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A REVIEW ON POLYHERBAL FORMULATION – VISHASURA KUDINEER CHOORANAM - A CLASSICAL ANTI-VIRAL DRUG USED IN SIDDHA SYSTEM OF MEDICINE

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ABSTRACT

Vector borne diseases are one of the major threat to the mankind especially Dengue Fever (DF), Chikungunya etc. The increased complexity in the epidemiology of these viral diseases is due to the intricate relationship between the host, the agent and complex environmental nature including biotic and abiotic factors. Hence the development of drugs including development of vaccines is cumbersome to achieve in modern medicine. On the other hand, ethno-medicines, provide complete solution to the viral diseases through traditional medicines with no adverse effects. This review emphasizes the potential role of one of the poly-herbal formulations, "Vishasura Kudineer chooranam" used in Siddha system of medicine for viral diseases. Out of nine herbs of this formulation neem bark, licorice, sandal wood, ginger was already found to possess antiviral activity against many kinds of viral pathogens. This review throws limelight on revealing pharmacognostical, ethnobotanical and pharmacological data of constituents of the formulation.

KEYWORDS: Viral fever, Vishasura Kudineer chooranam, Siddha medicine, Dengue fever, chikungunya.

INTRODUCTION

The challenging diseases of this medically advanced age is infectious viral diseases like dengue, chikungunya, H1N1, HIV, herpes, viral hepatitis etc and non-communicable diseases like Diabetes mellitus, Hypertension, Ischaemic heart disease, Cancer etc. Emerging and re-emerging epidemic diseases pose an on-going threat to global health security.[1] The WHO's Twelfth General Programme of Work sets the reduction of "mortality, morbidity and societal disruption resulting from epidemics**.,** through prevention, preparedness, response and recovery activities" as one of its five strategic imperatives.[1] So epidemics gained global attention as many viral diseases do not have medicines or vaccines and the medicines available for certain diseases poses adverse effects. In spite of much medical advancement, still there is paucity of safe and effective drug for viral diseases.

Ethno-medicine will be a successful and true alternative for a healthy and disease free human population. Since ancient times, man survived through many disease outbreaks with their own ethno-medicines. One such an ethno-medicine of South India is Siddha Medicine. Siddha medicine renders remedy for many ailments. But to reach globally, scientific studies are essential to prove the quality, safety and efficacy. A retrospective study of Siddha Medicine enlists numerous medicines for viral diseases like chicken pox, mumps, influenza, dengue etc. Siddha medicines are used for prophylaxis as well as to treat viral diseases without any adverse effects since time immortal.

Vishasura Kudineer (VSK) is a poly herbal formulation from Siddha literature 'Kaaviya Sura Nool'.[2] According to the Siddha context, Vishasuram is characterized by high grade fever, body pain and altered sensorium. Vishasura Kudineer is, traditionally being used for symptoms associated with viral fever. The word 'Kudineer' refers to an aqueous solution wherein the different parts of the plant like leaves, flowers, bark, roots or fruits (fresh or dried) are mixed with certain quantity of water and boiled well to condense to a particular proportion as per the indication and requirement.[3]

Among thirty two kinds of internal medicines, charu (juice), surasam (extract), kudineer (decoction), manappagu (syrup), tailam (oil), theeneer, thiraavagam (distillate) are in liquid forms of varying densities. The other names to denote decoction are marundhu neer, uneer, kiyazham, vaai kudithidum punal.[3] This article

aims to bring out the ethnopharmacological aspects of the drug in this formulation.

The scientific details including morphological description, phytochemical constituents and their pharmacological studies were collected from books and published journals available in online. The Siddha pharmacological perspective of the drug in relation to treatment of fever has also been elucidated.

Vishasura kudineer chooranam – pharmcognostic aspect.

