Acalypha indica* leaves extract or infusion of leaves or powder intake will cure helminthiasis. Phytochemical screening of crude extracts revealed presence of flavanoids and alkaloids like acalypus and acalyphine is the major chemical constituents. The leaves extracts of *Acalypha indica* contains cynogenic glycocides, inositol methylether, resin, triacetomamine and volatile oils. The presence of terpenoids, flavonoids and polyphenols shown anthelmintic activity.

While the *Acalypha indica* were screened for the evaluation of its anthelmintic activity, the aqueous and ethanolic extracts of this plant posses potent anthelmintic activity compared with standard drug piperazine citrate at 100 mg/ml against pheretima posthuma at different concentrations.

2. **Allium sativum**  
   Tamil Name: Poondu  
   English Name: Garlic  
   Bot. Name: Allium sativum  
   Family: Liliaceae  
   Parts used: Bulb.

In Siddha literature *Gunapadam* it’s described that 20 – 30 drops of allium sativum juice twice or thrice daily will cure helminthiasis. In *Allium Sativum* Bulb contains phytochemicals such as flavanois, alkanoids, and the alcoholic extract of allium sativum shows moderate in-vitro anthelmintic activity against human Ascaris lumbricodes. *Allium sativum* has effective in the exposure of dysentery and also act as vermifuge. The active chemical in garlic is Allicin, which is produced by crushing or chewing of raw garlic. It’s shows anthelmintic activity which comparable to standard drug Piperazine citrate.

3. **Punica Granatum**  
   Tamil Name: Madhulai  
   English Name: Pomegranate  
   Bot. Name: Punica granatum  
   Parts used: Root bark.

In Siddha literature *Gunapadam* it’s described that infusion made of *punica granatum* root bark and syzygium aromaticium with water in a dose of 15-30 ml twice daily before food for 6 days internally gives a good result for Helmnthiasis.

The alcoholic extract of bark was evaluated for its proclaimed anthelmintic potential. The activity was found dose dependent inhibiting transformation of eggs to filariform larvae of *Haemonchus contortus*. In clinical studies the plant shows efficacy against nematodiasis in calves. The stem bark is reported to contain an alkaloid Pelletierine tannate, which was considered to be the most effective and least harmful form of the remedy because of its insolubility it prevents its rapid absorption and thus enabled a prolonged contact with the worms. Punica granatum bark 5 %, all of the extracts were able to killed all tested parasites with the LT100 The porcine ascarides , porcine cestodes, chicken ascarids and chicken trematodes.

4. **Melia Azedarach**  
   Tamil Name: Malai vembu  
   English Name: Common beard tree  
   Bot. Name: Melia azadiracta  
   Family: Meliaceae  
   Parts used: Root bark.

*Gunapadam* Literature said that infusion of *Melia azedarach* in a dose of 15-30ml will cure helminthiasis. Extracts obtained from the drupes of *M. azedarach* are active against both the tapeworm
and the earthworm tested. It is worth to mention that the drupe extracts are comparatively more active than piperazine phosphate against Taenia solium. The antiparasitic activity against this tapeworm was better than that of piperazine phosphate (80 min at 0.1 %, and 56 min at 0.2%) at drupe extract concentrations of 0.1 % and 0.2 % (mean death values of 52 and 32 min, respectively).  

5. Butea Monosperma  
Tamil Name: Palasu.  
English Name: Flame of the forest  
Bot. Name: Butea monosperma  
Family: Fabaceae  
Parts used: Seeds.

In Gunapadam Siddha literature it’s mentioned that purified seeds of Butea monosperma 260 mg thrice a day with honey for 3 days will cure helminthiasis 1. In seeds of Butea monosperma present Triterpene, butein, butin, isobutrin, coreopsin, isocoreopsin (butin 7-glucoside), sulphurein, monospermoside (butein 3-e-D-glucoside) and isomonospermoside, chalkiness, aureoles, flavonoids (palasitrin, prunetin) and steroids 8. A lactone called Palasonin, present in Butea Monosperma seeds was evaluated and found anthelmintic activity 9. It has also shown effective anthelmintic activity against Ascaris lumbricoides 10.

6. Nigella Sativa  
Tamil Name: Karunseeragam  
English Name: Black cumin  
Bot. Name: Nigella sativa  
Family: Ranaunculaceae  
Parts used: Seeds.

