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A Review of Hepatoprotective Potential of Siddha Herbo mineral formulation - Saman Chooranam

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ABSTRACT

Liver is a vital organ for metabolism and it is affected due to various diseases and toxic products. It also plays an important role as bio Transformer of xenobiotic which are more toxic and more reactive substances. Though there are some liver tonics in modern medicine, Siddha medicine has innumerable formulations to protect the liver. Jaundice is an important sign of liver disorder. Hepatocellular carcinoma is the commonest cause of liver cancers which leads to 5th common cause of cancers affecting mankind. Liver cirrhosis is the common cause of liver disease in India. There is a need of safe hepatoprotective drug from Siddha system of medicine. The available information was collected from various Siddha and modern literature, scientific databases such as PubMed, Science Direct, Scopus, Web of Science and Google Scholar etc. One such hepatoprotective drug is *Saman Chooranam*. But there is no sufficient collective literature report and scientific validation of this formulation. The significance of this review is aimed to provide a brief and collective scientific evaluation of the key active phytochemical components and its pharmacological actions for the possible development of this formulation *Saman Chooranam* in future perspective. This review reveals that the traditional use, phytochemistry and pharmacological profile of Siddha herbomineral formulation of *Saman Chooranam* thereby identifying the research lacuna and future steps regarding this drug.

Keywords: Siddha medicine, *Saman Chooranam*, Hepato protective, Herbomineral.

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INTRODUCTION

Liver is one of the most vital organs responsible for many important functions including metabolism, conjugation, and excretion of various endogenous substances and exogenous substances. Apart from these, liver also plays an important role as bio Transformer of xenobiotic which are toxic and more reactive substances. Jaundice is an important sign of liver disorder. Liver is a prime target for damage, which can lead to various types of hepatic diseases that can be classified into acute or chronic hepatitis, cirrhosis and hepatocellular carcinoma.

In the absence of reliable hepatoprotective medicines, liver diseases will be the next major lifestyle disorder of India after diabetes and hypertension. The worldwide annual incidence of drug-induced hepatotoxicity is increased day by day. ¹

There has been a paradigm shift in the dynamics of liver cirrhosis and about 10 lakh new patients are diagnosed with it every year in India. Around 10 lakh patients of liver cirrhosis are newly diagnosed every year in India. Liver disease is the tenth most common cause of death in India as per the World Health Organization. Liver disease may affect one in 5 Indians. Liver Cirrhosis is the 14th leading cause of deaths in the world and could be the 12th leading cause of deaths in the world by 2020. ²

Hepatocellular carcinoma (HCC) is the most frequent cause of all liver cancers and constitutes 90% of cancers of liver globally. Approximately 7.5 Lakhs of new cases of HCC per year occurs globally which makes HCC as the 5th common cause of cancers affecting human. ³ Hepatocellular carcinoma (HCC), or a cancer in the liver, is the second most common cause of death due to malignancy in the world.

The main symptom is jaundice, vomiting, dyspepsia, anorexia, enlargement or shrinking of liver, ascites, loss of function etc.

Herbal based preparations play a vital role in the treatment of various liver disorders. There are numerous medicinal plants and their formulations used for liver disorders in Siddha system of medicine. However, we do not have satisfactory scientific documentation for these herbal drugs. Few herbal drugs speed up the natural healing process of liver and evaluated for its hepatoprotective effects. Hence, the world is looking at the traditional Indian Siddha system of medicine for remedies to treat the hepatic disorders. Still the search for effective hepatoprotective drug continues. One such promising Siddha formulation '*SAMAN CHOORANAM*' mentioned in Siddha classical literature '*Agasthiyar Vaithya Chinthamani Venba – 4000*' ⁴ indicated for various liver disorders. This medicine is used by the Siddhars and Siddha medical practitioners to treat the liver disorders from *Sangam* era. However there are no reports regarding the pharmacological activities of this formulation.

Hence, the present review is aimed at compiling the data based on ‘*SAMAN CHOORANAM*’ consisting herbs and minerals reported works on promising phytochemicals from medicinal plants and geological perspective of the mineral.

MATERIALS NEEDED FOR *SAMAN CHOORANAM*

The formulation of *Saman Chooranam* has been selected from the Classical Siddha Literature. ‘*Agasthiyar Vaithya Chinthamani Venba – 4000*’, Page No.178⁴.