Botanical aspects of herbs found in VSK were compiled from The Treatise on Indian Medicinal Plants and Wealth of India.[4,5,6,7,8,9,10]

1. Tamil Name: Veppam pattai
Botanical name: Azadirachta indica
Family : Meliaceae
Morphological description:[4]
A medium sized or large evergreen perennial tree. Bark varies much in thickness according to age. External surface is rough, fissured and rusty-grey.
Part used: Bark

Phytochemical constituents
All parts contain β- sitosterol. Stem bark contain tannin 12-16%, non-tannin 8-11%. Bark yields a red dye. Alcoholic extract of fresh stem bark yields bitter principles nimbin, nimbinin, nimbidin. Petroleum soluble fraction of the alcoholic extract of stem bark yields essential oil (0.02%), have characteristics similar to the oil obtained from the blossoms.
Wood oil contains β- sitosterol, cycloeucalenol, 24-methylenecycloartenol. Destructive distillation of dried heartwood yields pyroligneous acid and methanol. Benzyl alcohol, thioamyl alcohol, arachidic, 3-glucoside, arachidic, behenic, linoleic, oleic, palmitic and stearic acids, azadiradione and margosene.

2**. Tamil name: Neeli/Avuri**
Botanical Name: Indigofera tinctoria
Family: Fabaceae
Morphological description
A branching shrub upto 2m high with 7-13 green leaflets. Leaves are green when fresh and greyish black on drying, tender branches bluish red in colour, flowers many in nearly sessile lax spicate racemes which are much shorter than the leaves with red or pink in colour. Fruits cylindrical pods. Pale greenish grey when young and dark brown on ripening with 10-12 seeds.
Part used: Roots

Chemical Constituents
Contains glycoside indicant which on acid hydrolysis and aerial oxidation yields a water soluble galactomannan, flavanoids, alkaloids in seeds, indigotine, indiruben, rotenoids.

3. Tamil Name: Chukku
Botanical Name: Zingiber officinale
Family: Zingiberaceae

Morphological Description
A slender, perennial, rhizomatous herb, linear leaves, sessile, glabrous, flowers yellowish green in oblong cylindrical spikes. The rhizomes are white to yellowish brown in colour, irregularly branched. The growing tips are covered over by a few scales. The surface of the rhizome is smooth and if broken a few fibrous elements of the vascular bundles project out from the cut ends. The pieces are about 5-15 cm long, 1-1.5 cm wide usually 1-1.5 cm thick; showing longitudinal striations and occasional fibres; odour agreeable and aromatic; taste agreeable and pungent. Rhizomes are widely dug in January-February.
Part used: Rhizome

Chemical Constituents
Gingerols, shogaols, dihydrogingerol, gigerdione, hexahydrocurcumin and desmethyl hexahydrocurcumin, α-zingiberene, β-sesquiphellandrene, ar-curcumene, lipids, proteins, fats, waxes, starch, protein, fibre.

4. Tamil name: Nannari
Botanical Name: Hemidesmus indicus
Family: Asclepiadaceae

Morphological Description
A slender twining or prostrate perennial with terete stem. Leaves from broadly obovate to oblong-elliptic; linear or linear-lanceolate, obtuse or apiculate. Flowers small, greenish purple in opposite, crowded sub sessile cymes. Follicles glabrous, often purplish slender, divaricate. Seeds ovate-oblong, flattened, black. Flowers during July-August and fruits during October-December.

