



Pharmacological Actions of Contents of *Venpoosani nei* - A Siddha Formulation for Leucorrhoea

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ABSTRACT

Reproductive tract infections (RTIs) are one of the major illness women face all over the world while Leucorrhoea being the commonest among the women of reproductive age group. *Vellai Noi* (Leucorrhoea) is a condition of female genital tract characterized by excessive white discharge. *Venpoosani nei* is a polyherbal Siddha sasthanic preparation of 21 ingredients, which includes *Benincasa hispida*, *Cocosnucifera*, *Pandaons Odo rattissimus*, *Myristica fragrans*, *Aloevera*, *Terminalia bellarica*, *Quercus infectoria*, *King coconut*, *Coriandrum sativum*, *Hyocyanus niger*, *Terminalia chebula*, *Eletaria cardomomum*, *Cuminum cyminum*, *Phyllanthus cmblica*, *Piper cubeba*, *Saccharum officinarum*, *Rhus succedanea*, *Woodfordia fruticosa*, cows' milk and cow's ghee. The current literature review on *Venpoosani nei* documents the potential pharmacological effects of each ingredient in regard to the treatment of leucorrhoea. The present article sheds light on both Siddha aspect of humoral theory with special reference of alleviating *Pitham (Fire component among trihumours)* in *Vellai Noi*(Leucorrhoea) as well as the scientific facts on the potential multi-targeted action on each of its herbal ingredient.

Key words: Siddha, Pelvic inflammatory disease, White discharge, Traditional medicine, Herbal medicine, Women's health

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INTRODUCTION

Pelvic inflammatory disease (PID) and leucorrhoea are the most common

challenging conditions to the gynaecologists towards its management (1)(2) Leucorrhoea is characterized by excessive vaginal white



discharge associated with pruritus and irritation. The aetiology of leucorrhoea can be related with vaginal or inflammation in cervix, bacterial infections or infections caused by *Candida albicans* and *Trichomonas vaginalis*. It can also be caused due to cervical dysplasia, senile vaginitis, chronic cervicitis or malignancy.(3) The pathophysiology of the disease is not fully understood but explained as an ascending infection which is through sexual transmission. (4) The parallel spread can be because of diverticulitis and sometimes haematogenous spread which is followed by apoly-microbial stage immediately. (5) The overall incidence of RTIs including STIs is 33% with a total of 5 % in high socioeconomic groups and 70 % in low socioeconomic groups especially in rural areas.(6) The risk of infection depends on the age, use of contraceptives, sexual activity and life style.(6) Intra uterine contraceptive tool insertion, obstetric delivery, dilatation and curettage can also be the serious factors. Vaginal diseases that can cause leucorrhoea are often associated with symptoms of itching, constipation, pain in legs, anorexia, fever, increased erythrocyte sedimentation rate general weakness while cervical, uterine and pelvic diseases exhibit similar clinical manifestations like low backache and lower abdominal pain.(7)(6)

Venpoosani Nei is a traditional Siddha formulation utilized in the treatment of skin problems, dysuria, amoebiasis, lymphadenopathy and cervical cancer. Previous research work has been done to examine the clinical efficacy of Venpoosani Nei for infertility in females based on its indication in Siddha literature. (8) The current review on *Venpoosani nei* is the first of its kind to document the potential antimicrobial effects of each ingredient in regard to the treatment of leucorrhoea. (9)

Causes of leucorrhoea:

The most common physically contact microorganisms like *Trichomonas vaginalis*, *Chlamydia trachomatis*, *Neisseria*

gonorrhoeae are responsible for upper and lower female genital tract infection often associated with leucorrhoea. The physiological leucorrhoea is explained by the congestion of vaginal mucosa which occurs during ovulation and pregnancy. (10)

Vellai noi (Leucorrhoea) in Siddha

The Siddha system of medicine basically describes that the body of humans is made up of 96 *thathuvas*. It is said to function with three *uyir thathus* (3 humors), 7 *Udal Thathukal* (7 basic constituents), *Pancha boodhangal* (5 Basic elements), *arusuvaigal*-6 tastes.