Table 1: Ingredients of *Saman chooranam*⁴

S.No	Ingredients	English Name	Scientific Name	Quantity
1	<i>Indhuppu</i>	Rock salt	Impure Sodium chloride	5gms
2	<i>Perungayam</i>	Asafoetida	<i>Ferula asafoetida</i>	5gms
3	<i>Evatcharam</i>	Wood salt	Impure Potassium Carbonate	5gms
4	<i>Kalluppu</i>	Common salt	Sodium chloride	5gms
5	<i>Kadukkai</i>	Yellow myrobalan	<i>Terminalia chebula</i>	5gms
6	<i>Chukku</i>	Dried ginger	<i>Zingiber officinale</i>	5gms
7	<i>Vaividangam</i>	Embelia	<i>Embelia ribes</i>	5gms
8	<i>Sathicharam</i>	Mixture of fullers earth, Lime stone and Soil falling from the wall	Yet to be validated	5gms
9	<i>Kodiveli</i>	Leadwort	<i>Plumbago zeylanica</i>	5gms
10	<i>Thippili</i>	Long pepper	<i>Piper longum</i>	5gms
11	<i>Kurosani Omam</i>	Henbane seeds	<i>Hyoscyamus niger</i>	5gms

Method of preparation:

Purification process

All the above ingredients purified as per Siddha literature. After purification, the herbal ingredients are collected in equal parts and fried separately in a fry pan until golden brown.⁵ Then they are powdered separately. Rock salt, wood salt, common salt and *Sathicharam* are powdered and all the powders are mixed together in a stone mortar and finally stored in an air tight glass jar.

Adjuvant: It is consumed with rice and ghee.

Indications: Jaundice, Liver disorders, Anemia, Peptic ulcer and indigestion.

Pharmacognostic Aspect of each ingredient

1. *Ferula asafoetida* (Umbelliferae)

Common name: Asafoetida

Vernacular Name: *Perungayam*

Part used: Gum resin

Phytochemical constituents: It consists of three main fractions resin, gum and essential oil.⁶

The resin fraction contains ferulic acid and its esters, coumarins, sesquiterpene coumarins and other terpenoids.⁷ The gum includes monoterpenes and volatile terpenoids. Sulfur compounds in *Ferula asafoetida* resin shows various biological activities valuable in medicine.⁸

Actions: Stimulant, Carminative, Antispasmodic, Laxative, Anthelmintic and Diuretic.

Indications: It is used for flatulence, belching, gastric ulcer, ascites, worm infestation etc.,⁹

Pharmacological activities:

Hepatoprotective effect: Methanol-insoluble fraction has anti hepato toxic activity.¹⁰

Antihypertensive activity: Intravenous administration to dogs at variable doses showed antihypertensive activity.

Antitumor: The aqueous extract isolated from the dried oleoresin of *Ferula asafoetida* given to mice on CA-Ehrlich ascites and 53% increase in life span was observed.¹¹

Anti-carcinogenic: *Ferula asafoetida* given to rats showed a remarkable reduction in the multiplicity and size of palpable N- methyl -N-Nitrosourea induced mammary tumours and there was delay in mean latency period of tumour appearance.

Antioxidant activity: *Ferula asafoetida* in rats significantly restored the level of antioxidant system.¹²

2. *Terminalia chebula* (Combretaceae)

Common name: Yellow myrobalan

Vernacular Name: *Kadukkai*

Part used: Fruit rind

Phytochemical constituents: It contains high phenolic content, especially hydrolysable tannins, anthraquinone and flavonol. Other constituents contain chebulic acid, chebulinic acid, tannic acid, ellagic acid, gallic acid, flavonoids like luteolin, rutins and quercetin etc.¹³

Actions: Stimulant, Stomachic, Tonic, Rejuvenator, Laxative

Indications: It digests the food materials which is hard to digest. It induces the peristaltic movement and defecation. It has an Anti-ageing property. It cures cheek, cervical, tongue, penile diseases, cancerous growth in the soles, ascites, ulcers, jaundice, poison due to plants, mineral and metals.⁹

Pharmacological activities:

Hepatoprotective effects: *Terminalia chebula* (fruit) prevents liver toxicity caused by sub-chronic administration of rifampicin, isoniazid and pyrazinamide in combination. The antioxidant potential associated with hepatoprotective effects was evidenced by the reduction in biochemical parameters along with the histopathological studies.¹⁴