Part used: Roots
Chemical Constituents
Roots contain three coumarinolignoids namely hemidesminine, hemidesmin-1, hemidesmin- 2, α- and β-amyrin, β- amyrin acetate, β- sitosterol, lupeol and acetate, lupeol octacosanoate, triterpenes. The volatile matter of roots contains Ca. 91 % of 2-Hydroxy-4-methoxybenzaldehyde, which is used to synthesize human microflora metabolites such as Urolithins. The other chemical constituents, among which ledol (4.5%) and nerolidol (1.2%), the sesquiterpene alcohols, are major. The minor but olfactorily and biologically significant constituents are borneol, linalyl acetate, dihydrocarvyl acetate, salicylaldehyde, terpinyl acetate and 1,8-cineol.[11] Pregnane glycosides such as denicunine and heminine were isolated from stem of Hemidesmus indicus.[12] The concentration of glycosides, flavanoids, tannins and sterols in the entire plant is the highest during summer.[13]

5. Tamil name: Maeda moolam
Botanical Name: Aristolochia bracteolata
Family: Aristolochiaceae

Morphological Description
Leaf reniform, cordate or rounded, slightly grooved on upper surface. It has bitter taste and characteristic odour. Roots and shoots soft. Fruits are oblong or ellipsoid capsules. Flowers and fruits after the rainy season.
Part used: Roots

Chemical Constituents
Alkaloids, triterpenoids, steroids, sterols, flavanoids, saponin, phenolic compounds and cardiac glycosides. Methanolic extract of parts of plant is a source of physiological active compounds. Aristolochic acid-1 (AA-1), AA-1 methyl ester and piperonylic acid.

6. Tamil name: Iruveli
Botanical Name: Vetiveria zizanioides
Family: Poaceae

Morphological Description
The plant is densely tufted perennial grass. Rootstocks are branching with spongy aromatic roots. Leaf sheath compressed very smooth, firm. Ligules reduced to a scarious rim; panicle oblong; rachis stout and smooth.
Part used: Roots

Chemical Constituents
Volatile essential oil, salt of lime, colouring matter, resin, a free acid, oxide of iron and woody matters. Isobisabolene, khusol, khusinol, khusilal, khusinol oxide, isokhusimol, khusillrol,khusimene, khusenic acid, sokhusenic acid, khusimone, epicyclocopacampheno1 (C-I1epimer), vetiselinenol, zizanol, zizanene levojunenol, Epikhusinol. Recently in the year 2016, three sesquiterpenoids namely, Vetiverianines A, B, and C were isolated from its roots.[14] The roots also contain sesquiterpenoids, such as a-vetivone, ß-vetivone, and isovalencenol, and several flavonoids.[15]

7: Tamil name: Adhimadhuram
Botanical Name: Glycyrrhiza glabra
Family: Fabaceae

Morphological Description
It is a hardy herb or undershrub. Roots thick, having many branches with red or lemon-colour outside and yellowish or pale-yellow inside.

Part used: Roots
Chemical Constituents
Glycyrrhizin is the principal sweetening agent. Glycyrrhizic and glycyrrhetinic acid, liquiritin, glabrine, glabranine, glabrolide, licuraside, licochalcones A and B. Glycyrrhizin has a sweet taste 30-50 times the sweetness of sugar. The isoflavone glabrene and glabridin are phyto-oestrogens.

8: Tamil name: Elam
Botanical Name: Elettaria cardamomum
Family: Zingiberaceae

Morphological Description
An herb with thick, fleshy branched rhizome and several erect stems, going sometimes up to 3 m high. Fruits are about 1.5cm long, pale green to yellow, ovoid; 3-celled, many-seeded. Seeds are triangular brownish-black. Often, the fruits offered in market are bleached with sulphur fumes and made white.
Part used: Fruits

Chemical Constituents
The major components identified in the essential oil are cineole, linalool, terpinyl acetate, d-limonene, alpha-terpineol, alpha- and beta- pinenes, terpene-4-ol, geraniol, and geranyl acetate. In addition, linalylacetate, sabinene, methyl heptanone, myrcene and alpha-terpinene are also present.

