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Review Article

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Therapeutic potency of Siddha formulation *Vathathirku legium* for lumbar spondylosis:A Review

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Abstract

Siddha system of medicine is one of the ancient systems of medicine. This system is responsible for treating both the physical and mental health. *'Vathathirku legium'* is a herbal preparation with ingredients of 12 herbal drugs. It is used to treat the Vatha diseases. This review is aimed to bring out scientific evidence for the therapeutic usage of *'Vathathirku legium'* according to pharmacological activity . Most of the drugs have anti-inflammatory, antianalgesic and antioxidant activity hence justifying its usage in above mentioned disease.

Keywords: Siddha System , Vathathirku Legium, Anti- inflammatory, Lumbar spondylosis

Introduction

Siddha Medicine is a system of traditional medicine practiced in south India particularly in Tamilnadu. Siddhars laid foundation for this system. Siddhars were of the concept that a healthy soul can only be developed through a healthy body. So they developed certain principles and medication, that are believed to strengthen their physical body to attain heavenly bliss.

Siddhars not only contributed medicine but also the knowledge of eternity, alchemy and yogic living. According to Siddha medicine the human body is made up of a combination of five universal elements such as Earth, water, fire, wind and space. These elements regulates the three Vital humors (*vatham,pitham and kapham*) in relation to six suvai (taste) and two veeriyam (potency). Their interaction produces various pathological states.

In Siddha system, diseases have been classified into 4448 types on the basis of Mukkutram theory. In Siddha text, Yugi Vaithiya Chindhamani Vatha disease is classified into 80 types, Thandagavatham is one amoung them. As per Yugi text, the signs and symptoms of Thandagavatham may be correlated with Lumbar Spondylosis in modern science. Prevalence of lumbar spondylosis is 14.4% in India. According to modern era, due to Life style, occupation, obesity etc., more number of peoples are suffering from low back pain.

Vathathurku legium: Siddha Aspect

Siddha system of medicines are broadly classified into two types and each type consists of 32 forms:

1. Internal medicines
2. External medicines (includes medicines and therapies)

Legium is one of the internal medicine. It is composed of drug or drugs in powder or decoction, and some oil, or ghee, honey, sugar or old jiggery. The sugar or jiggery is made into a pure syrup of thick consistence, with the addition of decoction by applying gentle heat when syrup is hot, and when the decoction is not well mixed with it, powdered drug, ghee and honey are mixed and the resulting thick mass is taken out of the vessel and preserved for use.[1]

Materials and Methods

Vathathirku Legium

Cow Milk		- 1 *Padi* (1.3 lt)
Poondu	[*Allium sativam*]	- 1 *Palam* (35 mg)
Saathi pathiri	[*Myristica fragrans*]	
Seeragam	[*Cuminum cyminum*]	
Thipilli	[*Piper longum*]	
Kirambu	[*Syzygium aromaticum*]	
Elam	[*Elettaria cardamomum*]	
Saathikkai	[*Myristica fragrans*]	- *Each 5 Varagan (30 gm)*
Chukku	[*Zingeber officinale*]	
Milagu	[*Piper nigrum*]	
Parangi pattai	[*Smilaxchina*]	
Akkarakaaram	[*Anacyclus pyrethrum*]	
Omam	[*Carum copticum*]	
Nilapanai kizhangu	[*Curculigo orchioides*]	

Purification of the drugs:

All the raw drugs are purified as per the methods defined in Siddha literature.

Standard operative procedure of Vathathirku legium:

Garlic is boiled in cow's milk. Other ingredients are fried and made into fine powder then they are mixed with the boiling milk. Then ghee and honey are added one by one and mixed well until it attains legium consistency[2].

Pharmacological activities of the ingredients of Vathathirku legium:

Smilax china

The rhizomes yield prosapogenin A of dioscin, gracillin, Me-protogracillin, and Me-protodioscin and its 22-hydroxy analog.other compounds are beta sitosterol glucoside, smilaxin, a furastanol glycoside and isonarthogenin 3-o-alfa-L-rhamnopyranosyl-(1-2)-o-alfa-l-rhmnopy[50].

