

A REVIEW ON THERAPEUTIC EFFECTIVENESS OF KALARCHI CHLOORANAM - A SIDDHA FORMULATION

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Abstract

Plant-based formulations and nutraceuticals are have become a spectrum of interest due to their versatile biological activities. Many plant-based phytochemicals have been reported to have various pharmacological activities such as antimicrobial, anti-insecticidal, anti-ulcer and anticancer properties. The evaluation of traditional Siddha formulations will open new windows in the treatment of different diseases. In the present study, *KalarchiChooranam* (KC) consisting of two herbal ingredients *Caesalpinia bonduca* (*Kalarchikaai*) and *Piper Nigra* (*Milagu*) a simple Siddha formulation was evaluated and reviewed for its versatile biological activities which may aid further researches in the near future.

Keywords: *Kalarchi* (*Caesalpinia bonduca*), *Milagu* (*Piper nigra*), Siddha, Traditional medicine.

1. INTRODUCTION

The traditional Siddha system of medicine has been in practice since thousands of years in south Asian regions. In recent years, plant-based formulations are acquiring more interest due to their versatile pharmacological activities such as antimicrobial, antioxidant, anti-inflammatory, anti-ulcer, and antiproliferative anticancer properties. These medicinal herbs and plants have versatile phytoconstituents such as alkaloids, flavonoid, polyphenol, etc., which posses these medicinal properties to support and enhance the human health (1, 2, 3). Many polyherbal formulations have been reported to have combination of medicinal plants which shows relatively high amount of phytoconstituents when compared when used as a single composition, thus showing high medicinal properties (4, 5, 6). A report from WHO states that India is a country of medicinal plants which has nearly 13000 medicinal plants and has clearly studied 7000 plants for the treatment of various diseases (12). In Siddha system both single herbal and multiple herbal medicines (polyherbal) can be used to treat disorders. The *KalarchiChooranam* is a polyherbal composition of *Kalarchiparuppu* (*Caesalpinia bonduca*) and *Milagu* (*Piper nigra*) which has been indicated in the siddha classical text “Gunapadam”Siddha MateriaMedica herbal divisionfor uterine disorders such as menstrual irregularities, polycystic ovarian disease, Scrotal edema and other inflammations as both internal and external medicines.(7)

Previous studies reveal the phytoconstituents of *KalarchiChooranam* had a higher number of alkaloids and flavonoids. The DPPH free radical scavenging assay was performed for the 4:1 ratio of *KalarchiChooranam* and found that at 100 µg/ml concentration it showed potent antioxidant activity in comparison with ascorbic acid.(9-11) The antibacterial activity of the 4:1 ratio of *KalarchiChooranam* was tested against *Escherichia coli*, *Azospirillumbrasilense*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Streptococcus agalactiae* using paper disc method and the antifungal activity was tested against *Candida albicans*, *Aspergillusniger*, *Candida auris*, and *Fusariumsporotrichioides*, *Streptococcus agalactiae* respectively. The result showed clear zone of inhibition indicating antimicrobial potential of

KalarchiChooranam against the tested microorganisms. In the future, this *KalarchiChooranam* might be deeply evaluated for its significant biological activities.(3)

Siddha literature evidence on *Kalarchichooranam*

S.no	Ingredients	Taste	Potency	Action
1.	<i>Kalarchi</i> (Caesalpinia bonduca)	Bitter	Hot potency	Anti-periodic, Tonic, Anti-spasmodic, Anthelmintic and Febrifuge
2.	<i>Milagu</i> (Piper nigra)	Bitter, Pungent	Hot potency	Acrid, Carminative, Anti-periodic, Rubefacient, Stimulant, Resolvent, Anti-vata

Preparation:

Kalarchi seeds and Pepper are separately purified and grinded into fine powder. Both the ingredients are taken in same ratio and mixed together. 325-1000 mg of the mixture can be given internally with hot water.