9: Tamil name: Sandhanam
Botanical Name: Santalum album
Family: Santalaceae

Morphological Description
A small or medium-sized evergreen semi-parasitic tree, with slender branches, sometimes attaining a height of 18 m and girth of 2.4 m. Bark dark grey or nearly black or reddish, rough with deep vertical cracks on old trees. Sapwood unscented and whitish yellow to white but heartwood scented and light yellowish brown (when freshly cut) or dark brown, reddish brown (upon exposure and ageing).
Part used: Heart-wood

Chemical Constituents
Sandalwood oil contains α- santalol, santene, α and β-santalenes, α and β -santalic acid, santenol, teresantalic acid, teresantalol, isovaleraldehyde, santanone. Terpenoids, saponin, phenols and tannins.

Siddha Medicine Concepts About Constituents of VSK

Table I: describes the ingredients of Vishasura Kudineer with the taste of each drug, its five element perspective, parts used and actions of the drug.[16,17]

S. No	Name of the drug	Taste	Pancha bootham	Part used	Actions
1	Azadirachta indica (Vembu)	Bitter, mild astringent	Air + Space Earth+ Space	Stem bark	Anti-periodic Tonic Astringent Anthelmintic
2	Indigofera tinctoria (Neeli)	Bitter	Air + Space	Root	Germicide Antiperiodic Stimulant
3	Zingiber officinale (Chukku)	Acrid	Fire + Air	Rhizome	Stimulant stomachic carminative
4	Hemidesmus indicus (Nannari)	Sweet, mild bitter	Earth + Water Air + Space	Root	Alterative Tonic Demulcent Diuretic Diaphoretic
5	Aristolochia bracteata (Maeda moolam)	Bitter (nauseating)	Air + Space	Root	Anthelmintic Emmenagogue Stimulant Tonic Purgative Alterative Antiperiodic
6	Vetiveria zizanioides (Iruveli)	Sweet	Earth + Water	Root	Tonic Stimulant Antispasmodic Diaphoretic Diuretic Emmenagogue Febrifuge.
7	Glycyrrhiza glabra (Madhuram)	Sweet	Earth + Water	Root	Tonic Emollient Laxative Mild expectorant.
8	Elettaria cardamomum (Elam)	Acrid	Fire + Air	Fruit	Alexiteric Aromatic Acrid, Sweet Cooling Carminative Cardiotonic Digestive Diuretic Stimulant
9	Santalum album (Sandanam)	Bitter, mild astringent	Air + Space Earth + Space	Heart wood	Cooling Diaphoretic Diuretic Expectorant

Process of Preparation of Decoction

Kudineer Vidhi – Rule of decoction[18]

Siddha literature describes decoction for many diseases. It is used both internally and externally, internally advocated for fever, cough, phlegmatic affections and externally administered to wash wounds, gargling, vaginal and anal wash.

a) Quantity of water

The quantity of water to be used depends upon the weight of drugs of a particular formulation. It is a general rule to add water16 times the weight of raw drug.

b) Proportion of condensation[19]

The quantity of water used to prepare and to condense determines the efficacy and indication.

Table 2: Proportion of Condensation of Kudineer (Decoction).

S. No.	Proportion of condensation	Indication
1	1/2	To bath
2	1/3	To drink and bath
3	1/4	Internal usage For the preparation of medicated oil and ghee
4	1/5	Gargling
5	1/6	For instillation into eyes
6	1/7	For enema
7	1/8	For drinking For making medicated porridge For induction of purgation Application of decoction on the body to induce sweating
8	1/9	For face wash
9	1/12	External wash for wounds

Generally decoctions for internal administration are condensed to ¼ or 1/8th of the original quantity.

c) Methods

Decoction can be prepared by soaking the drugs in water for few hours or overnight in hot water or cold water. This is called 'ooral kiyazham'. Decoction from bark and woods are prepared in this way. Eg: Sandhana ooral kiyazham

The decoction can be prepared by boiling and reducing the water. This is called 'kodhi kiyazham'. Eg: Nilavembu kudineer, kaba sura kudineer

Decoctions can be prepared from animal products. Eg: Aamaiodu karukku kudineer

d) Shelf Life

The shelf life of kudineer is three hours (90 minutes).[3]

Ethnomedicinal Uses of The Drug[16,17]

1. Azadirachta indica

The plant is regarded as "village dispensary" in India. Because almost every part of the tree is bitter and has found application in indigenous medicine. 4-8 g of powdered stem-bark is useful in vomiting, dyspepsia, thirst, skin diseases. Useful in fever, convalescence after fever, indigestion, vata diseases, peptic ulcer, worm infestation.