Vellai noi (Leucorrhoea) is classified under “*Neer rogam*”. The aetiology, clinical features and types of *Vellai noi* are referenced in “*Yugi Chinthamaniand Magalir Maruthuvam*. Siddha system of medicine defines the physiological functions of the body being interceded by tri humors called *Vatham, Pitham, Kabam*. When a balance between these three humors is disturbed, disease is caused. Factors that disturb this equilibrium include climatic conditions, environment, diet, emotions and physical activities. *Agasthiyar gunvagadam Vellai noi* in Siddha literature is said to have symptoms of purulent white discharge and lower abdominal pain which can be compared to Leucorrhoea of modern medicine. ‘*Pagar pittha vinthaiyallathu megam varathu*’. (11) Alteration of *pitham* causes mega diseases affecting *Abanan* (an expulsive component of *vatha Humour*), *Viyanan* (Circulatory component) and *Devadhathan* (a component of *vatha*). Changes in *Abanan* *vayu* (propulsive force) aggravates the *theyu pootham* (fire components) and causes dysuria, aches and pains in the low back lower stomach area, constipation, and vaginal discharge. Changes in *viyanan* and *devadhathan* (components of *vadham*) modifies *akaya pootham* (*Space component of five element theory*) resulting in symptoms of itching in vulvar region, fatigue, mental stress, emaciation, loss of appetite and sleep disturbances (12)

Table1: Bioactivities of phytochemical constituents in ingredients of VP Nei

Bioactivities of phytochemical constituents in ingredients of VP Nei					
S.No	Ingredients	Consistuent	Class	Bioactivity	Ref



1.	<i>Benincasa Hispida</i>	Alnusenol, Multiflorenol, Isovitexin, lupeol, Beta sitosterol	Flavanoids Alkaloid Phytosteroids	Diuretic, Antilithiatic, Uterine tonic	Cardiotonic, Anti-epileptic,	(12)
2.	<i>Pandaons Odo rattissimus</i>	Lignans Coumestrol Phenolic Compounds	Isoflavones Coumestans <i>Polyphenols</i>	Antiarthritic, Anti Spasmodic, Antiinfective, Cardiotonic, Antioxidant,	Antiulcer,	(13)
3.	<i>Cocosnucifera</i>	Tannins Leucoanthocyanidin Triterpenes	<i>Polyphenols</i> Flavanoids Squalene Group	Antioxidant Antihelminthic, Anti-Inflammatory, Antitumor Activities		(14– 16) ,(17)
4.	<i>King Coconut</i>					
5.	<i>Aloevera</i>	Anthraquinones Lignans, Licylic Acid, Saponins Anthracene, Emodin	<i>Polyphenols</i> Glycoside Compounds Polyphenols	Antioxidant, Anti- Inflammatory, Hepatoprotective Effect Cancer Prevention, Antiulcer Effect		(18), (19) (20,21)
6.	<i>Myristica fragrans</i>	Limonene, Sabinene, A- Pinene, B-Pinene, Myristicin, Safrol	Terpenes, Phenylpropene, Benzodioxoles	Nervine, Diuretic, Diaphoretic, Hypolipidemic, Hepatoprotective		(22- 24)
7.	<i>Quercus infectoria</i>	Triterpenes, Tannins, Saponins	Phenols, Flavonoids, Phytosteroids,	Antiviral, antibacterial, Antidiabetic, Larvicidal, Antiulcerogenic, Gastroprotective Activitiesmenorrhagia, anti- inflammatory,		(25- 27)
8.	<i>Terminalia chebula</i>	Terpenes, Anthocyanins, Triterpenoids, Coumarin Chebulin	Polyphenols, Flavonoids, Alkaloids, Glycosides, Gallic Acids	Antidiabetic, Hepatoprotective , antioxidant, Cardioprotective.		(28)
9.	<i>Phyllanthus emblica</i>	Tannins, Phyllembelic Acid, Phyllembelin, Rutin, Curcuminoids	<i>Phyllaemblic Comp</i> ounds, <i>Polyphenols</i>	Antidiabetic, Hypolipidemic, Antioxidant, Hepatoprotective,		(29- 33)
10.	<i>Terminallia bellarica</i>	Tannins, Ethyl Gallate, glucoside Chebulinic Acid, gallic acid.	<i>Polyphenols</i> , Galloyl Esters	Antidiarrheal, Anticancer, Antihypertensive, Hepatoprotective, antioxidant.		(34- 38)
11.	<i>Cuminum cyminum</i>	Protein, Anthraquinone, Flavonoid, coumarin, Protein, Resin, Saponin, Tannin,	Alkaloid Phytosteroid	Insecticidal, Analgesic, Antimicrobial, Inflammatory, Antioxidant	Anti-	(39- 41)



