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REVIEW ARTICLE

A Drug Review on Nandheesar Sandamarutha Mezhugu

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ABSTRACT

Nandheesar Sandamarutha Mezhugu (NSM) is a classical Siddha herbo-mineral formulation traditionally used in the management of Vatha disorders, particularly those involving inflammation and pain. To review and document the traditional uses, composition, pharmacological actions, and supporting evidence for Nandheesar Sandamarutha Mezhugu ingredients in the context of Siddha and modern pharmacology. A comprehensive review of classical Siddha texts, Siddha Formulary of India, and contemporary research articles was conducted to collect information on the ingredients, therapeutic indications, and pharmacological activities of NSM. The ingredients of this formulation possess anti-inflammatory, analgesic, detoxifying, and neuroprotective properties. Traditionally administered orally with adjuvants like milk or ginger juice, NSM is used in the treatment of Azhal Keel Vayu (inflammatory joint diseases), sciatica, and chronic arthritis. Preliminary pharmacological studies support its anti-arthritic and pain-relieving effects, although safety monitoring is essential due to its metal content. Nandheesar Sandamarutha Mezhugu holds significant therapeutic potential in managing Vatha-related musculoskeletal disorders.

KEYWORDS: *Nandheesar Sandamarutha Mezhugu, Pain management, Siddha Medicine, Vatha Disease*

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INTRODUCTION

It is estimated that over 60% of the world's population depends on traditional medicine, which has remained a cornerstone in the management of diseases and disorders for generations [1]. The Siddha system of medicine is one of the oldest and most traditional healthcare systems, utilizing herbs, minerals, and animal-derived substances to treat various ailments since ancient times [2]. Within this system, internal medicines are categorized into 32 distinct types, with *Mezhugu* (medicated wax) being a significant category [3]. *Mezhugu* formulations are typically prepared by processing raw drugs into a waxy form known as *Mezhugu Pakkuvam* and are reported to have a shelf life of up to 5 years [3]. Based on the preparation method, *Mezhugu* is broadly divided into two types: *Surukku Mezhugu* and *Araippu Mezhugu*. *Surukku Mezhugu* is made through heat processing in the presence of oily substances, whereas *Araippu Mezhugu* is obtained through grinding without heat. *Nandheesar Sandamarutha Mezhugu* is a traditional example of an *Araippu Mezhugu* formulation [4, 5]. It is used in managing a range of *Vali* disorders, including *Mudakku Vatham* (rheumatoid arthritis), *Thimirvatham* (paralysis), *Paandu Rogam* (anemia), *Soolai Vaayu* (acute abdominal pain), *Paarisa Vaayu* (paraplegia), *Kudal Vaaivu* (intestinal dysfunction), *Mandai Vaaivu* (neurological conditions), *Soothaga Vaayu* (dysmenorrhea), *Eeral Vali Vaayu* (hepatalgia), and *Mega Vaayu* (venereal rheumatism). Inflammation is the body's natural defense mechanism against infections, injuries, and harmful agents. While short-term (acute) inflammation is essential for healing, persistent (chronic) inflammation contributes to diseases such as arthritis, heart disorders, and neurodegeneration. Although synthetic anti-inflammatory drugs are widely used, their

long-term use often causes adverse effects, including digestive problems and organ damage [6,7]. Pain, an unpleasant sensation triggered by internal or external factors, is a common manifestation of such conditions [8]. Also, Neuroinflammation is now recognized as a central mechanism in the development of neurodegenerative disorders, rather than merely a secondary response to neuronal injury. It involves dynamic interactions between peripheral immune cells and resident immune components of the central nervous system (CNS), particularly astrocytes and microglia. During this process, the release of pro-inflammatory cytokines, chemokines, and other mediators contributes to the maintenance of a chronic inflammatory state [9]. The formulation is believed to have anti-inflammatory, analgesic, neuroprotective, hepatoprotective, and hematinic effects due to its synergistic mix of herbal and mineral ingredients. Its clinical use is typically individualized, administered with appropriate adjuvant palm jaggery to enhance palatability and bioavailability. *Nandheesar Sandamarutha Mezhugu* exemplifies the Siddha system's holistic approach in treating chronic and degenerative conditions through rational drug combinations and traditional processing methods [4].