Smilax china has anti-inflammatory activity. Its decoction (90 and 180 mg/kg; p.o) could significantly inhibit inflammatory swelling on adjunctive arthritis mouse[3.] Shu *et al* 2006 has studied the anti-inflammatory activity[4]. Sieboldogenin, isolated from ethyl acetate fraction of *Smilax china* has potent anti-inflammatory activity[5]. In traditional Chinese medicine, it is used in the management of chronic pelvic inflammatory disase[4], syphilis, acute bacterial dysentery and chronic nephritis[6]. The methanol extract of Smilax china exhibit antimicrobial activity[7]. In vitro antimicrobial activity of *Smilax china* was reported by Shu Xiao-Shun *et al*[8]. The scavenging activity of plants was may be due to the presence of some important chemical compounds like polyphenol, alkaloids, glycosides, flavonoids, and steroids[9]. These phytochemical compounds were commonly found in plants have been reported to have multiple biological effects[10], including antioxidant activity. The Smilax china extracts have scavenging activity against DPPH radicals. The isolation and characterization of active molecules (compounds) responsible for antioxidant activity work is in progress[11].

Zingiber officinale

The rhizomes contain calamanene, the diarylheptenones, gingerenone A, isogingrenone and several diarylheptenones. The major pungent principles in ginger are gingerone and shogaol. The dried ginger contains the anti ulcer compounds , beta –sesquiphellanderene, arcurcumene and shogal[50].

The anti-oxidative properties of ginger and its components have been explored in various *in vitro* and *in vivo* tests. Strengthening the body's deafness by improving the antioxidant status will undoubtedly protect human against many chronic diseases[12]. 6-Shogaol has exhibited the most potent antioxidant and anti-inflammatory properties in ginger, which can be attributed to the presence of alpha, beta-unsaturated ketone moiety[13]. Gingerol, shogaol, and other structurally-related substances in ginger inhibit prostaglandin and leukotriene biosynthesis through suppression of 5-lipoxygenase or prostaglandin synthetase. It also inhibit synthesis of pro-inflammatory cytokines such as IL-1, TNF-α, and IL-8[14, 15]. In another investigation, Pan et al. showed that in macrophages[16], shogaol can down-regulate inflammatory iNOS and COX-2 gene expression[17]. Jung et al. indicated that rhizome hexane fraction extract of *Zingiber officinale* inhibited the excessive production of NO, PGE (2), TNF-alpha, and IL-1beta.[18]. The Anti-inflammatory effect of ginger can reduce muscle pain after intense physical activity. It can treat a wide range of diseases via immunonutrition and anti-inflammatory responses[19].

Piper nigrum

The alkaloid piperine is isolated from black pepper is reported to show anti-bacterial against Pseudomonas. The liganan,(-)cubebin and its two isomers have been isolated from petroleum and chloroform extracts of the leaves of black pepper. Black papper contains safrol and tannic acid which are reported to show weak carcinogenic activity in mice when compared to the control carcinogen[49].

Singh and Duggal have reported the anti-inflammatory action of piperine. The pro-inflammatory cytokine GM-CSF, IL-6, TNF-α and IL-1β was decreased by administration of piperine[21]. Black pepper possess anti-inflammatory activity. B caryophyllene from black pepper exhibits anaesthetic activity[22]. The piperine is significantly inhibited the production of two important proinflammatory mediators, IL6 and PGE2, in IL1β-stimulated human FLS. that piperine has antirheumatic effects in animal models and anti-inflammatory effects on IL1β-stimulated FLSs. Anti-inflammatory and antiarthritic effects of piperine was reported by Jun Soo Bang *et al*[23]. The immunomodulatory effects of macrophages with regards to production of pro-inflammatory cytokines IL-6 and TNF-α in response to aqueous extracts of black pepper and cardamom have been widely investigated by Majdalawieh and Carr in 2010[24]. They showed that at concentrations of 1, 10, 50 and 100µg/ml, aqueous extracts of black pepper enhanced the release of IL-6 and TNF-α from the BALB/c splenocytes. These results were consistent with their findings using *in vitro* proliferation assay using [3H]thymidine incorporation that these four doses of aqueous extracts of black pepper also stimulated the splenocytes to proliferate. Black pepper contains several antioxidants and is one of the most powerful antioxidants for preventing as well as curtailing oxidative stress. Its principle phytochemical, piperine is known to inhibit pro-inflammatory cytokines that are produced by tumour cells.