Cytoprotective effect: A 70% methanol extract of *Terminalia chebula* fruit, was studied for its effects on growth in several malignant cell lines including a hum4n (MCF-7) and mouse (S115) breast cancer cell line, a human osteosarcoma cell line (HOS-1), a human prostate cancer cell line (PC-3) and a non-tumorigenic, immortalized human prostate cell line (PNT1A) using assays for proliferation, cell viability and cell death). In all cell lines studied, the extract decreased cell viability, inhibited cell proliferation, and induced cell death in a

dose dependent manner. Chebulinic acid, tannic acid and ellagic acid were found to be the most growth inhibitory phenolics of *Terminalia chebula* fruit extract.¹⁵

Antidiabetic and Renoprotective effects: Oral administration of the extracts reduced the blood sugar level in normal and in alloxan diabetic rats. Continued, daily administration of the drug produced a sustained effect.¹⁶

Antioxidant Activity: *Terminalia chebula* possess potent antioxidant properties due to the presence of the phenolic compounds in adult male Sprague-Dawley rats.^{17, 18}

Antibacterial effect: *Terminalia chebula* extract reduces the colony formation of the bacteria confirming its antibacterial potential.¹⁹ *Terminalia chebula* showed stimulatory effects on gastric emptying, due to its potent prokinetic properties.²⁰

3. *Zingiber officinale* (Zingiberaceae)

Common name: Dried ginger

Vernacular Name: *Chukku*

Part used: Rhizome

Phytochemical constituents: The volatile oils and pungent phenol compounds found in ginger rhizome, such as shogaols, zingerone, and gingerols contribute to its taste and odour. Sesquiterpene and monoterpenoid hydrocarbons, gives ginger its distinct aroma and flavour.²¹

Actions: Stimulant, Stomachic, Carminative

Indications: It cures indigestion, heart burn, alimentary tract diseases, diarrhoea, gastric ulcer, flatulence, pain in the flanks, anaemia, pain abdomen etc.,⁹

Pharmacological activities:

Hepatoprotective effect: *Zingiber officinale* is useful in preventing acute liver injury caused by CCl₄ and acetaminophen-induced liver damage and *Zingiber officinale* could be useful in preventing acute liver injury.²²

Nephroprotective effect: Ethanol extract of *Zingiber officinale* is effective against Cisplatin induced nephrotoxicity. This protection is mediated by renal antioxidant defence system.²³

Effect of Liver cancer: Gingerol can inhibit both proliferation and invasion of hepatoma cells and apoptosis.²⁴

Anti-diabetic effects: Ginger significantly lowered blood glucose, serum total cholesterol, LDL, VLDL, triglycerides and raised HDL in hyperglycemic rats.²⁵

4. *Embelia ribes* (Myrsinaceae)

Common name: Embelia

Vernacular Name: *Vaividangam*

Part used: Fruit

Phytochemical constituents:

The vilangin compound found in the dry ripe berries.¹³ The other constituents isolated are volatile oils, fixed oil, resin, tannin, christembine, phenolic acids such as caffeic acid, vanillic acid, cinnamic acid, o-cumaric acid from the berries of *Embelia ribes*.²⁶ The new compounds detected from the seeds are embelinol, embeliaribyl ester and embeliol. The embelin is found in the fruit part.²⁷ It also contains components like potassium embelate, quercitol etc.,^{28, 29} It also contains Chromium, Potassium, Calcium, Copper, Zinc and Manganese along with steroids, cardiac glycosides, alkaloids, anthraquinones, tannins and phenolics.^{30, 31}

Actions: Anthelmintic, Carminative, Stomachic, Stimulant

Indications: It cures anaemia, gastric ulcer, ascites, flatulence, worm infestation and ulcer in anus. It prevents abdomen disorders.⁹

Pharmacological activities:

Hepatoprotective: The ethanolic extract of the *Embelia ribes* showed hepatoprotective activity on paracetamol-induced liver cell damage using a mice model. It decreases serum glutamate pyruvate transaminase in a dose-dependent manner.³²

Antitumor: Embelin component of the *Embelia ribes* exhibits significant antitumor activity in methylcholan-threne-induced fibrosarcoma in albino rats.³³

Antioxidant: The aqueous extract of the *Embelia ribes* showed antioxidant activity in the streptozotocin-induced diabetic rats.³⁴

5. Sathicharam

Common name: *Suvarsigai*

Synthetic preparation:**Ingredients:**

1. Fuller's earth : 130 ml
2. Lime stone : 65 ml
3. Soil falling from the wall : 130 ml
4. Water : 1300 ml

Preparation:

The fuller's earth and the limestone are mixed and kept in a holed straw barrel. Then the above said soil is dissolved in water and filtered. The filtrate is boiled till it attains the wax consistency and made into flat cakes and spread over a mat and allowed to cool. A salt is obtained which is called as *Sathicharam*.