		glycoside.			
12.	<i>Eletaria cardomomum</i>	Terpenoids Carotenoids Quercetin, Kaempferol And	Flavonoids, Phenol Compounds	Antidiabetic, Antibacterial, Anticancer, Cardioprotective Immune Stimulant	(42 – 45)
13.	<i>Piper cubeba</i>	Essential Oils and Lignans Specially Cubebin Andhinokinin	Polyphenolic Compounds, Alkaloids	Nephroprotective, Hepatoprotective, Antidiabetic Antioxidant Activity	(46)
14.	<i>Woodfordia fruticosa</i>	Flavonoids Alkaloids, Phenols, Tannins	Flavonoids, Phenol Compounds, Alkaloids	Antidiabetic, Antidepressant. Fever, Hemoptysis, Rheumatism, Disinfectant	(47 – 49)
15.	<i>Rhus succedanea</i>	Flavonoids, Catechins, Saponins, Tannins	<i>Polyphenols</i> Flavanoids	Astringent, Antiviral, Tonic, Expectorant, Stimulant Properties	(50– 52)
16.	<i>Coriandrum sativum</i>	Petroselinic Acid, Linalool	Lipids, Essential Oil	Anti-Dyslipidemic, Diuretic, Anti-Microbial, Anti-Diabetic, Anxiolytic, Anti-Inflammatory, , Anti-Hypertensive, Anti- Oxidant Neuro-Protective.	(53)
17.	<i>Hyocyamus niger</i>	Cleomiscosin A Liganamides, Grossamide, Cannabisin G, Cannabisin D Scopolamine, Hyoscyamine, Atropine, Tropane	Coumarinolignoids Lignin Alkaloid	Anti Inflammatory, Bronchodilating, Anti Cytotoxic Effect Anti-Diarrheal	(54- 56)
18.	<i>Saccharum officinarum</i>	Phenolic Acids, Higher Terpenoids, -O- And -C- Glycosides, Phytosterols.	Alcohol, Esters, Flavonoids, Fatty Acid, <i>Polyphenols</i>	Jaundice, Antihypercholesterolemic Effect, Antihyperglycemic Activity, Antihepatotoxic Activity, Antithrombotic Activity, Dysuria, Anuria, Other Urinary Diseases	(57- 59)

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Pharmacology of ingredients related to Antifungal and Anti-bacterial studies				
S. No	Botanical name	Antifungal studies	Anti-bacterial studies	Reference
1	<i>Benincasa hispida</i>	+	-	(60,61)
2.	<i>Pandaons odorattissimus</i>	+	-	(60)
3.	<i>Cocos nucifera</i>	+	+	(61,62)
4.	<i>Aloe vera</i>	+	+	(63,64)



5.	<i>King coconut</i>	+	+	(65,66)
6.	<i>Myristica fragrans</i>	+	+	(67,68)
7.	<i>Quercus infectoria</i>	+	+	(69, 70)
8.	<i>Terminalia chebula</i>	+	+	(71,72)
9.	<i>Phyllathus emblica</i>	+	+	(73)(,)
10.	<i>Terminallia bellarica</i>	-	+	(75)
11.	<i>Cuminum cyminum</i>	+	+	(76, 77)
12.	<i>Eletaria cardomomum</i>	-	+	(78)
13.	<i>Piper cubeba</i>	+	+	(79, 80)
14.	<i>Woodfordia fruticosa</i>	+	+	(81)(,)
15.	<i>Rhus succedanea</i>	-	+	(83)
16.	<i>Coriandrum sativum</i>	+	+	(84,85)
17.	<i>Hyocyamus niger</i>	+	+	(86, 87)
18.	<i>Saccharum officinarum</i>	-	+	(88)