Nigella sativa seeds contains active compounds such as thymoquinone, thymohydroquinone, dithymoquinone, p-cymene, carvacrol, 4-terpineol, t-anethol, sesquiterpene longifolene, α-pinene and thymol etc. Isoquinoline alkaloids e.g. nigellicimine and nigellicimine-N-oxide, and pyrazol alkaloids or indazole ring bearing alkaloids which include nigellidine and nigellicine are present in Black seeds. Also other compounds like carvone, limonene, citronelol were found in trace amounts. 11

Thymoquinone and dithymoquinone-cymene and alpha-pinene are the major active principles in N. sativa. The anthelmintic potential of essential oil N.sativa Linn was evaluated against earthworms, tapeworms, hookworms and nodular worms exhibited fairy good activity against earthworms and tapeworms. Activity against hook worms and tape worms are comparable with that of hexyl resorcinol 12.

7. Sespania Grandiflora  
Tamil Name: Agathi  
English Name: August tree  
Bot. Name: Sespania Grandiflora  
Family: Fabaceae  
Parts used: Leaves.

In Gunapadam” Siddha literature it’s said that decoction made of Sespania grandiflora leaves with small quantity of palm jaggery internally had vermifuge action 1. And also intake leaves as food 13. Phytochemical analysis reported the presence of flavanoid, phenol, tannin, alkaloid, saponin, steroids and triterpenoid in leaf aqueous extract of Sespania grandiglora. It recorded a definite anthelmintic efficacy against A.galli and G. domesticus . Increasing the concentration of the extracts decreased the survival of A. galli 14.

8. Allingium Salvifollium  
Tamil Name: Alinjil  
English name: Sage-leaved alangium  
Bot.Name: Allingium Salvifolium
Family: Cornaceae
Parts used: Root bark

‘Gunapadam’ Siddha literature said that decoction made of Allinjium salvifolium root bark along with ghee is best for helminthiasis1. Allinjium salvifolium contains active constituents such as Alkaloids, Tannins, Steroids, Phenolic compounds, Flavinoids, Methyl-1H-pyrimidine-2,4-dione and 3-O-b-D-glucopyranosyl-(24B)-ethylchololesta-5,22,25-triene, Phenolic glycosides, Salviifosides A,C and Salicin, Kaempferol, Kaempferol 3-O-b-Dglucopyranoside.15

The aqueous and alcoholic extracts of roots of Allinjium salvifolium was evaluated against Pheritima posthuma for its Anthelmintic activity. Three different concentrations (50, 100 and 150 mg/ml) of crude extracts of hexane, ethyl acetate, chloroform and methanol were tested. Parameters such as; paralysis and death period of the worm were evaluated. It shows significant anthelmintic activity of methanol and chloroform extracts16.

9. Pergularia Daemia
Tamil Name: Veliparuthy
English Name: trellis-vine
Bot. Name: Pergularia daemia
Family: Asclepiadaceae
Parts used: leaves

In Siddha literature Gunapadam it mentioned that decoction made of Pergularia Daemia is good for helminthiasis1. Pergularia Daemia contains flavonoid, tannins, alkaloids, glycosides, terbenoids, steroids and carbohydrates.17

Pergularia daemia leaves not only demonstrated paralysis, but also caused death of worms especially at higher concentration of 100 mg/ml, in shorter time as compared to standard drug Albendazole. Phytochemical analysis of the crude extract revealed the presence of tannins and phenolic compounds is one of the chemical constituents contained within them. Tannins were shown to produce anthelmintic activities18.

10. Embelia Ribes
Tamil Name: Vaividangam
English Name: False pepper
Bot. Name: Embelia Ribes
Family: Myrsinaceae
Parts used: leaves: Seeds

In Siddha literature Gunapadam said that 4-16 gm of Embelia ribes seeds powder mix with honey twice or thrice daily will eliminate intestinal worms.

Phyto chemical study of Embelia ribes seeds shows, it contains Non-reducing polysaccharides, Gums, Mucilage, Proteins, Amino acids, Fats and oils Steroids, Glycosides, Saponin , Flavonoids, Alkaloids, Tannins and Volatile oil . Tannins, the polyphenolic compounds, are shown to interfere with energy generation in helminth parasites by uncoupling oxidative phosphorylation or, binds to the glycoprotein on the cuticle of parasite, and cause death19-20.

The ethanolic extract of the seeds Embelia ribes (10-200 μg/mL) exhibited potent anthelmintic activity.