MATERIAL AND METHODS

The data was collected through an extensive review of various electronic databases, including Google Scholar, PubMed, Wiley, Science Direct, ACS Publications, Springer Link, Semantic Scholar, and Embase, using keywords such as "*Smilax china*", "*Glycyrrhiza Glabra* ", "*Zingiber officinalis*", "*Piper nigrum*", "*Piper longum", "Plumbago zeylanica ", "Terminalia chebula fruit," "Papaver somniferum," "Psoralea corylifolia," "Wrightia tinctoria," "Myristica fragrans," "Elettaria cardamomum," "Syzygium Aromaticum," "Alpinia Officinarum," "Piper cubeba,""Crocus sativus,*""Pharmacological activity," "Hepatoprotective activity," "Antiulcer activity", "Antioxidant", "Anti-inflammatory", "Analgesic","Anti-nociceptive", "Anticancer"," Anti-arthritic", "Antibacterial", "Antimicrobial," and "Anthelmintic activity," along with their combinations. Special emphasis was placed on keywords related to pharmacological actions, ethnopharmacology, traditional medicine, Siddha, and herbal medicine. The data collected primarily covered the period from 1997 to 2024, and the analysis took about six months. All the articles were included based on their relevance to the ingredients of Nandheesar Sandamarutha Mezhugu and its therapeutic indications, the availability of full-text articles, and the study design, such as clinical trials, mechanistic studies, and reviews. Articles were excluded if they were duplicates, not relevant to the subject, or lacked adequate methodological details. Studies that did not focus on treatments or not directly applicable to the topic were also excluded. The selection process involved several steps: screening titles and abstracts, reviewing full texts, and applying inclusion and exclusion criteria to ensure only relevant and high-quality studies were included. This process ensured that the studies provided valuable information on the role of Nandheesar Sandamarutha Mezhugu in the treatment of Vatha diseases.

INGREDIENTS:

Table 1: Herbal Ingredients of *Nandheesar Sandamarutha Mezhugu*

S.NO	INGREDIENT	PART USED	BOTANICAL NAME	FAMILY	PURIFICATION
1.	Parangipattai 140 G	Root	*Smilax china* Linn	Smilacaceae [10]	1. Take equal quantities of Cow's milk and water in a pot and boil *Smilax China* pieces in this mixture. After the mixture has been reduced to quarter (1/4), remove the pieces, wash and sundry [11]. 2. Soak in karunthulasi juice (*Ocimum tenuiflorum*) or Donkey dung for 24 hours [10]
2.	Kadukkai - 140 G	fruit	*Terminalia chebula* Roxb	Combretaceae [10]	1. The seed is removed [10] 2. Soak in rice washed filterate (Kazhuneer), Remove its seed and dry completely [11].
3.	Chukku 70 G	Rhizome	*Zingiber officinalis*	Zingiberaceae [10]	1. The outer skin should be peeled [10] 2. Remove the scale leaf and dry it [6].