Table-2. Pharmacological studies on the ingredients of *Venpoosani*

1. Kalyana poosani (*Benincasa Hispida*)

Kalyana poosani also called *Kushmanda* (Sanskrit), *Kalyana poosani* (Tamil), white gourd melon (English). Native from Japan and Java, cultivated in warm countries including India. The plant parts were medicinally used to treat various conditions such as gastrointestinal problems, respiratory diseases, urinary diseases, heart diseases and diabetes mellitus. In tradition fruits were used as a cardiotoxic, diuretic, epilepsy, schizophrenia, psychologic disorders tonic, laxative, aphrodisiac, urinary calculi, jaundice, dyspepsia, fever and menstrual disorders. The higher chemical substance constituents of *Benincasa hispida* fruits are volatile oils, proteins, vitamins, minerals, flavonoids, glycosides, saccharides, β -sitosterin, uronic acid and carotenes. Chemical analysis showed that the main sugars in the *Benincasa hispida* peels were galactose, glucose, xylose and sorbose.

Based on the literature the plant as a whole exhibit pharmacological activity like antioxidant, antidepressant, anti-inflammatory, anti-asthmatic, anxiolytic, analgesic, diuretic, antimicrobial, antidiabetic, nephroprotective and central nervous effects. It has been tested to have antibacterial action especially against few bacteria (*Bacillus subtilis*, *Micrococcus luteus*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*,

Escherichia coli and *Pasteurella multocida*). (89)(90)

Clinical studies have revealed that extracts of *Benincasa hispida* show antimicrobial, antioxidant and free radical scavenging activity. The methanolic extract of *Benincasa hispida* is also proven to have antifungal actions against *Aspergillus Niger* and *Candida albicans*. (91,92)

2. Thazhai (*Pandaons Odorattissimus*)

Pandaons Odorattissimus which is also called *ketaki*, *Dhuli puspika* (Sanskrit), Fragrant screw (English), *Thazhai* (Tamil) is distributed widely along the Indo-Malayan coasts of India and Sri Lanka, Malaysian islands, Ryukyu Islands and Australia. (93,94)

Studies have shown that extracts of *Pandanus odorattissimus* contain anti-inflammatory, antioxidant, antispasmodic, analgesic, diuretic properties and is also tested to regulate fertility in rats. (95-98)

The alkaloids and flavonoids present in the leaf extracts of *Pandanus odorattissimus* have shown antibacterial and antifungal action against *Candida albicans*. (95-98)

3. Thennambo (*Cocos nucifera*)

Cocos nucifera commonly known as *Tranaraj* (sanskrit), coconut palm (English), The origin of *Tengu* (Tamil) from southeast Asia and the islands between Pacific Ocean and India. (99-100)

The major chemical constituents present are tocopherol, alcohol palmitoleyl, cycloartenol,



and β -sitosterol and alkaloids. It has shown a good antibacterial action against various gram negative and positive organisms. The antifungal effect of *Coccus nucifera* is also proved against *Candida albicans* with fluconazole as a reference drug and against *Aspergillus fumigates* with reference to ketoconazole. (101,102) The endocarp of *Coccus nucifera* and its oil extracts were also known to have antioxidant and antimicrobial effects. The results of these studies were consistent with the previous about the antibacterial and antifungal effects of *Coccus nucifera*. (103)

4. Kattrazhai (Aloe vera)

The *Aloe vera* pulp is studied to have the following chemical constituents; cholesterol, Campesterol, β -Sitosterol, lupeol, anthracene, auxins, gibberellins barbaloin, anthranol, anthraquinones, emodin, aloetic acid, ethereal oil, aloin, chrysophanic acid, ester of cinnamic acid, resistannol and isobarbaloin along with 6 antiseptic compounds like salicylic acid, lupeol, urea nitrogen, phenols and sulphur.

