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SIDDHA HERBAL FORMULATION ELATHY CHOORANAM- A DRUG REVIEW

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ABSTRACT

The Siddha system of medicine is considered as one of the traditional systems in India having its close embedded with South Indian culture. The Siddha system of medicine explained about 32 forms of internal medicines in Siddha text. Among these, *Chooranam* is the one form of internal medicine. The aim of this drug review is to validate the Siddha herbal formulation *Elathy chooranam* with scientific evidences. The medicinal uses and therapeutic actions of each ingredient used in this formulation matched with current research findings from various research publications. The ingredients present in this formulation have effective in the treatment of Jaundice. Based on this evidence of Siddha literature and the modern scientific research studies also provide keyhole which result are hepatoprotective, anti inflammatory, Anti-viral, Analgesic activities most presents in ingredient of *Elathy chooranam* as evident from the review.

KEYWORDS: *Elathy chooranam*, Jaundice, Siddha system.

INTRODUCTION

Siddha system of healing that originated in South India and considered to be one of Indian's oldest systems of medicine. It is one the traditional, the oldest medical system in the world and deals with physical, psychological, social and spiritual wellbeing of an individual. The

World Health Organization (WHO) estimates that 80 percentage of the population of some Asian and African countries presently uses herbal medicine for health care.[1] Herbal medicines as the major remedy in Siddha system of medicine have been used in medical practices since antiquity.[2] The Siddha system of medicine is contains roughly 300,000 verses covering diverse aspects of medicine. This work includes herbal, mineral, herbomineral and metallic compositions used as medicine. The Siddha system of medicine explained about 32 forms of internal medicines in Siddha text. Among these, *Chooranam* is the one form of internal medicine in which drugs were purified and made into powder form by demulshing method.[3] *Elathy Chooranam* is a herbal formulation contains four ingredients which is mentioned in Siddha Literature of Anubava vaithiya theva ragasiyam (Part-3) Page number: 388. This drug use for Jaundice (Kaamaalai). The drug review of '*Elathy Chooranam'* is a herbal formulation gives evidence for its therapeutic action mentioned in literatures. The ingredients of this drug are Elakkai *(Elettaria cardamomum)* Seeragam *(Cuminum cyminum),* Keezhanelli *(Phyllanthus amarus)* and Sarkkarai *(Saccharum officinarum).* This review describes the Description of the plant, chemical properties and pharmacological activities of each ingredient used in this formulation.

MATERIALS AND METHODS

Research Design: Drug Review on Literature

Type of Research: Literature Review

Literature collected from

Siddha Literature: Anubava vaithiya theva ragasiyam (Part-3) Page number: 388

Author: J.Seetharam prasath

Published by: B.Rathna nayakkar & sons, Thirumagal Achagam

Year of Publication: 1991

Literature searching in electronic databases such as Science Direct, Pub Med, Pub Med Cochrane and Google-Scholar for publications.

Ingredients of drug

Elakkai *(Elettaria cardamomum)* - 1 part (100g)

Seeragam *(Cuminum cyminum)* - 1 part (100g)

Keezhanelli *(Phyllanthus amarus)* - 1part (100g)

Sarkkarai *(Saccharum officinarum)* - 1part (100g)

Drug Preparation

All the drugs were got authenticated by the *GUNAPADAM* experts and Botanist. All the drugs were dried and purified according to the classical *Siddha* literature. Then all the ingredients were finely powdered The *CHOORANAM* was purified by *PITTAVIAL* process (Steaming process). Then sugar was added to it. Then it was dried and stored in an air tight container.