						3. Slake *Zingiber officinalis* (1 part) with lime (2 parts) and rinse it off after 3 hours (*1 Saamam*). Remove the outer layer [12]. 4. Remove the scale leaf of *Zingiber officinalis* soak it in lime stone solution for 1 hour, and dry it [10]. 5. Dip the *Zingiber officinalis* in juice of *Notchi (Vitex negundo)* 9 times [13].
4.	Milagu		fruit	*Piper nigrum*	Piperaceae [10]	1. Roasted in low flame [11]. 2. Soak in sour butter milk for 3 hours and dry it [12, 14]. 3. Soak in water for 1 day [10]. 4. Dip in *Eclipta prostata* for 7 times [13]. 5. Soak in *Phyllanthus emblica* [13]. 6. Soak in Vinegar (*Kaadi*) [13] 7. Grind in lemon juice (*Citrus limon*) [13]
5.	Thippili		fruit	*Piper longum*	Piperaceae [10]	1. Soak in *Plumbago indica* leaf juice [13]
2.	Kodiveli - 70 G			*Plumbago zeylanica* Var.	Plumbaginaceae [10]	Soak in Buttermilk overnight [11]
3.	Khas Khas - 35 G		Seed	*Papaver somniferum* L.	Papaveraceae [10]	-
4.	Karbogarisi - 17.5 G		Seed	*Psoralea corylifolia* Linn	Fabaceae [10]	Roasted in low flame [11]
5.	Vetpalai Arisi - 17.5 G		Seed	*Wrightia tinctoria* R.Br	Apocynaeceae [10]	Dry in Sunlight [15]
6.	Jathikai - 8.75 G		fruit	*Myristica fragrans* Henlt	Myristicaceae [10]	1. Remove the outer shell and cut the seed kernel into pieces and dry in sunlight [12]. 2. Remove the outer sell and roast its seed kernel in the ghee [10].
7.	Jathipathri - 8.75 G		Seed coat	*Myristica fragrans* Henlt	Myristicaceae [10]	Remove the impurities and insolate [12].
8.	Elam - 8.75 G		fruit	*Elettaria cardamomum* (L.) Maton	Zingiberaceae [10]	Exclude the impurities and insolate [12].
9.	Kirambu - 8.75 G		Floral bud	*Syzygium Aromaticum* (Linn.)Merr. & Perry.	Myrtaceae [10]	The bud is removed and roasted in low flame [11]
10.	Chitrarathai - 8.75 G		Rhizome	*Alpinia Officinarum*	Zingiberaceae [10]	Peel off the epidermal layer, cut into small layers and insolate [12].
11.	Vaal Milagu - 8.75 G		fruit	*Piper cubeba*	Piperaceae [10]	Remove the tail like stalk and dry it in sun light [15].
12.	Athimathuram - 8.75 G		Root	*Glycyrrhiza Glabra*	Fabaceae [10]	Wash with clean water and remove the epidermal layer, and cut into small [12].
13.	Kungumapoo - 8.75 G		Stigma	*Crocus sativus* L	Iridaceae [10]	Roast slightly [10]

Table 2: Animal origin Ingredients of Nandheesar Sandamarutha Mezhugu

S.NO	INGREDIENT	ENGLISH NAME	Scientific Name	Part Used
1.	Korosanai - 8.75 G	Cow Bezoar	*Capra aegagrus* [3]	Bile Secretion

Table 3: Metal & Mineral Ingredients of *Nandheesar Sandamarutha Mezhugu*

S.NO	INGREDIENT	ENGLISH NAME	CHEMICAL NAME	PURIFICATION
1.	Thaalagam - 35 G	Arsenic	Arsenic trichloride	1. Cut the Talagam into pieces like coins, wrap it in a cloth, and soak it separately in each of the following: cow dung, toddy, lime water, ash gourd juice (*Benincasa hispida*), Aavin milk, and decoction of Arasam pattai (*Ficus religiosa* bark). In each liquid, it should be soaked individually. Then boil it until three-quarters of the liquid evaporates and only the thick extract remains. This process should be done to purify it. For every unit (palam) of Talagam, take an equal quantity of each of the liquids 2. Take one palam (35 grams) of Talagam stone, place it between two lime stones, and repeatedly heat it with palm leaves not less than 10 times. After this process, wash it thoroughly and dry it. 3. Cut the Talagam into thin slices, tie it in a double-folded cloth, and soak it in either cow's urine, rice-washed water, or fermented toddy for three days. Then, heat it over a gentle fire (Kamalaagni) until it is thoroughly processed. This is considered a method of purification. 4. Take one part (1.3 liters) of Amuri (urine), add 325 ml of kuppaimeni (*Acalypha indica*) juice and 325 ml of slaked lime water. Boil this mixture and immerse the Talagam into it, heating it until the liquid thickens and the substance is processed. This is also considered a purification method. 5. Talagam can also be purified by placing it in a mud pot and heating it with donkey's urine [3].
2.	Veeram - 35 G	Mercuric chloride	Mercuric perchloride	1. Take one palam (35 grams) of Veerakatti, add pepper-infused water and boil it for six hours. Then place it inside pepper paste (Milagu Kalkam – *Piper nigrum*). In another pot, mix 650ml of buttermilk with one palam (35 grams) of sulfur and bury the previously processed Veerakatti in it. Heat the mixture on a mild fire for a few hours before taking it out. 2. Mix a small amount of sulfur in tender coconut water, place it in a pot, and expose the Veeram to the fumes without letting it touch the liquid. Heat it gently for half an hour and then remove it. This is another method of purification. 3. Take one palam (35 grams) of Alum (Padikaram) and one palam (35 grams) of Sulfur (Gandhagam), powder both and keep ready. Gradually add kerosene to the Veerakatti and extract it. While adding kerosene, ensure that the Veeram is seen