Aloe vera juice is observed to have anti-inflammatory action by inhibiting the cyclooxygenase pathway immunomodulatory effects, antiseptic, analgesic, wound healing, increases the collagen, oestrogen level which helps in contraction of pelvic floor muscle and effective in treating leucorrhoea. (104,105)

The presence of anthraquinones, lectin, emodin are the ground components in inhibiting the growth of Cytomegalovirus, virucidal action against pseudorabies virus, influenza, varicella zoster and herpes simplex viruses. It is also effective against several fungi, bacteria and viruses. *Aloe vera* juice has a broad-spectrum antibacterial action and effective inhibition against *Streptococcus faecalis*, *Streptococcus pyogenes*, *Pseudomonas aeruginosa* and against *Candida albicans*.(106)

5. Sevvilaneer (King Coconut)

The phytochemical compounds like tannins, saponins, sterols, monoglycerides and free fatty acids present in coconut extract oil exhibit analgesic, anti-inflammatory, antiparasitic, antibacterial, antiviral

properties, antifungal. It helps in treating abdominal pain, swellings, wound healing, symptoms of rheumatism and Alzheimer disease. It contains high oestrogen levels and used in delaying the menstrual cycle. (107)Inorganic ions and electrolytes are required for ordinary cellular function, enzyme activation, metabolism of amino acids, haemoglobin function, bone formation, gene expression, metabolism of carbohydrates and lipids.(108)

Bhavana Panjankula Thailam, which has coconut water in it is given to pregnant ladies in Government hospitals (*Amma magapperu sanjeevi kit*), Tamil Nadu, India for treating constipation during pregnancy, uterine pain and to induce normal delivery. It has specific proven antimicrobial action against *Candida fungus*, *Acetobacter aceti*, *E. coli*, *Staphylococcus* infections. It also helps to enhance the immune system. (109-111)

6.Jathikai, Jathipathri (Myristica fragrans)

Myristica fragrans also known as Jati phalam (Sanskrit), buah pala (Malay), *Jadikkay* (Tamil) and Nutmeg (English) belongs to the class Myristicaceae highly cultivated in Malaysia and Penang Island for spices.(112) The major phytochemicals present in *Myristica fragrans* are oleic acid, elemicin, eugenol, myristicin, beta pinene, myristic acid, safrole, palmitic acid, resorcinols, malabaricone C and malabaricone B are responsible for exhibiting analgesic, anti-convulsant, antifungal, antiviral, antimicrobial, anti-inflammatory and antioxidant properties.(113).

Clinical studies have shown that the methanolic and ethanolic extracts of seed and mace of nutmeg has a long-acting anti-inflammatory action, potential inhibition of oral pathogens, a broad-spectrum antibacterial action specifically against organisms like *Pseudomonas aeruginosa*, *Salmonella typhi*, *E. coli* *Vibrio* species and *Staphylococcus aureus*. It has shown strong potency against oral pathogens and against both gram-negative cariogenic and gram-positive bacteria which has approved its broad-spectrum antibacterial action. (114,115)

It is also found to be effective as an antifungal agent in inhibiting *Aspergillus Niger*, *Candida*



albicans and against *Helicobacter pylori* when compared with the minimum inhibitory concentration of clarithromycin.(116)

7.Maasikai (*Quercus infectoria*)

Quercus infectoria also called *masikai* in tamil is a small size tree nativity from Greece widely spread through Iran and Asia belonging to the *Fagaceae Family*. It is a medicinal plant of old and has been traditionally utilized in the treatment of eczema, impetigo, intertrigo, haemorrhages, chronic diarrhoea and dysentery. It also possesses antifungal, antibacterial, antioxidant and anti-inflammatory properties.

The major phytochemicals in *Quercus Infectoria* were found to be phenols, saponin, flavonoids and tannin. Recent studies have found that methanolic and aqueous extracts of *Quercus infectoria* are highly effective against the growth of yeasts even at minimum concentration especially against candida species. They are also known to have a broad spectrum of antibacterial action. It is effective in inhibiting *Bacillus aereus* and *Staphylococcus aureus* at a minimum inhibitory concentration value.(117)

The antibacterial action of both Q. ethanol gall extracts and *infectoria* aqueous against each confine of multi drug resistant (MDR) micro-organisms were classified (Table 1). (118)

8.Kadukkai (*Terminalia chebula*)

Terminalia chebula also called *kadukkai* is a medicinal plant that has been used in Siddha, Ayurveda, Homeopathic and Unani systems of medicine over the years. Researchers have found over 14 components of hydrolysable tannins and phenols, terchebulin, chebulinic acid, gallic acid, neochebulinic acid, casuarinin, chebulanin, punicalagin, corilagin, ellagic acid, chebulagic acid and anthroquinones from the *Terminalia chebula* fruit. It exhibits several pharmacological activities such as antimicrobial, antiarthritic, antioxidant, anti-inflammatory antidiabetic, anticaries, gastrointestinal motility, wound healing activity, cardioprotective, hepatoprotective, antimutagenic, antiproliferative and radioprotective activities.