Dosage: 1-2 gm (once a day - morning)

Adjuvant: Cow's milk

Indication: *Kaamaalai*

Drug Review

Elakkai (*Elettaria cardamomum*)

Fig. 1: *Elettaria cardamomum.*

Scientific Classification

Kingdom: Plantae

Class: Monochlamydeae

Order: Zingiberales

Family: Zingiberaceae

Genus: *Elettaria*

Species: *cardamomum*

Description

Herbaceous perennial plant, 2-5 m in height, 30-35 cm long leaves and 7-10 cm wide, lance late, acuminate, dark green in colour[4] inflorescences panicle, having a long cane-like peduncle having nodes and internodes, 2 - 4 panicles emerge from the swollen base of tillers;

white colour flowers with the central lip streaked with pink,[5] bisexual, irregular, labellum oval and indistinctly three lobed; calyx tubular, split about ¼ of its length on one side and shortly 3 toothed; corolla unequally three-lobed with the larger one at the posterior side; anthers 2-lobed; stigma funnel-shaped with cilia around a small cavity; ovary inferior, trilocular with axial placentation, ovules numerous in each and every carpel.[6]

Chemical constitutions

1, 8-cineole (28.94%), α-terpinyl acetate (26.7%), α-terpineol (14.6%), nerol (5.0%), sabinene (13.5%) and α-pinene (2.4%), 37 α-terpinyl acetate, 1, 8-cineole and α-terpineol[7] α-terpinyl acetate, 1, 8-cineole, sabinene, linalyl acetate, linalool,[8] limonene (2.9%), 4-terpineol (1.4%), α-pinene (1.1%), myrcene (0.8%), β-pinene (0.8%), octanal (0.2%), δ-3-carene (0.4%), (E)- nerolidol (0.7%), p-cymene (0.7%), cis-sabinene hydrate (0.6%), geranylacetate (0.3%), cis-sabinene hydrate acetate (0.2%), β-selinene (0.2%), β-caryophyllene (0.2%), γ-cadinene (0.2%), translinalooloxide (0.1%),[9] α-tocopherol, γ-tocopherol, δ-tocopherol, oleic acid, palmitic acid, linoleic acid[10] α-terpinyl acetate, Linalyl acetate, 1,8-cineole, Sabinene,[11] α-terpinyl acetate, α-terpineol, Linalool, Sabinene, Geraniol,[12] α-terpinyl acetate, Linalool, 1,8 Cineole, β-terpineol[13] 4-terpineol, α-terpene, 1,8-Cineol, Linalool.[14]

Pharmacological activities

Analgesic Activity

Oil from seeds of *E. cardamomum* (133-400 µl/kg) was evaluated for analgesic activity by using the p-benzoquinone-induced writhing method and compared with the standard drug aspirin (50-175 mg/kg).[15]

Anti-cancer Activity

Aqueous extract (1, 10, 50 and 100 µg/ml) from seeds of *E. cardamomum* was evaluated for the anti-cancer activity of NK cells against YAC-1 lymphoma cells by using JAM assay.[16]

Anti-inflammatory Activity

Cardamom oil from seeds of *E. cardamomum* (175-280 µl/kg) was evaluated for anti-inflammatory activity against carrageenan-induced hind paw oedema in male wistor albino rats and indomethacin at 30 mg/kg.[15a]

Anti-hypercholesterolemic Effect

Whole cardamom powder, de-oiled cardamom powder, and cardamom oil from seeds of *E.cardamomum* were evaluated for anti-hypercholesdterolemic effect against hypercholesterolemia induced Wistar albino rats at the dose of 50 g/kg. Cardamom oil reduced total blood cholesterol (31%), LDL cholesterol (44%), total serum cholesterol (17%) and LDL cholesterol (28%), respectively.[17]

Anti-spasmodic Activity

Cardamom oil from *E.cardamomum* seeds (200-900 nl) was evaluated for anti-spasmodic activity in rabbits, using acetylcholine as an agonist. The oil inhibits the stimulant action of acetylcholine in a dose-dependent manner. In conclusion, cardamom oil exerts its anti-spasmodic action through muscarinic receptor blockage.[15b]

Chemopreventive Effect

Cardamom was evaluated for chemopreventive effect against benzo (α) pyrene [B(α)P]-induced for stomach papilloma genesis in mice. The treatment with cardamom [(B(α)P + cardamom] reduced tumor incidence and multiplicity significantly by 41.67% and 74.55%, respectively, compared to that of the B (α) P control group and showed a significant enhancement in the hepatic activities of glutathione-S-transferases, superoxide dismutase, glutathione peroxidase and catalase in mice treated with cardamom compared with the control. In conclusion, cardamom has the potential to become a pivotal chemopreventive agent against fore-stomach cancer.[18]