				as vapor. 4. Place the Veeram in a clay vessel, pour breast milk over it until fully submerged, and keep it under sunlight until all the milk evaporates. Then collect the residue. Cow's milk may be used as an alternative to breast milk. 5. Split a bitter gourd (*Momordica charantia*), place the Veeram piece inside it, tie it securely with a string, and hang it over a vessel without touching the liquid below. Heat it for one hour using either tender coconut water or fruit juice underneath [3].
3.	Lingam - 35 G	Cinnabar	Mercuric sulphide	1. Cut and crush one ounce (1,400 gms) of *Alangium salvifolium* (L.f.) Wang bark, put in 5.2 liters of fermented rice water, and keep it in the moonlight overnight. Next morning, knead it well and mix it. Take 35 grams of cinnabar and make a pouch. Add this pouch to the above mixture and boil for 24 hours on low flame, take it and wipe it, and as before, the cinnabar pouch is boiled with the water mixed with tamarind mercy mixture and the fermented rice water mixed with nannari root (*Hemidesmes indica* Linn) separately 2. Lingam should be treated with the mixture of equal quantity of lemon juice, milk and kuppaimeni juice (*Acalypha indica* Linn). 3. Lingam should be soaked in breast milk and lemon juice (*Citrus limon* Linn) respectively for 1 day and dried [3].
1.	Pooram - 8.75 G	Calomel	Hydragyrum subchloride	1. A total of 8.75 grams of *Piper nigrum* (black pepper) and *Piper betel* (betel leaf) are ground into a fine paste and mixed with 1.3 litres of water. Separately, one *balam* of *Pooram* is securely wrapped in a cloth to prepare a *tholaindiram* (decoction bag). This bag is then immersed in the prepared mixture and the entire contents are subjected to boiling until the volume is reduced to $3/4^{th}$ of its original quantity. 2. One *balam* of *Pooram* is subjected to a two-step purification process. Initially, it is soaked in breast milk for a duration of three hours, followed by immersion in garlic (*Allium sativum*) juice for nine hours. 3. For using in leghiyam Pooram should be treated with Musumusukkai juice (*Mukina Madraspatna*) [3]
2.	Rasa chenduram - 8.75 G	Red Sulphide of Mercury	Red Sulphide of Mercury	1. Red Sulphide of Mercury should be soaked in breast milk or lemon juice for 24 hours, washed and dried 2. Red Sulphide of Mercury should be grinded with neem bark (*Azardirachta indica* Linn) decoction for 12 hours and dried [3].

Preparation:

All the ingredients are purified based on respective methods and powdered individually then all the drugs are ground along with *Thiripalathi kiyazham* (Decoction of *Terminalia Chebula* Roxb, *Phylanthus emblica* Linn, *Terminalia belerica* (Gaertn.) Roxb) for 12 hours and dried. This is then again ground with honey for 9 hours and stored in a Horn container (*kombu simizh*) [4].

Dose:
50 mg (Milagu Piramanam) [16] with palm jaggery
Indications:
Mudakku Vatham (Rheumatoid arthritis), *Thimirvatham* (paralysis), *Paandu Rogam* (Anemia), *Soolai Vaayu* (Acute pain), *Paarisa Vaayu* (Paraplegia), Kudal Vaaivu, *Mandai Vaaivu*, *Soothaga Vaayu* (Dysmennorhoea), *Eeral Vali Vaayu* (Hepatalgia), *Mega Vaayu* (Veneral Rheumatism) [4,17].
Diet:
Milk, Ghee, and Mutton should be included in diet. Foods like Pearl Millet, Jowar Millet, Sorghum, Kodo Millet, Unripe Plantain, Bitter gourd, Fish should be avoided [3].
LITERATURE REVIEW:

Table 4: Taste, potency and division of Herbal Ingredients of *Nandheesar Sandamarutha Mezhugu*

