Bulletin of Pure and Applied Sciences
Zoology (Animal Science), Vol.43B, No.2S,
July-December 2024: P. 896-907

Print version ISSN 0970-0765
Online version ISSN 2320-3188

Original Research Article
Content Available online at: www.bpasjournals.com

AN OVERVIEW OF SIDDHA EXTERNAL THERAPY MULANGAAL VATHA OTTRADAM (FOMENTATION)

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Abstract

Osteoarthritis in Siddha medicine is predominantly linked to the imbalances of Vatham and Kapham doshas. Effective management involves restoring these doshas' balance to address rigidity, coldness, and congestion. Mulangaal Vatha Ottradam, a traditional Siddha fomentation therapy detailed in "Aathmaratchamirtham," uses moist heat to relieve symptoms and restore dosha balance. This review evaluates Mulangaal Vatha Ottradam's efficacy in treating osteoarthritis, integrating findings from scientific databases and textbooks to assess its therapeutic value.

Introduction

Siddha medicine employs both internal and external treatment modalities. Among external therapies, "Pura Marundhu" is essential, with Ottradam being a significant technique for managing chronic injuries. Ottradam, or fomentation therapy, utilizes warm, moist compresses or poultices to alleviate muscle and joint stiffness, improve circulation, and detoxify the body.

Mulangaal Vatha Ottradam, described in "Aathmaratchamirtham," is a specific formulation in Siddha literature. Siddha classifications of diseases, including "Keel Vayu," closely align with symptoms of osteoarthritis, characterized by joint pain, swelling, and stiffness. Osteoarthritis, a prevalent degenerative joint disease, affects a large portion of the elderly population, particularly in India. The review explores Siddha medicine's literary, fundamental, pharmaceutical, and clinical research related to Mulangaal Vatha Ottradam's effectiveness for osteoarthritis.

Review of Mulangal vatha otradam:

The ingredients of **Mulangal vatha ottradam** are mentioned in Table 1

Table 1: Ingredients of Mulangal **vatha ottradam**

Tamil name	Botanical name	Quantity
Veela elai	*Cadaba fruiticosa*	Required quantity

Ellupai pinnakku	*Sesamum indicum*	Required quantity
Poondu	*Allium sativum*	Required quantity
Avaraiilai	*Senna auriculata*	Required quantity
Kadukkai	*Terminalia chebula*	Required quantity
nellikai	*Phyllanthus emblica*	Required quantity
Thandrikkai	*Terminalia bellerica*	Required quantity
Aamanaku ennai	*Ricinus communis*	Required quantity

1.*VEELA*

Parts: Leaves

Family: Capparaceae

Chemical Constituents: Alkaloids, Flavonoids, Triterpenoids, Saponins, Phenolic Compounds, Steroids

Fig 1 *Cadaba fruiticosa*

Alkaloids:

Cadaba fruiticosa may contain alkaloids, which are nitrogen-containing compounds known for their diverse pharmacological properties. Alkaloids are commonly found in various plant species and can exhibit analgesic, anti-inflammatory, or even toxic effects depending on their structure and concentration.

Flavonoids are polyphenolic compounds found in many plants, known for their antioxidant and anti-inflammatory properties. They contribute to the coloration of fruits and flowers and have been studied for their potential health benefits, including cardiovascular protection and anti-cancer effects.

Triterpenoids are a class of compounds derived from the isoprene unit, commonly found in plants. They exhibit various biological activities, including anti-inflammatory, anti-cancer, and antimicrobial effects. Triterpenoids are often responsible for the bitter taste of some plant species.

Saponins are glycosides with a characteristic foaming property when shaken in aqueous solutions. They have been investigated for their potential health benefits, including cholesterol-lowering effects and immune modulation. Saponins may contribute to the

medicinal properties of *Cadaba fruiticosa.*

Phenolic compounds are secondary metabolites found in plants, known for their antioxidant properties. They include compounds such as phenolic acids, flavonoids, and tannins, which can scavenge free radicals and protect cells from oxidative damage.

Steroids are a class of lipids with a characteristic four-ring structure, found in both plants and animals. Plant steroids have been studied for their potential therapeutic effects, including anti-inflammatory and immunomodulatory properties[1].

2. *ELLUPAI PINNAKKU*

Parts: Oil Cake of Sesame Seeds
Family: Pedaliaceae

Chemical Constituents: Sesamin and Sesamolin, Protein Hydrolysates, Phytosterols, Phenolic Compounds, Dietary Fiber, Minerals

Fig 2 *Sesamum indicum*

Sesamin and Sesamolin

Sesamin and sesamolin are lignans found in sesame seeds and oil. They possess antioxidant, anti-inflammatory, and hepatoprotective properties. While their concentration in oil cake might be lower, their presence could still contribute to potential pharmacological effects[2].

Protein Hydrolysates

Protein hydrolysates derived from sesame oil cake have been studied for their potential antihypertensive and antioxidant activities. These hydrolysates contain bioactive peptides that could modulate physiological functions[3].