Hepatoprotective Effect

Ethanolic extract was evaluated for hepato-protective effect against high carbohydrate high fat (HCHF) diet-induced obese Male Wistar albino rats. These results concluded that cardamom powder supplementation can prevent dyslipidemia, oxidative stress and hepatic damage in HCHF diet-fed rats.[19]

Immunomodulatory Activity

The aqueous extract (1, 10, 50, and 100 µg/ml) was evaluated for immunomodulatory activity by using ELISA. It is strongly suggested that seeds of cardamom exert immunomodulatory roles and hence manifest themselves as natural agents that can promote the maintenance of a healthy immune system.[16a]

Toxicological Profile

The methanolic extract (1, 1.5 and 2 g/kg) and essential oil (0.25, 0.50, 0.75 and 1 ml/kg) from seeds of *E. cardamomum* were evaluated for toxicological activity in NMRI male mice. No mortalities were observed up to the doses of 2 g/kg and 0.75 ml/kg for the extract and essential oil [P3]. Crude extract from fruit did not cause any mortality up to the dose of 10 g/kg when evaluated for toxicological activity in Swiss albino mice.[20]

Seeragam

Fig. 2: *Cuminum cyminum.*

Scientific Classification

Kingdom: Plantae

Class: Asterids

Order: Apiales

Family: Apiaceae

Genus: *Cuminum*

Species: *cyminum*

Description

The plant is a delicate, glabrous annual 10 to 50 cm hight. The stem is bifurcated at the base and glabrous. The leaves are glabrous and finely pinnatifid with oblong-linear tips, of which the lower are mostly doubly trifoliate. The flowers are in umbels radiating in groups of 3 - 5. The petals are white or red, oblong and deeply bordered with a long indented tip. The involucral bracts are long and simple. The style is short and turned outward at the end. The ovary is inferior and 3-Iocular. The fruit is a schizocarp, about 6 mm long and 1.5 mm wide and crowned with awl-shaped calyx tips. The mericarp is almost round in transverse section, with 5 thread-like, bristly main ribs and bristly secondary ribs.[21]

Chemical constituents

49 components were identified in the essential oil constituents of the *Cuminum cyminum* fruit grown in Delhi, which represented 99.78% of total detected constituents. The essential oil was characterized by the presence of monoterpene (79.61%), aromatic (16.55%), sesquiterpene (2.66%) and aliphatic compounds (0.66%). The predominant monoterpene hydrocarbon was γ-terpinene (23.22%) followed by α-phellandrene (12.01%), α-pinene (1.78%) and α-terpinene (1.24%). Among twelve monoterpenic alcohols, p-menth-2-en-7-ol (3.48%) was the major alcoholic constituent and trans-dihydrocarvone (31.11%) was the prominent monoterpenic ketone in the essential oil. The sesquiterpenes identified in the oil were teresantalol (2.62%) and karvaknol (0.04%). The aromatic compounds detected were p-cymene (15.87%), 8a-methyl octahydro-2(1H)- naphthalenone, 2-isopropyl-5-methyl phenol, p-cymen-7-ol, o-cymen-5-ol, p-cymen-3-ol, 6-allyl-4,5-dimethoxy-1,3-benzodioxole and 2,a,8,8-tetramethyl decahydrocyclopropanal [d] naphthalene. The aliphatic compounds included 1-(1, 2, 3-trimethyl-2- cyclopenten-1-yl) ethanone, 3-isopropyl phenol, 2-methyl-4-isopropyliden-cyclopentan-1-al, 1-methyl-4-iso propyl-3-cyclohexen-1-ol, 2-isopropenyl-5-methyl-hex-4-enal, 4-isopropyl cyclohex-1,3-dien-1-yl) methanol, 4-isopropyl-1-cyclohexen-1-carbaldehyde, hexadecylene oxide and (3,4-dimethyl-2-oxo-cyclopenten-1-yl) acetic acid.[22] Analysis of the methanolic extract of the fruits of *Cuminum cyminum* led to the isolation of five terpenic and steroidal constituents, they were characterized as 1,4,5,8-tetrahydroxynaphthyl geranilan-10′-al 1′-oate, lanost-5,20 (22)-dien-3α-olyl *n*docosanoate, labdan-6α,16,20-triol-16-(10′,11′- dihydroxy anthraquinone-2′-oate), stigmast-5-en- 3β-O-D-arabinopyranosyl-2′-benzoate and lanost-5,24-dien-3β-ol 3β-O-D- arabinopyronosyl-2′-*n*octadec- 9″, 12″-dienoate.[23] The characteristic odour of cumin was attributed to the presence of sminaldehyde, 1, 3-p-menthadien-7al, 1-4-p-menthadien-7-al. 14 free amino acids were also isolated from the seeds. While, flavonoid glycosides isolated from the plant were included apigenin-7-glucoside, luteolin-7-glucoside, luteolin-7-glcuronosyl glucoside, luteolin and apigenin.[24] Total polyphenols in cumin were 4.98± 0.31. (mg GAE/g DW).[25] Phenols (salicylic acid, gallic acid, cinnamic acid, hydroquinone, resorcinol, P-hydroxybenzoic acid, rutin, coumarine, quercetin) were isolated from seeds of *Cuminum cyminum*.[26]