A decoction of stem-bark shall be employed as prophylaxis against periodic fever and for the convalescence after fever. A decoction of root-bark was found to be efficient in malaria. Medicated oil prepared from its bark is indicated for bath, in treating vata diseases, head ache, nasal block, and ear diseases. Hundred years aged neem bark is useful in skin diseases. Anti-inflammatory against stomatitis in children.

2. Indigofera tinctoria

Decoction of the root is given in calculus. Juice of the young branches mixed with honey is used as application for aphthae of mouth in children. An infusion of root is given as an antidote for arsenic poisoning. Roots of Indigo plant is an universal antidote for many toxins. Root decoction is indicated in peptic ulcer, leucorrhoea, poisons. A combination of indigo leaves, root and asafoetida is pounded and taken internally for neurofibroma.

3. Zingiber officinale

Useful in diseases of the heart and throat, dyspepsia, inflammations, provocated humours, bronchitis, asthma, vomiting and aches. Dried ginger is generally given in digestive diseases, asthmatic complaints, vata diseases, fever and phlegmatic affections. A compound formulation called Chukku kudineer is being advised for Visha suram which can be correlated with viral fever.

4. Hemidesmus indicus

Root bark and root is indicated for anorexia, dyspepsia, fever, leucorrhoea, chronic rheumatism, scorpion sting, skin disease, urinary diseases and syphilitic ulcerations. Hot infusion with milk and sugar is given internally for chronic cough and diarrhoea in children. Roots are valuable remedy for constitutional debility and kidney troubles. Root powder with cow's milk is given in dysuria, urinary calculi, oliguria. Paste is applied to swellings and ulcers. The drug is indicated for pittha diseases, excessive thirst, nausea, vomiting, diabetes mellitus, fever. Root decoction relieves burning micturition. Root powder with milk is given in pittha diseases.

Aerial and underground parts of the plant can be fried in ghee and made as chutney with pepper, salt and little tamarind. This is a rejuvenative medicine indicated for diseases due to vitiated pittam like leucorrhoea, bad body odour.

5. Aristolochia bracteolata

Roots are ground into paste and given internally as antidote against snake-bite and other toxins. Root powder with warm water shall be given to induce labour pain. It is generally indicated for skin diseases, 80 types of vata diseases. Treatment of roundworms by causing their expulsion.

6. Vetiveria zizanioides

The drug is generally indicated for liver diseases, hypertension, thirst, fever, psychiatric diseases,diseases of head and neck, impotency, ulcer due to vitiated pittam.

7. Glycyrrhiza glabra

It is indicated for liver disorders, fever, phlegmatic affections, cough, head ache, eye diseases, psychiatric illness and diseases of bone and as antidote. The roots are given in respiratory troubles, jaundice, gastric and urinary troubles. This is generally advocated as powder or decoction.

8. Elettaria cardamomum

Siddha literature details the usage of cardamom for diseases of mouth, cheek, jaw, rectum, cough, fever, burning micturition, reduces vitiated pittam and increases semen. Beneficial in asthma, bronchitis, strangury, haemorrhoids, halitosis, dyspepsia, gastropathy and burning sensation. A poly herbal decoction containing cardamom, liquorice, sandal, sarasaparilla, khus khus root, dried ginger and other drugs is given for fever, milliaria rubra and to reduce body heat.