S.NO	INGREDIENT	TASTE	POTENCY	DIVISION
1.	Parangipattai (*Smilax China*)	Sweet	Cold	Sweet [10]
2.	Kadukkai (*Terminalia Chebula*)	Astringent, Sweet, Sour with Pungent, Bitter	Hot	Sweet [10]
3.	Chukku (*Zingiber officinalis*)	Bitter	Hot	Pungent [10]
4.	Thippili (*Piper longum*)	Sweet	Hot	Sweet [10]
5.	Milagu (*Piper nigrum*)	Bitter, Pungent	Hot	Pungent [10]
6.	Kodiveli (*Plumbago zeylanica*)	Pungent	Hot	Pungent [10]
7.	Khas Khas	Sweet	Hot	Sweet [10]
8.	Karbogarisi	Bitter	Hot	Pungent [10]
9.	Vetpalai Arisi (*Wrightia tinctoria*)	Sweet	Cold	Sweet [10]
10.	Jathikai (*Myristica fragrans*)	Astringent, Pungent	Hot	Pungent [10]
11.	Jathipathri (*Myristica fragrans*)	Astringent, Pungent	Hot	Pungent [10]
12.	Elam (*Elettaria cardamomum*)	Pungent	Hot	Pungent [10]
13.	Kirambu (*Syzygium aromaticum*)	Pungent	Hot	Pungent [10]
14.	Chitrarathai (*Alpinia Officinarum*)	Pungent	Hot	Pungent [10]
15.	Vaal Milagu (*Piper cubeba)*	Pungent	Hot	Pungent [10]
16.	Athimathuram (*Glycyrrhiza Glabra*)	Sweet	Cold	Sweet [10]
17.	Kungumapoo (*Crocus sativus*)	Bitter	Hot	Pungent [10]
18.	Korosanai	Bitter	Hot	Pungent [3]
19.	Thaalagam	-	-	-
20.	Veeram	Pungent with salty	Hot	Pungent [3]
21.	Pooram	Saltypungent	Hot	Pungent [3]
22.	Lingam	No Taste	Hot	-
23.	Rasa chenduram	-	-	-

Table 5: Phytochemical constituents and pharmacological acation of *Nandheesar Sandamarutha Mezhugu*

S.NO	INGREDIENT	PHYTOCHEMICAL CONSTITUENTS	PHARMACOLOGICAL ACTION
1.	*Smilax Chinensis* Linn	Astilbin, neoastilbin, isoastilbin, neoisoastilbin, astragaloside, quercetin, isoengelitin, taxifolin, taxifolin 3′-O-glucoside, and smilachromanone [18]	Anti-inflammatory Anti-nociceptive [19]
2.	*Terminalia chebula* Retz	Corilagin, Chebulagic acid, Chebulic acid, Gallic acid, punicalagin, Triacontanoic acid [20]	Antioxidant and Cytoprotective Effects, Antimutagenic, Immune Activation, Anticancer Activity, Anticariogenic, Cardiotonic Activity, Antibacterial, Anti-viral [20]
3.	*Zingiber officinalis* Roscoe	Gingerol, Shogaol, Zingerone, Gingerine, Gingiberol [21]	Antioxidant activity Anti-inflammatory activity Antimicrobial activity Anticancer activity Antiemetic activity [21]
4.	*Piper longum* Linn	Piperine, Piperlonguminine, Pipercide, Pellitorene, Pipernonaline, Asarinine, Bisabolene, Pentadecane [22]	Antibacterial activity Antimicrobial activity Antiamoebic activity Antiplatelet activity Immunomodulatory activity Antiasthmatic activity