Conclusion
A large variety of plants, in total or their products are used for wide variety of diseases in Siddha system of Medicine. A potent anthelmintic drug will eradicate the worm infestation without affecting the host by affecting the physiological activities of worms. By screening the crude plant extracts, essential oils and isolated active principles for in-vitro and in-vivo anthelmintic studies substantiate the above mentioned plants in Siddha system of medicines possess good results. To conclude, in future efforts should made to standardise the plant extracts with good anthelmintic activity to formulate good herbal formulation rather than synthetic ones. For that Phytochemical study, clinical study, and possible studies on molecular mechanism of action in herbal plants is in need.
Reference
1. Murugesu mudhaliar, Gunapadam Mooligai, Siddha Materia medica 1st part, Indian medicine & Homeopathy 6th edition 2002
2. Garai Ranju, In vitro anthelmintic activity of Acalypha Indica leaves extracts, IJRAP 2011,2(1) 247-249.
3. Zafar Iqbal, Qazi Khalid Nadeem, M.N. Khan, M.S. Akhtar† And Faisal Nouman Waraich , In vitro Anthelmintic activity of Allium sativum, Zingiber officinale, Curcurbita Mexicana and Ficus religiosa, International journal of Agriculture and Biology, 1560-8530/2001/03-4-454-45.
4. Prakash V, Singhal KC & Guptha RR, Anthelmintic activity of Punica granatum and Artemisia silversiana, Indian J Pharmacol, 1980,12,62-65
5. Pradhan KD, Thakur DK & Sudhan NA, Therapeutic efficacy of P.Granatum and C. Maxima against clinical cases of nematodeeasis in calves, Indian J Ind Med, 1992,9 (1),53-54.
6. Nguyen Thanh Hai *1, Nguyen Van Thanh2, Bui Thi Tho3,Miyamoto Atsushi A Study About Anthelmintic Effect Of Punica Gramatum L Bark On Veterinary Endoparasites
7. Víctor D. Szewczuk, Elena R. Mongelli and Alicia B. Pomilio Antiparasitic activity of Melia azedarach growing in Argentina by Molecular Medicinal Chemistry
8. Prasanth D, Asha M.K, Amit A, Padmaja R. Fitoterapia 2001:74:421-422.
9. Raj R K & Kurup P A, isolation and characterisation of palasonin an Anthelmintic principle from the seeds of Butea frondosa, Indian J.Chem,1967,5,86-87
10. Rao KS, Raviprakash V Chandra & sabir M, Anthelmintic activity of butea frondosa against Ascaris lumbricoides, Indian Journal physio pharmacol 1977,21,250-253,
11. Desai S D et al /J. Pharm. Sci. & Res. Vol. 7(8), 2015, 527-532
12. Agarwal R, Kharya MD and Shrivastava R, Antimicrobial and anthelmintic activities of essential oil of Nigella sativa Linn, Indian J Exp Biol, 1979, 17, 124-1265
13. Kuppusami mudhaliyar, Siddha Maruthuvam, 8th edition 2016, Pg.no: 35
14. R Jothi Karumari, S Sumathi, K Vijayalakshmi and S Ezhilarasi Balasubramanian, Anthelmintic Efficacy of Sesbania grandiflora Leaves and Solanum torvum Fruits against the Nematode Parasite Ascariida galli, American Journal of Ethnmedicine, 2014, Vol. 1, No. 5, 326-333
15. Ravira Venkateshwarlu et al. / Journal of Pharmacy Research 2011,4(5),1423-1425
16. Keyur Panara, Pawan K. Singh, Pooja Rawat, Vivek Kumar, Momin Maruf, Kanti Patel, R. K. Ravikumar and Vipin Kumar, Importance of Alangium salviifolium and Its Pharmacological Update, European Journal of Medicinal Plants 12(4): 1-15, 2016, Article no.EJMP.23899
17. Sridevi G , Prema Sembulingam , Sekar Suresh ,Sembulingam K, Phytochemical Analysis of Pergularia Daemia for Its Bioactive Components through Gas Chromatographic Mass Spectrometry, wwwiosrophr.org Vol 4, Is 5 (May 2014), PP. 41-46
18. Kishor Kumar1, P. Satheesh Kumar1 and T.Venkatachalam, Investigation Of Anthelmintic Activity Of Pergularia Daemia Leaves, Pharmacophore 2014, Vol. 5 (1), 44-48
19. Athnasiadau, S., I.kyriazakis, F.jackson, R.L.coop. (2001).Direct Anthelmintic effects of condensed tannins towards different gastrointestinal nematodes of sheep: in vitro and in vivo studies. Vet.parasit Vol.1,99,205-219. 11.
20. Thompson, D.P., T.G.Geary .(1995). The structure and function of helminth surfaces in Biochemistry and Molecular Biology of parasites (j.j.marr, ed.), 1st ed. Academic press, New York, pp.203-232.