Indications:

Ulcer, *Pakkasoolai* (Pricking pain), Scrotal oedema and other types of oedema due to *Vadhadisorders*. [7]

Scientific Evaluation on medicinal properties of Ingredients of KC

Caesalpinia bonduca

Caesalpinia bonduca is a large prickly shrub, native of South India, Burma and Ceylon which is widely distributed in all the major continents including Asia and Africa belongs to the family of Caesalpinaceae. It is also commonly called as Gray Nicker, Bonduca nut, Nicker tree Fever nut, Molucca bean, nataranj, nata, koranju, karanj in Bangladesh and putikaranja in India. In Traditional medicine the outer shell and the seeds of these plants are reported to have several therapeutic properties like antidiabetic, antibacterial, antifungal, antiparasitic actions along with body weight reduction and repairing of damaged pancreas. (12) (13)

The literature also shows us that Caesalpinia bonduca has been quoted in Ayurvedha and traditional scriptures for a very long time for its multiple restorative properties like anthelmintic, antidiuretic, hyperglycemic and hyperlipidemic, antimalarial activity, antitumor activity, anticonvulsive anti-ulcer activity and anti-inflammatory mechanism. The shell seeds and twigs of the plant are studied to have several medicinal properties. The most predominant alkaloid of the extract is Natin. Other phytoconstituents found in the seed and shell extract are saponins, terpenoids, diterpene, bondenlide, phytosterols, stearic, palmitic, oleic, linocerac, linolenic acid, fatty oil, starch, sucrose along with Bonducin which is a strong glycoside. It also has antiestrogenic, hematoxylin, stereocheanol A, 6-O-acetylloganic acid, 4-O-acetylloganic acid, and 2-O-b-D-glucosyloxy-4-methoxybenzenepropanoic acid, furanoditerpenes, phytosterin, β -sitosterol, flavonoids, bonducellin, aspartic acid, arginine, citrulline and β -carotene and Caesalpinifuranoditerpenes. (14)(15)(16) Other invitro studies have reported that hydro-methanolic extract of the seed has antioxidant property and can be used in the treatment of tumors and asthma. (17)

Piper nigra

Piper nigrum also called black pepper is one of the earliest spices known and is a native of Malabar Coast of India and later cultivated in tropics of Southeast Asia, widely exported and used as a spice all over the world. Growth of the plant requires a long rainy days and high temperatures with partial shade.(18)

Pepper also known as “King of Spices” a perennial climbing vine belongs to the family Piperaceae. Widely used as a spice around the world, pepper also has a limited usage in medicine as a carminative (to relieve flatulence) and as a stimulant of gastric secretions. The name “pepper” is derived from the word “*Pipali*” in Sanskrit. It is uses as one of the vital spicy ingredients, perfumes, preservatives and insecticides. The Phytoconstituents present in the pepper are α -pinene, α -thujene, α -phellandrene, sabinene, 3-carene, D-limonene, caryophyllene, β -phellandrene, and β -bisabolene. It also has traces of calcium, magnesium, potassium, iron, vitamin C, tannins, flavonoids, carotenoids, proteins and carbohydrates. Piperine naturally occurring principal bioactive alkaloid is found to have properties that enhance cerebral brain functioning and increase nutrient absorption. (19)

The therapeutic properties it possess are Antioxidant, anti-inflammatory, anticancer, antidiabetic, antimicrobial, antidepressant, enhance the bioavailability and help to aid digestion.(20)

1. DISCUSSION

The aqueous extract of 4:1 ratio of the *KalarchiChooranam* was subjected to GCMS analysis to determine the phytoconstituents composition present in it. Nearly 25 individual compounds were identified with specific peak area % and unique retention time (RT) as shown in Fig 1 and Table 1. Inositol, Xanthosine, and Alpha.-D-Glucopyranoside, methyl 2,3-bis-O were identified as the top 3 predominant compounds . Comparatively, both the lead compounds showed good binding affinities against the PCOS receptors CYP17 and Follistatin with significant binding affinities. Polycystic ovary syndrome (PCOS) is mainly exhibited by reproductive dysfunction and metabolic disorders with symptoms that have a long term effect on women’s health. It starts with hypersecretion of androgens which results in ovulatory dysfunction and limited follicular growth. This excess androgen causes hyperinsulinemia which ends up in insulin resistance. The insulin resistance further more increases the secretions of androgens and inhibits the production of sex hormone globulin. This cycle of dysfunction thereafter increases bioactive free testosterone circulating in blood causing the symptoms associated with PCOS. [19] In the presence of increased androgens, the peripheral and hepatic insulin action is inhibited which in turn leads to insulin resistance. (21)