			Antitumor activity Neuroprotective activity Anthelmintic activity [22]
5.	*Piper nigrum* Linn	Piperine, Piperamide. Pipercide, Sarmentosine, Sarmentine, Trichostachine [23]	Anti-pyretic activity Anti-inflammatory activity Antidiarrheal effect Carminative activity Immunomodulatory Anticancer activity Antioxidant activity Antimicrobial activity [23]
6.	*Plumbago zeylanica* Linn	chitanone, zeylanone, sitosterol, plumbagic acid, isozeylanone, sitosterol, stigmasterol, campesterol, dihydroflavono and plumbagin [24]	Antibacterial, Antifungal, Antiinflammatory, Antidiabetic, Anticancer, antioxidant, Hepatoprotective, Cytotoxic and Wound healing [24]
7.	*Papaver somniferum* Linn	Papaverine, morphinanes morphine, codeine, thebaine [25]	Antiallodynic activity Analgesics activity, Antitussive activity. Anti-diarrheal activity Antidepressant activity Anti-anxiety activity Bronchodilator activity. Antibacterial activity Narcotic activity [26]
8.	*Psoralea corylifolia* Linn	Angelicin, Aryl coumarin, Astragalin, Bakuchiol, Bavachinin, Bakuisoflavone, Bakuflavanone, Bavachin, Bakuchicin, Bavachalcone [27]	Estrogenic, antitumor, anti-oxidant, antimicrobial, antidepressant, anti-inflammatory, osteoblastic, and hepatoprotective activities [28]
9.	*Wrightia tinctoria* R.Br	lupeol, stigmasterol and campetosterol, Indigotin, indirubin, tryptanthrin, isatin, anthranillate and rutin Triacontanol, Wrightial, cycloartenone, cycloeucalenol, β-amyrin, Alpha-Amyrin, and β-sitosterol, 14α-methylzymosterol. Four uncommon sterols, desmosterol, clerosterol, 24-methylene-25-methylcholesterol, and 24-dehydropollinastanol [29]	Neuroprotective activity, Anticancer, Hepatoprotective activity, Anti-inflammatory activity, Anti-diabetic activity, Anti-psoriatic activity, Antimicrobial [30]
10.	*Myristica fragrans* Houtt	Elemicin, Myristicin, Eugenol, Terpinene, limonene, Pinene, caryophyllene [31]	antioxidant, anti-inflammatory, antimicrobial, Anticancer, Anticonvulsant activity [31]
11.	*Myristica fragrans* Houtt		
12.	*Elettaria cardamomum* (L.) Maton	α-terpinyl acetate, 1,8-cineole, linalool, limonene, and terpinen-4-ol [32]	antioxidant, anti-inflammatory, antimicrobial, antidiabetic, anticancer, neuroprotective, and hepatoprotective effects [32]
13.	*Syzygium aromaticum* Linn	Kaempferol, Eugenol, Caryophyllene, Maslinic acid, Quercetin, Gallic acid, Vanillin, Ellagic acid. [33]	Antithrombotic, Anti-inflammatory, myorelaxant, analgesic, antimicrobial, Antidepressant, Anticancer [33]
14.	*Alpinia Officinarum* Hance	Galangin, Alpinin, Kaempfride, pinobaksin, zingerone, Quercetin, Rutin [34]	Antioxidant, Anti-inflammatory, Anticancer, Antibacterial, Antifungal [34]
15.	*Piper cubeba* Lf	Rutin, catechin, gallic acid, caffeic acid, syringic acid, ferulic acid [35]	antioxidant, anti-inflammatory, antidiabetic, anticancer, reno-hepatoprotective, immunomodulatory, antidepressant, antimicrobial, anti-parasite, insecticidal, wound healing, and antidepressant activities [36]
16.	*Glycyrrhiza Glabra* Linn	Glabridin, 18β-Glycyrrhetinic acid, Liquiritigenin, Isoliquiritigenin, Glycyrrhizinic acid, Glycyrrhetinic acid,	Antidepressant, Antioxidant, Anticancer, Antimicrobial, Hepatoprotective, Anti-

		glabrene, Glycyrrhizin, Licochalcone E, Licochalcone A [37]	inflammatory, Immunomodulatory [38]
17.	*Crocus sativus* L	***trans***-crocetin, ***trans***-crocetin di-(***β***-D-gentiobiosyl) ester and ***trans***-crocetin (***β***-D-gentiobiosyl)-(***β***-D-glucosyl) ester, together with picrocrocin, safranal, kaempferol and quercetin [39]	Antinociceptive, Anti-inflammatory, Immunomodulatory, Neuroprotective, Antidepressant, Anticonvulsant, Antioxidant, Anticonvulsant [39]
18.	Cow Bezoar	Calcium phosphocholine, calcium phosphate, Bilirubin [40]	Anti –inflammatory, Anti-histamine, Anti-microbial, Anticonvulsants [40]
19.	Mercuric perchloride	-	**Antibacterial [41]**
20.	Calomel	-	Antipyretic, Anti-inflammatory [41]
21.	Cinnabar	-	Antipyretic, Anti-inflammatory, Analgesic, Neuroprotective [41]