Piper longum

It contains several aristolactons and dioxoaporphines. the alkaloids have been isolated from the cold ethanol extract of the roots are cepharadione A,B, cepharanone B, aristolcam A11 , noncepharadione B,2-hydroxy-1-methoxy-4h-dibenzo,quinoline-4,5(6h)-dione,piperolactamA and Band piperadione[49]

Piper nigrum has anti pyretic activity[20]. In carrageenan induced rat oedema model decotion of *Piper longum* showed marked anti- inflammatory activity[25]. the fruits of the plant *Piper longum* was studied for their Anti rheumatoid activity in Freunds Adjuvant Induced Arthritis Rats with the dose of 200 and 400 mg/kg p. o. this was reported by Subhash R. Yende *et al*[26].

Cuminum cyminum

Cumin seeds contain upto 14.5% lipids. The lipids contain: neutral lipida, glycolipida and phospholipids .The neutral lipids contains triglycerides composed of petroselinic, palmitic, oleic and linolenic acid. The flavanoid glycosides of which seven belong to apigenin, five to luteolin and two chrysoreiol[47]

Cuminum cyminum having the anti-oxidant property. The spice principle cuminaldehyde from cumin showed scavenging of superoxide anions as measured by inhibition of reduction of nitro-blue-tetrazolium (NBT) in xanthine-xanthine oxidase system to a maximum of 77 percent[27]. Souri *et al*(2008) evaluated the antioxidant activity against linoleic acid peroxidation using 1,3-diethyl-2-thiobartiuric acid as reagent. Antioxidant activity (IC_{50}) against peroxidation of linoleic acid (2mg/ml) was 5.76 and phenolic content was 241.41 mg/100g dry weight. The results of this study showed that there was no significant correlation between antioxidant activity and phenolic content of the studied plant materials and phenolic content could not be a good indicator of antioxidant capacity[28].

Elettaria cardamomum

The seeds contain palmitic acid and oleic acid as dominant fatty acids, besides linoleic and lenolenic acids, along with tocopherol,desmosterol and campesterol. Terpineol and acetyl terpineol, the active principles of cardamom seeds, showed a greater penetration enhancing capacities than Azone which was used aas a comparative penetration enhancer for the diffusion of prednisolone through mouse skin in vitro.It is also reported to possess anti-inflammatory, analagesic and carditonic properties[48].

The *Elettaria cardamomum* seed possess anti-inflammatory, analgesic and anti-spasmodic activity. The oil from *Elettaria cardamomum* seeds (175µl/kg and 280µl/kg) were found to show anti-inflammatory activity in carrageenan induced rat paw oedema[29].

Myristica Fragrans

Volatile oil from the leaves of *Myristica fragrans* was isolated and characterized by Gas Chromatography-Mass Spectroscopy. Twenty constituents from 20 peaks were identified beta-pinene (22.69%), alpha-pinene (14.06%), alpha-thujen (13.93%) and p-menth 1-en-4-ol (10.53%) are as the major constituents and this leaf oil contains the minor constituents like camphene (3.92%), α-terpinene (3.42%), Limonene (9.56%) p-cymene (6.86%) Linalool (7.41%), beta myrcen (4.81%), alpha fellandrene (3.14%), 3-carene (3.54%), allyl catechol methylene (8.32%), myristicin (7.20%), elermicin (9.85%), beta ocimene (4.74%), gamma terpinene (4.75%), alpha terpinolene (4.38%), p-menth 2-en-1-ol (3.30%) and α-terpineol (6.00%).

Mace is used in folk medicine for the treatment of rheumatism. The anti-inflammatory activity is observed in carrageenan- induced edema in rats, enhanced vascular permeability observed in mice, are attributed to the presence of the bio active principle, myristicine[49].