Pharmacological activity

Anticancer effect

Cancer chemopreventive potentials of different doses of a cumin seed-mixed diet were evaluated against benzo(α)pyrene [B(α)P]-induced forestomach tumorigenesis and 3-methylcholanthrene (MCA)-induced uterine cervix tumorigenesis. Results showed a significant inhibition of stomach tumor burden by cumin. Cumin seeds also decreased significantly the incidence of both B[*a*]P-induced neoplasia and 3'MeDAB induced hepatomas in Wistar rats.[27,28]

Antioxidant effects

The antioxidant capacity of cumin by ABTS and DPPH assays was3.26 ± 0.29 and2.16 ± 0.06 (mmol TE/g DW) respectively.[29] The antioxidant activity of cumin was studied. The oil showed higher antioxidant activity compared with that of BHT and BHA. The cumin essential oil exhibited a dose-dependent scavenging of DPPH radicals and 5.4 microg of the oil was sufficient to scavenge 50% of DPPH radicals/ml.[30] Antioxidant activity of essential oils was evaluated by DPPH radical scavenging assay, radical inhibition of *Cuminum cyminum* essential oils was 83.59%, the scavenging activities of the essential oil was increased with the increased of the essential oil concentrations.[31]

Anti inflammatory and analgesic effects

The potential anti-nociceptive and anti-inflammatory activities of the fruit essential oil of *Cuminum cyminum* has been evaluated in chemical (formalin test) and thermal (tail-flick test) models of nociception and formalin model of acute inflammation in rats and mice. The essential oil at the doses ranging between 0.0125 and 0.20 ml/kg exhibited a significant and dose-dependent analgesic effect in both model of chronic and inflammatory pain. However, the essential oil was devoid of anti-inflammatory activity. Moreover, the essential oil had no analgesic effect in tail flick test as a model of acute pain,[32] The antiinflammatory activity of cumin volatile oil was investigated in carrageenan-induced rat paw oedema. The volatile oil showed dose–dependent inhibition of rat paw oedema, at dose of 0.1ml/kg, ip, when compared to control group. The activity was comparable with that of the standard drug, diclofenac sodium.[33]

Hypolipidemic effects

The hypocholesterolemic effect of methanolic extract of *Cuminum cyminum* (MCC) was evaluated in ovariectomized (OVX) rats. MCC 1000 mg/kg and estradiol benzoate equivalent

to 0.15 mg/kg of estradiol were administered to OVX rats per orally for 10 weeks. The results indicated that estradiol as well as MCC protected OVX rats against increased cholesterol levels due to ovariectomy, MCC was better than estradiol.[34]