Phytosterols

Sesame oil cake contains phytosterols, plant sterols with cholesterol-lowering properties. These compounds have potential pharmacological applications in managing cardiovascular diseases and reducing cholesterol levels[4].

Phenolic Compounds

Phenolic compounds found in sesame oil cake exhibit antioxidant and anti-inflammatory properties. They have potential pharmacological applications in preventing oxidative stress-related diseases and inflammation[5].

Dietary fibre

Sesame oil cake contains dietary fiber, which has various pharmacological effects including improving gastrointestinal health, regulating blood sugar levels, and lowering cholesterol[6].

Minerals

Minerals present in sesame oil cake such as calcium, magnesium, and potassium play essential roles in various physiological functions and could contribute to its pharmacological properties[7].

3.POONDU

Parts: Cloves

Family: Amaryllidaceae

Chemical Constituents: Allicin, Sulphur Compounds (Diallyl Sulphide, Diallyl Disulfide, Diallyl Trisulfide), Saponins, Flavonoids (Quercetin), Organosulfur Compounds (Γ-Glutamyl-S-Allyl-L-Cysteine), Vitamins And Minerals

Fig 3 *Allium sativum*

Allicin

Allicin is one of the major bioactive compounds in garlic, formed when the enzyme alliinase acts on alliin. It exhibits antimicrobial, antioxidant, anti-inflammatory, and cardioprotective properties. Allicin has been studied for its potential in treating microbial infections, reducing oxidative stress, and lowering blood pressure and cholesterol levels[8].

Sulphur Compounds (Diallyl sulphide, Diallyl disulfide, Diallyl trisulfide)

Garlic contains various sulphur compounds that contribute to its characteristic Odor and pharmacological effects. These compounds exhibit antioxidant, anti-inflammatory, antimicrobial, and anticancer properties. They have been studied for their potential in preventing cardiovascular diseases, reducing inflammation, and inhibiting the growth of cancer cells[9].

Saponins

Garlic contains saponins, which have been shown to possess antimicrobial, antifungal, and anticancer activities. These compounds may contribute to the overall pharmacological effects of garlic extracts[10].

Flavonoids (Quercetin)

Garlic contains flavonoids such as quercetin, which have antioxidant, anti-inflammatory, and anticancer properties. Quercetin has been studied for its potential in reducing inflammation, scavenging free radicals, and inhibiting the growth of cancer cells[11].

Organosulfur Compounds (γ-glutamyl-S-allyl-L-cysteine)

Garlic contains organosulfur compounds like γ-glutamyl-S-allyl-L-cysteine, which have been

associated with various pharmacological effects including antioxidant, anticancer, and cardioprotective properties[12].

Vitamins and Minerals

Garlic is a rich source of vitamins (such as vitamin C, vitamin B6) and minerals (such as manganese, selenium), which contribute to its overall health benefits and pharmacological properties. These nutrients play important roles in immune function, antioxidant defence, and metabolic processes[13].

4.AVARAIILAI

Parts: Leaves

Family: Caesalpinioideae

Chemical Constituents: Anthraquinones, Flavonoids, Alkaloids

Anthraquinones

The plant is widely recognized for its laxative properties, primarily due to the presence of anthraquinone glycosides such as sennosides A and B. These compounds stimulate bowel movements, making Senna auriculata a common ingredient in herbal laxatives[14].

Fig 4 *Senna auriculata*

Flavanoids

Studies have shown that Senna auriculata possesses antidiabetic properties, possibly attributed to its flavonoid content, which exhibits insulin-mimetic and insulin-sensitizing effects, as well as its ability to regenerate pancreatic β-cells[15].

Antioxidant Activity: Flavonoids and other phenolic compounds present in Senna auriculata contribute to its antioxidant properties, which help in scavenging free radicals and reducing oxidative stress[16].

Anti-inflammatory Activity: Some studies suggest that extracts of Senna auriculata possess anti-inflammatory effects, which could be beneficial in conditions involving inflammation[17].

Hepatoprotective Activity: Extracts of Senna auriculata have demonstrated hepatoprotective effects in preclinical studies, indicating its potential in protecting the liver from damage caused by various toxins and chemicals[18].

5.KADUKKAI

Parts: Dried Fruit

Family: Combretaceae

Chemical Constituents: Tannins, Gallic Acid And Ellagic Acid, Flavonoids, Terpenoids,

Vitamin C

Fig 5 *Terminalia chebula*

Tannins: Terminalia chebula is rich in tannins, particularly hydrolysable tannins such as chebulinic acid and chebulagic acid. These compounds contribute to its astringent taste and various pharmacological activities including antioxidant, antimicrobial, and anti-inflammatory effects[19].

Gallic Acid and Ellagic Acid: Terminalia chebula contains gallic acid and its derivatives, along with ellagic acid. These compounds possess antioxidant, anti-inflammatory, and anti-cancer properties[20].