Hyperandrogenism is characterized by menstrual irregularity, hirsutism, acne, acanthosis nigricans, insulin insensitivity, chronic anovulation and infertility. *Caesalpinia bonduca* being the main ingredient of *KalarchiChooranam* is reported to have antioxidant and anti-diabetic properties. PCOS rats when treated with the seed extract of *C. bonduca* (200 mg/kg) showed lesser levels of testosterone in blood and higher levels of Progesterone and Estradiol when compared to the PCOS Induced group(15)

Studies have reported that there is an increase in the LH/FSH ratio and LH/FSH ratio greater than two which is considered as “gold standard for evaluating the gonadotropin status in PCOS. It also protects ovaries from excess proliferation of the theca cells, preventing PCOS condition. (21) The effects of *Nigella sativa* and black pepper on the size of dominant follicle and endometrial thickness increased pregnancy rates on treatment for infertile women with PCOS.(22) One study proved that there is a good binding affinity and showed strong and significant activities against the PCOS receptors.(22)

2. CONCLUSION

Siddha-based formulations and nutraceuticals are attracting interest due to their versatile pharmacological activities. The phytochemical analyses have revealed the presence of alkaloids, phenols, saponins, phytosterols and carbohydrate compounds. In GCMS analysis fifteen compounds identified in this study scientifically validated that the extract of *Kalarchichoornam* has potent anticancer, antiulcer, antimicrobial, anxiolytic, antiviral, antitumor and cytotoxic activities. The molecular docking studies reveal strong and significant activities against the PCOS receptors. The present review might be

utilized for the development of traditional medicines and further investigation needs to elucidate novel active compounds from the *Kalarchichooranam* which may be created a new way to treat many incurable diseases.

3. REFERENCES

1. Sethuraman J, Nehru H, Shanmugam K, Balakrishnanan P. Evaluation of potent phytochemicals and antidiabetic activity of *Ficus racemose* L. *W. J. Pharm. Res.* 2017; 6(15); 909– 20.
2. Nagarasan S, Boominathan M. Invitro studies on the primitive pharmacological activities of *Adhatodavasica*. *Int. J. of Lif Sci.* 2016; 4(3); 379-85. 15.
3. Nagarasan S, Boominathan M. Perspective pharmacological activities of *Leucas aspera*: an indigenous plant species. *Indo Am J Pharm Res.* 2016; 6(09); 6567.
4. Ahmed S. R, Rabbee M. F, Roy A, et al. Therapeutic Promises of Medicinal Plants in Bangladesh and Their Bioactive Compounds against Ulcers and Inflammatory Diseases. *Plants (Basel).* 2021;10(7); 1348.
5. Sharifi-Rad M, Fokou P. V. T, Sharopov F, et al. Antiulcer Agents: From Plant Extracts to Phytochemicals in Healing Promotion. *Molecules.* 2018; 23(7); 1751.
6. Pandey M. M, Rastogi S, Rawat A. K. Indian traditional ayurvedic system of medicine and nutritional supplementation. *Evid Based Complement Alternat Med.* 2013; 2013; 376327.
7. MurugesuMudaliyar, K. S. "Gunapadam." *Part-I. Chennai: Tamil Nadu Siddha Medical Board* 274 (1956).
8. Mekala JR, Kurappalli RK, Ramalingam P, Moparthi NR. N-acetyl l-aspartate and Triacetin modulate tumor suppressor MicroRNA and class I and II HDAC gene expression induce apoptosis in Glioblastoma cancer cells in vitro. *Life Sci.* 202; 286:120024. <https://doi.org/10.1016/j.lfs.2021.120024>
9. M JR, Ramalingam PS, Mathavan S, B R D Yamajala R, Moparthi NR, Kurappalli RK, Manyam RR. Synthesis, in vitro and structural aspects of cap substituted Suberoylanilidehydroxamic acid analogs as potential inducers of apoptosis in Glioblastoma cancer cells via HDAC /microRNA regulation. *Chem Biol Interact.* 2022; 109876. <https://doi.org/10.1016/j.cbi.2022.109876>.
10. Mekala JR, Ramalingam P, Moparthi NR, Kutala VK. (2022) ROS Modulatory Role of HDAC Inhibitors in Cancer Cells. In: Chakraborti S. (eds) *Handbook of Oxidative Stress in Cancer: Therapeutic Aspects.* Springer, Singapore. https://doi.org/10.1007/978-981-16-1247-3_250-1 25.
11. TheophineChinwubaOkoye, Phillip F. Uzor, Collins A. Onyeto, Emeka K. Okereke, 18 - Safe African Medicinal Plants for Clinical Studies, Editor(s): Victor Kuete, *Toxicological Survey of African Medicinal Plants*, Elsevier, 2014, Pages 535-555.
12. Christophe Wiart, Chapter 7 - Antiparasitic Asian medicinal plants in the Clade Fabids, Editor(s): Christophe Wiart, *Medicinal Plants in Asia and Pacific for Parasitic Infections*, Academic Press, 2021, Pages 121-232.
13. Kannur DM, Paranjpe MP, Sonavane LV, Dongre PP, Khandelwal KR. Evaluation of *Caesalpinia bonduca* seed coat extract for anti-inflammatory and analgesic activity. *J Adv Pharm Technol Res.* 2012 Jul;3(3):171-5. doi:10.4103/2231-4040.101010. PMID: 23057003; PMCID: PMC3459446.
14. Subbiah V, Nagaraja P, Narayan P, Nagendra HG. Evaluation of Pharmacological Properties of *Caesalpinia bonduca* Seed and Shell Extract. *Pharmacognosy Journal.* 2019;11(1):150-154.
15. Thirumurugan, A. & Senthil Kumar, Thirupathi& Shanmugam, Achiraman& Kumari, Ranjitha& Diana, Bollipo.(2021). Effect of aqueous seed extract of *Caesalpinia bonduca* (L.) Roxb., on hormonal assay and lipid profile in induced Polycystic Ovary Syndrome albino female rats. 6. 139-146.