9. Santalum album

Siddha literatures reveal that sandal wood is helpful in fever, psychiatric diseases, itching and diseases due to vitiated pittam. Decoction of wood, mixed with dried ginger is beneficial in haemorrhoids. Paste of wood is useful in headache, fever, skin diseases to allay heat and pruritis. Sandalwood oil mixed with its double the quantity of mustard oil is a useful application for pimples on the nose. Decoction made from sandal wood is given in fever, indigestion, palpitation. This decoction increases sweating in fever and regulates pulse rate. The supernatant of solution prepared from its powder is given internally for severe leucorrhoea, dysentery, thirst and flatulence. The distillate of sandal wood has same property as that of decoction. It is applied externally for herpes, itching, tinea. Volatile compounds isolated from Santalum album have been used to treat common cold, bronchitis, fever and urinary tract infections.[20]

Pharmacological Evaluation of Drugs of Vishasura Kudineer

i) Stem bark of Azadirachta indica

Condensed tannins from the bark contain gallic acid, (+) gallocatechin, (–) epicatechin, (+) catechin and epigallocatechin, of which gallic acid, (–) epicatechin and catechin are primarily responsible for inhibiting the generation of chemiluminescence by activated human polymorphonuclear neutrophil (PMN)[21] indicating that these compounds inhibit oxidative burst of PMN during inflammation. Margolone, margolonone, isomargolonone isolated from neem stem bark are active against Klebsiella, Staphylococcus and Serratia species.[22]

The chloroform extract of stem bark is effective against carrageenan-induced paw oedema in rat and mouse ear inflammation.[23] An aqueous extract of stem bark has been shown to enhance the immune response of Balb-c mice to sheep red blood cells in vivo.[24] An aqueous extract of neem bark possess highly potent antiacid secretory and antiulcer activity and the bioactive compound has been attributed to a glycoside.[25]

Aqueous leaf extract offers antiviral activity against Vaccinia virus.[26] Chikungunya and measles virus in vitro.[27] In vitro antiviral activity of aqueous neem leaves extract assessed in $C_{6/36}$ (cloned cells of larvae of Aedes albopictus) cells employing virus inhibition assay showed inhibition in dose dependent manner. The pure neem i.e. Azadirachtin did not reveal any inhibition on Dengue virus type-2 replication in both in vitro and in vivo systems.[28]

Stem bark is antiviral against Herpes simplex virus type-1.[29] immune stimulant, anti-complement activity.[30]

ii) Indigofera tinctoria

Methanolic extract of whole plants of I. tinctoria (collected from India) were screened for activity as inhibitors of HIV-1 (III B) and HIV-2 (ROD) replication in MT-4 cells.[31]

Methanol extract of I.tinctoria exhibits antiproliferative effect on HCT 116 colon cancer cell line via apoptosis.[32]

iii) Zingiber officinale

Antirhinoviral Sesquiterpenes[33] was isolated from rhizomes. Fresh ginger has anti-viral activity against human respiratory syncytial virus in human respiratory tract cell lines.[6] Gingerol isolated from ginger a major pungent principle of ginger has potential anti-inflammatory, antioxidant, anticarcinogenic and antimutagenic effects[35a-c]. Evidence reveals that an inhibitory effect on DNA synthesis and causes apoptosis in human promyelocytic leukaemia (HL-60) cells.[36]

iv) Hemidesmus indicus

Antiviral activity was studied against Ranikhet virus[37] Antibacterial against Streptococcus mutans. Aqueous extract effective against Corynebacterium diphtheria, Diplococcus pneumonia, Staphylococcus aureus, Staphylococcus pyogenes and antiyeast activity was also studied[38,39] Helicobactericidal[40,41] glycosides from its roots inhibit S. typhimurium[42] anticancer[43] chemopreventive[44] antioxidant.[45]