Studies have shown that *T.chebula* as a potent antifungal agent active against dermatophytes and *Candida albicans* like *Floccosum*, *Epidermophyton*, *Trichophyton rubrum* and *Microsporum gypseum*. It is also found to have broad spectrum antibacterial activity especially against *Escherichia Coli*, *Clostridium*, *Perfringens*, *Bacillus Subtilis*, *Pseudomonas Aeruginosa*, *Staphylococcus Epidermis*, *Staphylococcus Aureus*, *Staphylococcus Flexinera*. (119,120)

The antiviral effect of fruit extracts of *T. chebula* is proven against four immunodeficiency virus type 1 (HIV-1) integrase inhibitors, human cytomegalovirus (CMV), cytomegalovirus, three galloyl glucoses (II-IV), and potato virus and is traditionally used in the treatment of acute respiratory infections and as a prophylaxis in immunocompromised patients. (121)

9. Nellikai (*Phyllanthus emblica*)

Phyllanthus emblica L or *Embllica officinalis* belongs to the Euphorbiaceae family commonly called 'Amla' or 'Indian gooseberry' or 'Amla'. The *Phyllanthus emblica* fruit is said to have enormous nutraceuticals like calcium, vitamin-C, phosphorus, nicotinic acid, lysine, minerals, methionine, riboflavin, tryptophan and certain chemical constituents like alkaloids, D-xylosyl, D-galacturonic acid, D-arabinosyl, D-galactosyl, D-glucosyl, D-mannosyl, D-rhamnosyl, emblicanin A, emblicanin B, ellagitannins, flavonoids and gallic acid. It is used in the ancient Ayurveda system of medicine for its immune boosting effects. It is traditionally used to treat conditions like inflammation, hypertension, dyslipidaemia, chronic periodontitis, hyperacidity, dental caries, skin diseases, cancer, Type 2 diabetes, bacterial infections, obesity, osteoporosis, pulmonary TB, few fungal infections and certain neurological disorders.(121)

The antibacterial effect of the fruit extracts was determined when tested against ten pathogens both gram negative and gram-positive bacteria. The ethanolic and acetone fruit extracts of *Phyllanthus emblica* when compared with the standard drug amoxicillin showed efficacy against *Salmonella typhi*,



Bacillus subtilis, *Shigella dysenteriae*, *Staphylococcus aureus*, *Bacillus megaterium* and *Vibrio cholera*. It is reported that both extracts showed antifungal activity only against *Fusarium equiseti* and *Candida albicans* when compared to the standard drug Grisofulvin.(122)

10. Thandrikai (*Terminalia bellarica*)

Terminalia bellarica also called *Thandrikai* belongs to the family Combretaceae studied to have bioactive components like gallic acid, glucoside, tannins, corilagin, ellagic acid, glucoside, tannins, chebulagic acid, glucoside, tannins, and arjunolic acid. It possesses various pharmacological activities including antiulcer, antihypertensive, anti-hyperlipidemic, antioxidant, anti-inflammatory, antibacterial, immunomodulator, antifungal, hepatoprotective, Reno protective, antidiabetic and anticancer activities. The dried ripe fruit and fruit extracts have been traditionally used to treat conditions like cough, diarrhoea, hoarseness of voice, dropsy, haemorrhoids, scorpion-sting, eye diseases and also used as a hair tonic. (123)

Clinical studies conducted have shown that methanol and aqueous fruit extracts of *T. bellarica* that have antibacterial action against *Salmonella typhimurium*, *Salmonella enterica* serovar Typhi, *Escherichia coli*, *Yersinia enterocolitica*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*. It is studied to be effective in treating urinary tract infections. It is also observed to be effective against the drug resistant strains of *Acinetobacter* spp, *E. coli*, *staphylococcus aureus* and *pseudomonas aeruginosa*. The extract of *T. bellarica* fruit is effective as a free radical scavenger and its antifungal effects were also studied against *Candida tropicalis* and *Candida albicans* spp. (124)