16. Jana K, Chatterjee K, Ali KM, Ghosh A, Bera TK, Ghosh D. Antioxidant potential of hydro-methanolic extract of seed of *Caesalpinia bonduca*: An in vitro study. *J Adv Pharm Technol Res.* 2011 Oct;2(4):260-5. doi: 10.4103/2231-4040.90884. PMID: 22247894; PMCID: PMC3255348.
17. Britannica, The Editors of Encyclopaedia. "black pepper". *Encyclopedia Britannica*, 11 May. 2023, <https://www.britannica.com/plant/black-pepper-plant>. Accessed 21 May 2023
18. Ashokkumar, K., Murugan, M., Dhanya, M.K. et al. Phytochemistry and therapeutic potential of black pepper [*Piper nigrum* (L.)] essential oil and piperine: a review. *ClinPhytosci* 7, 52 (2021). <https://doi.org/10.1186/s40816-021-00292-2>
19. Harada M. Pathophysiology of polycystic ovary syndrome revisited: Current understanding and perspectives regarding future research. *Reprod Med Biol.* 2022 Oct 8;21(1):e12487. doi: 10.1002/rmb2.12487. PMID: 36310656; PMCID: PMC9601867.
20. Balasubramanian MeeraMurugesan, PalayyanMuralidharan, Rajeswary Hari *Journal of Applied Pharmaceutical Science* Vol. 10(02), pp 072-076, February, 2020.
21. Teede H, Deeks A, Moran L. Polycystic ovary syndrome: a complex condition with psychological, reproductive and metabolic manifestations that impacts on health across the lifespan. *BMC Med*, 2010;
22. AtharRasekhJahromi, Asra Ansari, Zahra Zareibabaarabi, VahidRahmanian, Nader sharifi. Comparative Effect of *Nigella Sativa*+ Black Pepper and Letrozole + Tamoxifen on Female Infertility in Women with Polycystic Ovarian Syndrome: A Randomized Clinical Trial. *J. Med. Chem. Sci.*, 2023, 6(9) 2154-2163
23. V, V., & P, B. (2023). Insilico evaluation of pharmacological activities of *KalarchiChooranam*. *International Journal of Ayurvedic Medicine*, 13(4), 991–996. <https://doi.org/10.47552/ijam.v13i4.3119>.