Purification:

This is dissolved in goat's urine for 3 days and filtered. The filtrate is insolated.³⁵

Chemical constituents:

Sodium carbonate, sulphate of soda, potash (fuller's earth), $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$, Calcium oxide, Silicon dioxide, Calcium and Iron. ³⁶

Actions: Laxative, Diuretic

Indications:

Indigestion, constipation, splenomegaly, abdominal pain, ascites and diarrhoea. ³⁵

Pharmacological activities:

Yet to be validated.

6. *Plumbago zeylanica* (Plumbaginaceae)

Common name: Indian Leadwort

Vernacular Name: *Kodiveli*

Part used: Root

Phytochemical constituents: It contains plumbagin, 3- chloroplumbagin, 3, 3- biplumbagin, binaphthoquinone, isozeylanone, zeylanone, elliptinone and droserone. ^{37, 38}

Actions: Anti periodic and Diaphoretic

Indications: It cures dropsy, diarrhoea, worm infestation, anaemia, pricking pain, flatulence, fever due to indigestion, etc., ⁹

Pharmacological activities:

Hepatoprotective activity: Methanolic extract of *Plumbago zeylanica* significantly reversed hepato toxic changes dose dependently, as compared to hepatotoxicant control through its ant oxidative, anti-inflammatory and anti-fibrotic effects against experimentally induced liver toxicity. ^{39, 40, 41}

Anticarcinogenic Activity: Plumbagin is a potent inhibitor of the NF- κ B activation pathway that leads to suppression of NF- κ B-regulated gene products. This explained its cell growth modulatory, anti-carcinogenic and radio-sensitizing effects. ⁴²

7. *Piper longum* (Piperaceae)

Common name: Long pepper

Vernacular Name: *Thippili*

Part used: Fruit

Phytochemical constituents: Methyl piperine, piperonaline, piperettine, pellitorine, piperundecalidine, piperlongumine, piperlonguminine, pergumidiene, pipericide, piperderidine, longamide, tetrahydropiperine. Piperine and piperlonguminine. ^{43, 44, 45}

Actions: Stimulant, Carminative

Indications: It cures gastric ulcer, anaemia, fatigue, dyspepsia, abdominal discomfort, worms, etc. ⁹

Pharmacological activities:

Hepatoprotective activity: The fruit extract had hepatoprotective action against carbon tetrachloride induced liver damage. Piperine is effective against carbon tetrachloride-induced hepatotoxicity by reducing lipid peroxidation in vitro and in vivo. ^{46, 47}

Anticancer activity: The alcohol extract of *Piper longum* inhibits solid tumour development in mice. ⁴⁸

Antioxidant activity: *Piper longum* exhibits promising antioxidant potential against free radical-induced oxidative damage. Decrease lipid peroxide levels and maintain glutathione content, demonstrating antioxidant activity. ⁴⁹

Anti-inflammatory activity: A marked anti-inflammatory activity of *Piper longum* fruit decoction has been reported using carrageenan induced rat oedema. ^{50, 51}

Antihyperlipidemic activity: The ethanol extract of the *Piper longum* fruit exhibits appreciable antihyperlipidemic activity in vivo. ⁵²

8. *Hyoscyamus niger* (Solanaceae)

Common name: Henbane seeds

Vernacular Name: *Kurosani Omam*

Part used: Seed

Phytochemical constituents: It contains alkaloid hyoscyamine, hyoscyne, scopolamine, atropine, etc., ^{53, 54, 55} volatile oil, glycoside, albumin, steroidal glycosides (atroposide A, atroposide C, atroposide E), phenolics, (vanillic acid, vanillin, pinoreosin, and N transferuloyltyramine) and phytosterols (daucosterol and beta-sitosterol), etc. ^{56, 57}

Actions: Hypnotic, Sedative, Anodyne, Antispasmodic, Mild diuretic

Indications: It cures dental diseases, mental disorders, tremor, memory impairment, insomnia, cardiomegaly, etc., ⁹

Pharmacological activities:

Cardioprotective activity: *Hyoscyamus niger* proved to protect from the cardiac damage by activation of antioxidant enzymes. ⁵⁸

Anticancer activity: Alkaloidal extract shows anticancer activity. ⁵⁹

Antihypertensive: *Hyoscyamus niger* crude extract lowers blood pressure in animal models. ⁶⁰

9. Impure Sodium chloride

Common name: Rock salt

Vernacular Name: *Indhuppu*

This is taken out from earth especially in the North West regions of Punjab and Sind (Pakistan). The out surface is greyish yellow which its inner core is white in colour; saline taste.