Effect on erythrocyte hemolysis

The effect of methanolic and acetonic seed extracts of Cumin (*Cuminum cyminum*) was studied on on human erythrocyte hemolysis in comparison with caraway. Both seed extracts were able to protect erythrocytes from hemolysis. Methanolic cumin extract showed higher percentage of protection than caraway.[35]

Side effect and toxicity

Health risks or side effects following the proper administration of designated dierapeutic dosages are not recorded.[21a] The LD50 of essential oils in mice was 0.59 ml/kg.[36] *Cuminum cyminum* fruits were fed to male Wistar rats at 2% or 10% of standard diet for 6 weeks. A mixture (5% *Cuminum cyminum* fruits + 5% *T. vulgaris* leaves) was also fed to rats for a similar period. Diets containing 2% *Cuminum cyminum* fruits, was not toxic to rats. Impairment of growth and enterohepatonephropathy were observed in the rats fed a diet containing 10% *Cuminum cyminum* fruits. These changes were also recorded in the rats fed the mixture of the 2 plants and were accompanied by leukopenia, anemia and increases in serum AST activity and urea and by decreased total protein and albumin levels.[37] Acute and subchronic toxicity of cumin essential oil were studied in a 30 day oral toxicity study in rats. A 17.38% decrease in WBCs count, and 25.77%, 14.24%, and 108.81% increase in hemoglobin concentration, hematocrit, and platelet count respectively, were noted. LDL/HDL ratio was reduced to half.[30a] **Dose:** Daily dosage: The average single dose is 300 to 600 mg of drug (equivalent to 5 - 10 fruits). However, cumin was used both internally and externally in ground form and as a pressed oil.[21b]

Keezhanelli

Fig. 3: *Phyllanthus niruri.*

Scientific Classification

Kingdom: Plantae

Class: Magnoliopsida

Order: Euphorbiales

Family: Euphorbiaceae

Genus: *Phyllanthus*

Species: *niruri*

Description

Phyllanthus niruri is a branching annual glabrous herb which is 30 - 60 cm high and has slender leaf bearing branchlets, distichous subsessile leaves with elliptic-oblong, obtuse, rounded base. Flowers are axillary and yellowish, whitish or greenish. Male flowers are in groups of 1 - 3 whereas females are solitary. Fruits are depressed-globose like smooth capsules present underneath the branches and seeds are trigonous, pale brown with longitudinal parallel ribs on the back.[38] Capsules on stalks are 1 - 2 mm long, round, smooth, 2 mm wide six seeds. The plant has explosive seed capsules that propel the seeds some distance from the plant. Seeds are triangular, light brown, 1 mm long with 5 - 6 ribs on the back.[39,40]

Chemical constituents

The major class of bioactive compounds like alkaloids, flavonoids, lignans, phenols, tannins, terpenes and volatile oils has been isolated. These bioactive compounds further include their respective phytoconstituents. Alkaloids possess securinine, nor-securinine, epibubbialine, isobubbialine, dihydrosecurinine.[41,42] Flavonoids contain Quercetin, kaempferol, astragalin, quercetin-3-O-glucoside, quercitrin.[39a,43,44,45,46] Likewise, Tannins include Amarulone, geraniin, amariin, furosin, corilagin, melatonin, phyllanthusin D.[43a,38a,45a] Lignans contains important pharmacological activities because of its phyto-constituents such as Phyllanthin, hypo-phyllanthin, 5-dimethoxy-niranthin, nirtetralin, phyltetralin, hinokinin, 4-(3,4-dimethoxy-phenyl)-1-(7-methoxy benzo[1,3]dioxol-5-yl)-2,3-bismethoxymethyl-but --an-1-ol.[39b,42a,47,48,49,50,51,52] Sterols include Amarosterol A, amarosterol B.[53] Triterpenes like Phenazine and phenazine derivatives, 2Z, 6Z, 10Z, 14E, 18E, 22E-farnesyl farnesol[44a,50a] and volatile oils such as Linalool, Phytol.[54]