Flavonoids: Terminalia chebula contains various flavonoids such as quercetin, kaempferol, and their glycosides. Flavonoids contribute to its antioxidant, anti-inflammatory, and hepatoprotective activities[21].

Terpenoids: Terminalia chebula contains terpenoids including triterpenoids and sesquiterpenoids. These compounds exhibit various biological activities such as antimicrobial, anti-inflammatory, and anticancer effects[22].

Vitamin C: Terminalia chebula is a good source of vitamin C (ascorbic acid), which contributes to its antioxidant properties and helps in boosting the immune system[23].

6. NELLIKAI

Parts: Seeds

Family: Phyllanthaceae

Chemical Constituents: Tannins, Fatty Acids, Proteins, Flavonoids**,** Polyphenols, Phytosterols

Fig 6 *Phyllanthus emblica*

Tannins are polyphenolic compounds that are commonly found in seeds, and Phyllanthus emblica seeds are likely to contain various tannins. These compounds may contribute to the

astringency and antioxidant properties of the seeds[24].

Fatty Acids: Phyllanthus emblica seeds contain various fatty acids, including linoleic acid, oleic acid, and palmitic acid. These fatty acids contribute to the lipid content of the seeds and may have potential health benefits[25].

Proteins: The seeds of Phyllanthus emblica contain proteins with essential amino acids. These proteins may have nutritional significance and could contribute to the overall health benefits of the seeds[26].

Phenolic Compounds: While more prevalent in the fruit, Phyllanthus emblica seeds also contain some phenolic compounds such as gallic acid, ellagic acid, and their derivatives. These phenolic compounds contribute to the antioxidant properties of the seeds[27].

Phytosterols: Phyllanthus emblica seeds may also contain phytosterols such as β-sitosterol and stigmasterol, which have been associated with various health benefits, including cholesterol-lowering effects[28].

7.Thandrikai

Parts: Dried Fruit

Family: Combretaceae

Chemical Constituents: Tannins, Phenolic Compounds, Terpenoids, Alkaloids**,** Volatile Oils

Fig 7 *Terminalia chebula*

Tannins: Terminalia bellerica contains various tannins, including gallic acid and its derivatives, ellagic acid, and chebulinic acid. Tannins contribute to its astringent taste and pharmacological properties, including antioxidant and antimicrobial effects[29].

Phenolic Compounds: Terminalia bellerica contains phenolic compounds such as flavonoids (quercetin, kaempferol) and phenolic acids (gallic acid, ellagic acid). These compounds exhibit antioxidant, anti-inflammatory, and hepatoprotective activities[30].

Terpenoids: Terminalia bellerica contains terpenoids including triterpenoids and sesquiterpenoids. These compounds possess diverse pharmacological activities such as anti-inflammatory, anticancer, and hepatoprotective effects[31].

Alkaloids: While present in smaller quantities compared to other compounds, Terminalia bellerica also contains alkaloids. Alkaloids may contribute to its pharmacological properties, although further research is needed to elucidate their specific effects[32].

Volatile Oils: Terminalia bellerica may contain small amounts of volatile oils, which contribute to its aroma and may possess antimicrobial properties[33].

8.AAMANAKU ENNAI

Parts: Oil

Family: Euphorbiaceae

Chemical Constituents: Triglycerides, Ricinoleic Acid, Glycerides, Phytosterols, Tocopherols

Fig 8 *Ricinus communis*

Triglycerides: Castor oil consists predominantly of triglycerides, with ricinoleic acid being the primary fatty acid constituent. Ricinoleic acid constitutes about 90% of the fatty acids in castor oil[34].

Ricinoleic Acid: Ricinoleic acid, a monounsaturated fatty acid with a hydroxyl group (-OH) at the 12th carbon, is unique to castor oil. It contributes to the oil's lubricating, emollient, and anti-inflammatory properties[35].

Glycerides: In addition to ricinoleic acid, castor oil contains glycerides of other fatty acids such as oleic acid, linoleic acid, and stearic acid. These glycerides contribute to the overall composition and properties of the oil[36].

Phytosterols: Castor oil contains phytosterols, which are plant-derived sterols with structural similarity to cholesterol. Phytosterols contribute to the oil's emollient properties and may have skin-conditioning benefits[37].

Tocopherols: Castor oil contains tocopherols, which are forms of vitamin E with antioxidant properties. Tocopherols help protect the oil from oxidation and may also provide some health benefits[38].

CONCLUSION

The present review on mulangal vatha ottradam showed that the ingredients present in this formulation had antimicrobial, antioxidant, anti-inflammatory and anticancer activities. **Current treatment for OA is Pain Relievers**: like acetaminophen (Tylenol) or nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen (Advil, Motrin IB) or naproxen sodium (Aleve), **Topical Pain Relievers** like Creams, gels, or patches containing capsaicin or NSAIDs and Corticosteroid injections may produce various side-effects. Hence, this medicine might be effective in osteoarthritis. Further clinical studies are done to prove the efficacy of mulangal vadha otradam for osteoarthritis.

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