v) Aristolochia bracteolata

Antibacterial against Moraxella catarrhalis.[46] Aqueous and ethanolic extract were found to exhibit anti-inflammatory and antipyretic activity[47] Aristolochic acid from the plant has antivenom activity against Russell's viper and cobra venom[48] The root extract has anti-angiogenesis activity and possess inhibitory effect on proliferation of melanoma cells[49] Dried root extracts showed a broad spectrum of antibacterial activity.[50]

vi) Vetiveria zizanioides

Vetiver oil, the volatile constituents of Vetiveria zizanioides obtained from the roots reported to exihibit antibacterial, antioxidant and antifungal activities.[51-54]

vii) Glycyrrhiza glabra

In vitro and in vivo studies of isoliquiritigenin, a flavonoid isolated from the roots of Glycyrrhiza glabra reported to have spasmolytic effect on uterine contraction and analgesic effect.[55] Glabridine, an active constituent of Glycyrrhiza glabra reported to possess resistant modifying activity against drug resistant mutants of candida albicans.[56]

A component of licorice root glycyrrhizic acid had antiviral activity inhibiting the growth and cytopathic effect of several DNA and RNA viruses, such as Vaccinia, herpes simplex type 1, Newcastle disease and vesicular stomatitis viruses in vitro and the drug did not affect the cell activity.[57] Glycyrrhizin inhibited the cytopathic effect and the virus-specific antigen expression in HIV-infected MT-4 cells.[58] Glycyrrhizin was tested in vitro for antiviral activities against flavi viruses like dengue, Japanese encephalitis, Yellow fever and mammalian tick-borne encephalitis.[59] influenza[60] and hepatitis A,B,C viruses.[61]

viii) Elettaria cardamomum

Anti-microbial activity of flavour components were studied.[62] The seeds have antiulcer.[63] antioxidant[64] and hepatoprotective[65] properties.

ix) Santalum album

Sandalwood oil, the essential oil of Santalum album L., was tested for in vitro antiviral activity against Herpes simplex viruses-1 and -2. It was found that the replication of these viruses was inhibited in the presence of the oil. This effect was dose-dependent and more pronounced against HSV-1. A slight diminution of the effect was observed at higher multiplicity of infections. The oil was not virucidal and showed no cytotoxicity at the concentrations tested[66]. β- santalol is studied against influenza virus.[67]

α– and β -santalols, volatile compounds isolated from Santalum album shown to have anti-inflammatory properties[68] and cause autophagy in proliferating keratinocytes.[69]

Table 3: Scientifically proven antiviral activity of constituents of VSK.

S. No.	Botanical name	Antiviral studies
1	Stem bark of Azadirachta indica	Antiviral against Herpes simplex virus type-1[29]
2	Indigofera tinctoria	Inhibitors of HIV-1 (III B) and HIV-2 (ROD) replication in MT-4 cells.[31]
3	Zingiber officinale	Antirhinoviral Sesquiterpenes[33] was isolated from rhizomes. Anti-viral activity against human respiratory syncytial virus in human respiratory tract cell lines.[34]
4	Hemidesmus indicus	Antiviral activity was studied against Ranikhet virus.[37]
5	Glycyrrhiza glabra	Antiviral against vaccinia, herpes simplex type 1, Newcastle disease and vesicular stomatitis viruses in vitro.[57] anti-HIV against MT-4 cells[58] dengue, Japanese encephalitis, yellow fever and mammalian tick-borne encephalitis[59] influenza[60] and hepatitis A,B,C viruses[61]
6	Santalum album	In vitro antiviral activity against Herpes simplex viruses-1 and 2[64] β- santalol is studied against influenza virus.[65]

CONCLUSION

Based on the above facts it is pertinent to note that, the polyherbal formulation,"Visha sura kudineer" one of the versatile drugs used in the Siddha system of medicine possesses excellent pharmacological properties with unreported adverse effects clinically. The review also highlighted the pharmacognostical, chemical constituent details of the drug and explained about the Siddha concept of herbal properties along with emphasis on the antiviral properties of various herbs used in this formulation.

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