Antioxidant Activity

Using DPPH (1,1-diphenyl-2-picrylhydrazyl) method, free radical scavenging activity was evaluated using *in-vitro* callus which showed that the methanol extract of *P. amarus.*, contains the highest amount of phenolic compounds and exhibits the greatest antioxidant activity in comparison to other extracts and even more as compared to *in-vivo* plant extraction.[55]

Anti-viral Activity

In-vitro culture of hairy roots of *P. amarus* induced by *Agrobacterium rhizogenes* was shown to possess 85% inhibition (in contrast to 15% in the control) in binding of Hepatitis B Surface Antigen (HBsAg) to its antibody (anti-HBs) after 24 h of incubation with HbsAg-positive sera *in-vitro* at 37 °C 66. The aqueous extract of *P. amarus* showed partial antiviral activity against white spot syndrome virus in shrimp at the concentration of 150 mg/kg of animal body weight for 30 days.[56]

Anti-cancer Activity

The effects of aqueous extract of the whole plant of *P. amarus* against Cr (VI)-induced oxidative toxicity *in-vitro* in MDA-MB-435S human breast carcinoma cells revealed a distinct decline in Cr(VI)-induced cytotoxicity was noticed in MDA-MB-435S cells with an increase in extract dosage. Its phenolic constituents simultaneously may inhibit Cr (VI)-induced oxidative toxicity to MDA-MB-435S cells.[57]

Anti-inflammatory Activity

The methanol extract of *Phyllanthus amarus* significantly inhibited carrageenan, bradykinin, serotonin and prostaglandin E1-induced paw edema, but failed to inhibit the histamine-induced paw edema. The extract significantly decreased the formation of granuloma tissue in chronic inflammation model.[58]

Hepatoprotective effect

Hepatoprotective effects of aqueous extract from *Phyllanthus amarus* on ethanol-induced rat hepatic injury were studied in *in vitro* study where *Phyllanthus amarus* increases the percentage 3- [4,5-dimethylthiazol-2-yl]-2,5 diphenyl tetrazolium bromide (MTT) reduction assay and decreased the release of aspartate transaminase (AST) and alanine transaminase (ALT) in rat primary cultured hepatocytes treated with ethanol. The results reveal that treatment of rats with *Phyllanthus amarus* extract orally brought cell recovery in ethanol-

induced liver injury by bringing the levels of aspartate transaminase (AST), alanine transaminase (ALT), high-sensitivity human thyroglobulin (HTG) and Tumor necrosis factor (TNF-α) to normal. Histopathological study confirmed the beneficial effect of *Phyllanthus amarus* with its potential antioxidant activity.[59]

Sarkkarai

Fig. 4: *Saccharum officinarum.*

Scientific classification

Kingdom: Plantae

Order: Poales

Family: Poaceae

Subfamily: Panicoideae

Tribe: Andropogoneae

Genus: Saccharum

Species: S. officinarum

Description

S. Officinarum, a perennial plant, grows in clumps consisting of a number of strong unbranched stems. A network of rhizomes forms under the soil which sends up secondary shoots near the parent plant. The stems vary in color, being green, pinkish, or purple and can reach 5 m (16 ft) in height. They are jointed, nodes being present at the bases of the alternate leaves. The internodes contain a fibrous white pith immersed in sugary sap. The elongated, linear, green leaves have thick midribs and saw-toothed edges and grow to a length of about 30 to 60 cm (12 to 24 in) and width of 5 cm (2.0 in). The terminal inflorescence is a panicle up to 60 cm (24 in) long, a pinkish plume that is broadest at the base and tapering towards the top. The spikelets are borne on side branches and are about 3 mm (0.12 in) long and are concealed in tufts of long, silky hair. The fruits are dry and each one contains a single

seed.[60] Sugarcane harvest typically occurs before the plants flower, as the flowering process causes a reduction in sugar content.[61]