Carum copticum

Fruits of Ajwain accumulate up to 5% essential oil in its compartments[30].However, some investigation reported the yield of fruits essential oil up to 9% which may be considerable [31].Usually, Thymol is the main Ajwain essential oil constituent and may be yielded from 35% to 60% [32, 33].The non-thymol fraction (Thymene) contains Paracymene, Gamma-terpinene, Alpha-pinene, Betapinene, α-terpinene, Styrene, Delta-3-carene, Betaphyllanderene, terpinene-4-ol and Carvacrol [34, 35]. On the other hand, in an investigation, carvone (46.2%), limonene (38.1%) and dillapiole (8.9%) were introduced as principal oil constituents [36]. Also oleic, linoleic, palmitic, petroselinic acid, resin acids are isolated from fruits of Ajwain [37]. New glycosyl constituents such as 6-hydroxycarvacrol and 3,5-Dihydroxytoluene 3-O-β-D-Galactopyranoside are recently reported from fruits of Ajwain [38]. Also, a steroid like substance and a compound namely 6-O-β-Glucopyranosyloxythymol has been isolated from thefruits [39]. Ajwain was also evaluated for exhibiting anti–inflammatory effect. Accordingly, both total alcoholic extract and total aqueous extract possess *in vivo* significant anti–inflammatory effect[40].

Curculigo orchioides

The rizome contains the lactones , 3-methoaxy-5-acetyl-3l tri triaconate. the phenolic glucoside, curculigoside, the immune adjuvant, the hydro ketones,2,6 dimethoxybenzoate and long chain of fatty acids,4-methylheptadecanoic acid. Alcholic extracts of the rhizomes showed hypoglycaemic and anti cancer activities.the powdered rhizomes and their aqueous extract exhibited significant hepatoprotective activity when comparable to silymarin, a known hepatoprotective agent.

The mathanolic and aqueous extract exhibited significant anti-inflammatory activity comparable to ibufrufen and indomethacin[rao and mishra,. Alcoholic extracts of the plant showed adaptagenic, anti-inflammatory, anti convulsive, sedative,androgenic and immune promotion activities[47].

Syzygium aromaticum

The dried leaves contains eugenol 4-o-b-d-(6-o'-galloyl) glcopyranoside, 2 methyl 5,7hydroxy chromone.the leaves also contain valoneic acid bis lactone, gallic acid glycosides, ellagitanin, eugenin, rugosin A,D and E, Causuarin, Pterocarpin and galloyl penduncalagi [Tanaka et al, chem pharm bull,1993,41,1232].This oil also possesses antioxidant, anti hydrolytic property [Sethi et all,j res Ayurvsiddha,1987,8,64]. Cloves are also an ingredient in an anti-inflammatory and analgesic preparation containing cinnmaldehyde the preparation accelerates blood circulation and does not cause pain[50].

Anacyclus pyrethrum

The cortical portion of the root to contain 5per cent of pyrethrin. It resembles piperovatin (C16H21NO2), the nonbasic, active principle isolated by the same authors from the resin obtained from the leaves of Piperovatum. Both are pyridine derivatives. n-isobutyldienediynamide Myrorelaxation Activity (Rota rod performance) The effect on motor co-ordination was assessed using rota rod apparatus .Pre selected mice were placed on the horizontal rotating bar. The test was conducted on five groups of 6 mice each , 30 min after the administration of ethanolic extract (200,

400,600mg/kg i.p) and diazepam (1mg/kg i.p) and normal saline (10ml/kg i.p)[41]. A significant dose dependent muscle relaxant effect of AP was observed in rota rod apparaturs compared to that produced by diazepam. The data was analyzed by one-way analysis of varience (ANOVA) followed by turkey multiple comparisons test[46].

Honey

These health benefits of honey in treating diverse diseases can be attributed to its various pharmacologically active constituents, especially flavonoids and phenolic constituents. Some of the flavonoids and phenolic compounds that have been identified in honey include chrysin, kaempferol, quercetin, pinobanksin, pinocembrin, luteolin, apigenin, genistein, naringenin, hesperetin, p-coumaric acid, gallic acid, ellagic acid, ferulic acid, syringic acid, caffeic acid Molecules 2014, 19 2499 and vanillic acid [42-45]. These honey constituents have been shown to exert anti-inflammatory, antioxidant, antiproliferative, antitumor, antimetastatic and anticancer effects[51-54]. The inhibitory effect of honey on tumorigenesis and cancerogenesis can therefore be attributed to the presence of these flavonoids and phenolic acids.

Conclusion

From this literature review it is evident that the most of ingredients of *VATHATHIRKU LEGIUM* has pharmacological activity like anti-analgesic, immunomodulatory, anti-inflammatory, anti-oxidant and myo-relaxant activity which are responsible for its therapeutic activity claimed in literature.

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