Purification: Rock salt is kept soaked in vinegar (leftover rice fermented water) for three days and insolated to get purified and detoxified form.

Chemical constituents: It consists of 95-98% sodium chloride, 2-4% polyhalite (potassium, calcium, magnesium, sulphur, oxygen, and hydrogen), 0.01% fluoride, 0.01% iodine and small amounts of numerous trace minerals. ⁶¹

General properties:

Rock salt cures, eight types of gastric ulcer (*Gunmam*), indigestion, blood diseases, constipation, polydipsia, haemorrhoids, abscess, throbbing pain etc.,

Actions: Laxative, Purgative, Carminative, Diuretic, Stomachic

Indications: Hot fomentation of rock salt reduces painful swelling. It is an ingredient of *Indhuppu Chooranam* which cures indigestion, vomiting and ascites. ³⁵

Pharmacological activities:

Antioxidant effect: It helps in getting rid of toxic minerals and refined salt deposits by stimulating blood circulation and mineral balance. ⁶¹

10. Impure Potassium Carbonate

Common name: Wood salt

Vernacular Name: *Evatcharam (Mara uppu)*

It is available in the market as white solid chips. It is prepared by reducing to ashes the green spikes of barley, dissolving the ashes in water straining the solution and evaporating it over fire. The resulting salt is a clear amorphous powder with the saline taste.

Synthetic preparation of Impure Potassium carbonate:

Bogar one of the 18 Siddhars who was a pioneer in alchemy and various synthetic preparation of minerals has mentioned about the preparation of *Evatcharam* from ashes of *Hordeum decorticatedum* (Barley corn-*Eva gothumai*). ³⁵

Chemical constituents: Carbonate of potash ³⁶

Actions: Appetite, Stimulant, Laxative, Diuretics, Anti-inflammatory, Convalescence.

Indications: This is effective in diseases of the anasarca, gastric ulcer, throbbing pain, obesity, indigestion, urinary retention and splenomegaly etc. ³⁵

Pharmacological activities:

Anti-microbial activity: It has very high activity against *Escherichia coli*. ⁶²

11. Sodium chloride

Common name: Common salt

Vernacular Name: *Kariuppu*,

Purification:

It is dissolved in water or vinegar, filtered with a cloth and dried in sunshade.

Chemical constituents: Sodium chloride consists of sodium and chloride ions are in the ratio of 1:1. It is commonly called *table salt or common salt*. Seawater is a major source of this salt. The chemical formula of Sodium chloride is NaCl. It is an ionic compound which consists of a chloride anion (Cl⁻) and a Sodium cation (Na⁺).⁶³

Actions: Stomachic, Laxative, Anthelmintic, Febrifuge

Indications: It is effective in the treatment of liver disorders, flatulence, pricking pain, loss of taste, gastric ulcer, dryness of tongue, constipation etc.³⁵

Antibacterial agent: It is a good antibacterial agent which prevents bacteria from developing and multiplying.⁶⁴

Anti - Microbial activity:

The antimicrobial properties were proved against *Escherichia coli*, *Salmonella typhimurium*, *Listeria monocytogenes*, *Staphylococcus aureus* and *Clostridium perfringens*.⁶⁵

CONCLUSION AND FUTURE DIRECTIONS:

The entire world is in search of a potent liver treatment. There are very few safe and efficacious hepatoprotective drugs available in modern medicine. Though there are a lot of Siddha herbal and poly herbal formulations to treat liver disease effectively, many drugs are not scientifically validated so far. Hence, a need for scientifically validated potent herbal liver tonic at the same time safe and cost effective. The existing literature information about the Siddha herbomineral formulation *Saman Chooranam* is said to be hepatoprotective, hepato curative and anti-oxidant activities. Each ingredient of *Saman Chooranam* showed hepato protective effect confirmed by various scientific evidence. The detailed research on *Saman chooranam* includes phytochemical, physicochemical, biochemical and pharmacological studies is under process. Based on the results the clinical trial will be initiated.

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CONFLICTS OF INTEREST:

The authors have no conflicts of interest to share.

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