Chemical constituents

High-Performance Liquid Chromatography with Diode-Array Detection (HPLC-DAD) analysis of phenolic compounds from sugarcane juice showed the presence of phenolic acids such as hydroxycinnamic acid, sinapic acid, and caffeic acid along with flavones such as apigenin, luteolin, and tricin. Among the flavones, tricin derivatives accounted for the highest concentration.[62] Extensive chromatographic and spectroscopic studies indicated the presence of various -*O*- and -*C*- glycosides of the above-mentioned flavones, and 3947 were identified.[63] Four new minor flavones swertisin, tricin-7-*O*-neohesperoside-4'-*O*-rhamnoside, tricin-7-*O*-methylglucuronate-4'-*O*-rhamnoside, and tricin-7-*O*-methylglucuronide were isolated and identified from sugarcane juice.[64] In addition, some novel acylated flavone glycosides, such as, tricin-7-*O*-β-(6'-methoxycinnamic)-glucoside, luteolin-8-C-rhamnosyl glucoside, and tricin-4'-O-(erthroguaicylglyceryl)-ether were isolated, along with orientin from sugarcane juice.[65] Liquid chromatography-mass spectrometry (LC-MS) analysis of aqueous and dichloromethane extracts of brown sugars confirmed the presence of various phenolic acids were p-hydroxy benzoic acid, vanillic acid, syringic acid, ferulic acid, p-Coumaric acid. In addition to phenolic acids, eight major volatile constituents that is 1 methyl2pyrrolidinone, 2,3butanediol, 4-hydroxy benzaldehyde, benzyl alcohol, syringaldehyde, dimethyl sulphoxide and benzophenone were also reported to be present in brown sugars

Pharmacological activity

Analgesic activity

Ethanol extracts (95%) of both fresh leaves and shoots were administered intragastrically to mice at a dose of 1 g/kg. The leaf extracts were active against benzoyl peroxide-induced writhing and tail-flick response, but ethanol extract of shoots were active only against the tail-flick method.[66]

Antihepatotoxic activity

The aqueous extract of dried stems administered intraperitoneally to mice, at a dose of 25 mg/kg, was active against chloroform-induced hepatotoxicity.[67]

Anti-inflammatory effect

Mixtures of fatty acids isolated from sugarcane wax were examined for their anti-inflammatory effect on both rats and mice. Oral administration of this mixture showed anti-inflammatory activity in the cotton pellet granuloma assay and in the carrageenan-induced pleurisy test, both in rats, as well as in the peritoneal capillary permeability test in mice.[68]

Antihypercholesterolemic effect

The policosanols were also examined for prevention of atherosclerosis in male New Zealand rabbits fed on a cholesterol-rich diet for 60 days at doses of 25 or 200 mg/kg. Policosanol-treated rabbits did not develop marked hypercholesterolemia and the intima thickness was also significantly less compared to the control animals.[69]

Toxicity profile of sugarcane juice

There is some presence of polycyclic aromatic hydrocarbons (PAHs) in sugarcane juice. PAHs are formed during incomplete combustion of the organic matter and their presence originates mainly from processing and cooking of food. At harvesting season most of the sugarcane plantation is burnt and this burning is an important source of PAHs. HPLC analysis of sugarcane juice collected at different periods was done, which confirmed the presence of four PAHs: Benz (a) anthracene, benzo (b) fluoranthene, benzo (k) fluoranthene, and benzo (a) pyrene in the juices collected in the harvested period.[70]

CONCLUSION

Through this extensive review on recent research reports maximum scientific validation has been carried out on various pharmacological actions and therapeutic benefits of each ingredient of *Elathy chooranam*. The ingredients present in this formulation have effective in the treatment of Jaundice. Based on this evidence of Siddha literature and the modern scientific research studies also provide keyhole which result are hepatoprotective, anti inflammatory, Anti-viral, Analgesic activities most presents in ingredient of *Elathy chooranam* as evident from the current review. Thus further research publications on preclinical and clinical evaluation is the need of the hour for their wide spread acceptance among public and scientific community.

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