11. Seeragam (*Cuminum cyminum*)

Cuminum cyminum commonly called cumin, *seeragam*, *zeera*, *comino*, *kamun*, *cumino*, *zirech-e sabz*, *kemon* in various parts of the world. It is an aromatic herb belongs to the family Apicaceae widely cultivated in Egypt, India, Iran and the Mediterranean. The major phytochemicals present are α -terpinen-7-al, cuminal, β -terpinene, β -pinene, p-cymene, β -

terpinen-7-al and β -terpinen-7-al which covers over 95% of the total active ingredient. It is also a rich source of iron and traditionally used since long to treat symptoms of diarrhoea, digestive disorders, flatulence, vomiting, fever, nausea, aches, inflammation, worm infestation and skin diseases. (125,126) The antimicrobial effect of cumin oil is tested against 12 bacteria and 4 yeast species. It is found to be effective against multi-drug safe strains of methicillin safe *staphylococcus aureus*. It exhibits a dose dependent inhibitory action against these strains. The inhibitory concentration of yeast varies depending on the origin of the oil, type of strains tested. Studies have shown a powerful antifungal action against *saccharomyces cerevisiae* and *Candida albicans*. (127,128)

12. Ellam (*Elettaria cardamom*)

Elettaria cardamomum commonly called ellam, small cardamom or green cardamom true cardamom and widely grown in the regions of South part of India, Mexico, Sri Lanka, Nepal, Costa Rica, Guatemala, Tanzania, and Indonesia. The phytochemicals present in *elettaria cardamomum* are carbohydrates, phenols, lipids, proteins, minerals, flavonoids, terpenoids, carotenoids, alkaloids, anthocyanins, essential oils, α -terpineol, 1,8-cineole, nerolidol, linalyl acetate, α -pinene, linalool and an ester constituent α -terpinyl acetate. (129).

It is highly used in ancient traditional medicine and one of the ingredients of certain polyherbal formulations prescribed for the treatment of dementia, sore throat, anxiety, insomnia. Literature shows it exhibited an anticonvulsant activity and CNS depressant in mice. It is also proved to have antibacterial, antifungal, antioxidant and also acts as a permeation enhancer for certain topical drugs. It has also been effective against inhibiting the growth of oral microbes. (130) antimicrobial activity of cardamom extracts was showed to be very much effective against *Staphylococcus aureus*, *Bacillus cereus*, *Escherichia coli* *Streptococci mutans*, *Salmonella typhi* and the most resistant strains of *Staphylococcus aureus* and *Proteus mirabilis*. It has shown an inhibitory



antifungal effect against *Aspergillus terreus* and *Candida albicans*. (131)

13. *Vaalmilagu (Piper cubeba)*

Pipercubeba also called Tailed pepper or Java pepper originates from Borneo and Java cultivated for its essential oils and berries. The phytochemical studies reveal the existence of Sabinene, α -copaene, β -caryophyllene, terpinen-4-ol, γ -elemene, cubebol and β – elemene. The pharmacological activities include antimicrobial, antioxidant, antiparasitic, antibacterial, anti-inflammatory and antifungal. It is widely and traditionally used in the treatment of dysentery, diarrhoea, abdominal pain, enteritis, gonorrhoea, syphilis and a condition like asthma. (18)

One study has revealed the effect of antimicrobial of the crude ethanol *P* extract. *cubeba* against *Enterococcus faecalis*, *Streptococcus salivarius* and *Streptococcus mitis*, *Fusobacterium nucleatum*, *Bacteroides fragilis*, *Prevotella nigrescens*, *Actinomyces naeslundii* and *Porphyromonas gingivalis*. It is proved to have bacteriostatic, fungistatic and fungicidal activity and it is also highly potent against *Candida albicans*. (132, 133)

14. *Kattathi poo (Woodfordia fruticosa)*

Woodfordia fruticosa also called *Kattathi poo* is widely cultivated throughout all parts in India and many other countries of South and far East Asia like Sri Lanka, Malaysia, China, Indonesia, Japan, Pakistan and tropical Africa. The phytochemicals present in the dried flowers of *Woodfordia* include amino acids, flavonoids, saponins, alkaloids, glycosides, polyphenols, resins, phytosterols, carbohydrates, proteins, fixed oils, gums and mucilage.