RESULT AND DISCUSSION

Smilax chinensis Linn. (Parangipattai) is rich in astilbin and quercetin, providing anti-inflammatory and pain-relief effects [18,19]. Kadukkai (*Terminalia chebula* Retz) contains gallic acid and chebulagic acid, known for its antioxidant, cell-protective, and immune-boosting properties [20]. Chukku (*Zingiber officinale*) is notable for gingerol and shogaol, which contribute to anti-inflammatory, antioxidant, and anticancer activities [21]. Kodiveli (*Plumbago zeylanica* Linn) includes plumbagin and sitosterol, showing anti-inflammatory, anticancer, liver-protective, and wound-healing effects [24]. Khas Khas (*Papaver somniferum* Linn) is recognized for its pain-relieving, cough-suppressing, and antidepressant properties [25, 26]. Karbogarisi (*Psoralea corylifolia* Linn) contains coumarins and bakuchiol, providing estrogenic, bone-strengthening, liver-protective, and anticancer effects [27,28]. Vetpalai Arisi (*Wrightia tinctoria*) supplies a variety of phytochemicals like lupeol and indirubin, offering neuroprotective, anti-skin disorder, anti-inflammatory, and anticancer benefits [29, 30]. Aromatic and digestion-aiding herbs such as Jathikai (*Myristica fragrans* Houtt), Elam (*Elettaria cardamomum* (L.) Maton), Kirambu (*Syzygium Aromaticum* Linn), and Chitrarathai (*Alpinia officinarum* Hance) are rich in essential oils and flavonoids, providing antioxidant, antimicrobial, anticonvulsant, and anti-inflammatory advantages [31, 32, 33]. Vaal Milagu (*Piper cubeba* Lf) contains different phenolic acids and is valued for its antioxidant, anticancer, immune-modulating, and kidney-liver protective functions [35]. Athimathuram (*Glycyrrhiza glabra* Linn) has glycyrrhizin and flavonoids, which exert anti-inflammatory, liver-protective, and immune-regulating effects [37]. Kungumapoo (*Crocus sativus* Linn) is abundant in crocetin, safranal, and kaempferol, contributing to its neuroprotection, antidepressant, immune-modulating, antioxidant, and antinociceptive properties [39]. Thippili (*Piper longum* Linn) and Milagu (*Piper nigrum* Linn) both contain piperine and related alkaloids, offering antimicrobial, immune-modulating, neuroprotective, and anticancer effects. Piperine, a key active found in Thirikadugu—a traditional formulation comprising Chukku, Milagu, and Thippili—is known for significantly enhancing drug absorption, boosting the effectiveness of various medicines. In summary, this combination exhibits a synergistic pharmacological profile with anti-inflammatory, antimicrobial, anticancer, neuroprotective, and adaptogenic effects, rooted in Siddha tradition and supported by modern pharmacology [42]. According to Siddha Philosophy, the majority of the components exhibit pungent and hot potency characteristics, indicating their potential role in enhancing digestion, stimulating metabolism, and reducing Iyam and Vali humors [43, 44]. Ingredients such as *Chukku*, *Milagu*, *Kodiveli*, and *Karbogarisi* possess bitter and pungent tastes with hot potency, known for their deepana (appetizer) and pachana (digestive) actions. In contrast, *Parangipattai*, *Vetpalai Arisi*, and *Athimathuram* exhibit sweet taste and cold potency, contributing to their nourishing effects. Several ingredients like *Jathikai*, *Jathipathri*, *Kirambu*, and ***Elam*** combine pungent and astringent tastes, supporting carminative and astringent properties. The combined properties of these ingredients target disturbance in digestion, metabolic disturbance, and derangement in humor, particularly those involving iyam and Vali, while maintaining internal balance through selective inclusion of cold and sweet elements. The formulation is administered along with the adjuvant palm jaggery, which has a sweet taste and cold potency. Also, palm jaggery has the potential in treating imbalances in three vital humors [45].

CONCLUSION

This review indicates that the pharmacological properties, organoleptic characteristics, and chemical composition of all the ingredients align precisely with the indications. Backed by both traditional wisdom and modern pharmacological evidence, this formulation holds promise in chronic Vali diseases.

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