These flowers are traditionally used since long to treat blood disorders, leprosy, leucorrhea, menorrhagia, dysentery, toothache and fevers. In Charaka and Sushruta the sweetened decoction of flowers is used to treat fever, persistent dysentery, and haemothermia.

The Powder of dried flowers is mixed with honey and given orally to treat leucorrhoea. Also, the powder is dusted all over the ulcers and injuries to reduce wound discharge and to promote granulation. It is also used as an

astrigent tonic in liver disorders, haemorrhoids and also considered a safe stimulant in pregnancy. (134)

The antibacterial effect of methanol extracts of the flower was exhibited against *Micrococcus flavus* and *Bacillus subtilis*, *Pseudomonas pseudoalcaligenes* when compared with ciprofloxacin and amoxicillin as standard antibiotics. It was likewise seen that the extract was more dynamic and active against Gram-negative bacteria than Gram-positive bacteria. The potent antifungal effects of *Woodfordia fruticosa* were reported especially against *Cryptococcus neoformans* fungal strains and *Candida albicans*. (135)

15. *karkadaga singi (Rhus succedanea)*

Rhus succedanea is a flowering plant also the wax tree, is widely distributed in various parts of Asia. The major phytochemicals present in the plant are tannins, alkaloids, flavonoids, phenols, urushiol, 3,7,4'-trihydroxyflavone, rhoifolin, fustin, shikimic acid, corilagin, garbanzo fisetin, -7-glucoside, gallic acid and ellagic acid. Various pharmacological properties were studied on *Rhus succedanea* and it has been found to have antifungal anti-leucorrheal, antibacterial, antiviral, anti-inflammatory exhibits action on uterus and immune system stimulating properties. (136)

It is a potent antipyretic agent used to treat fever and it also helps in maintain a good reproductive health in females by removing the impurities, debris after menstruation and helps in healing uterine lining. (137) The methanolic extracts of *Rhus succedanea* is more effective against gram-negative bacteria when compared to gram-positive bacteria especially *Escherichia coli*. It is almost equally efficient in its antibacterial activity when compared to ciprofloxacin. (83)

16. *Kothamalli vidhai (Coriandrum sativum)*

Coriandrum sativum also commonly called coriander has various types of pharmacological properties like analgesic, hepatoprotective, anti-bacterial, anti-inflammatory, antifungal and antidiabetic properties. It contains flavonoids, aliphatic (2E)-alkenals, 2-decenoic acid, capric acid, E-11- tetradecenoic acid, geranyl acetate and linalool which are responsible for its pharmacological activities and broad-



spectrum action highly against *Salmonella typhimurium*, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Escherichia coli*, *Pseudomonas aeruginosa* against multidrug resistant strains of *Acinetobacter baumannii*.(138)

The Essential Oil of *Coriandrum sativum* leaves has a strong antifungal, antiadherent activity, anti-leucorrhoea activity and anti-proteolytic activity against *Candida albicans* which helps to treat various fungal infections. (139)

The nutritional and medicinal properties present in coriander makes it efficient in treating stomach disorders, cold, nausea, rheumatism and joint pains. The presence of linalool, terpenes and linalyl acetate gives the anti-inflammatory action to it. (140,141)

17. Crosani omam (Hyoscyamus niger)

Hyoscyamus niger also known as Henbane belongs to the Solanaceae family and is widely distributed in Europe and Asia. The major chemical constituents are alkaloids atropine, hyoscyamine, scopolamine which are highly toxic

tropane alkaloids. It is used traditionally as sedative, pain killer, also in relieving tremor and rigidity. It is used as preoperative medication, in treatment of asthma, whooping cough, paralysis. It is hallucinogenic and a hypnotic narcotic. It also contains antispasmodic, antifungal activity: antibacterial activity, anti-inflammatory activity and anti-leucorrhoea activity. The seeds and seed extracts are used to treat abdominal pain, serve as a mild laxative, increases the muscle tone to reduce women's

menstrual cramps and to tone and condition the uterus muscle before delivery. (144,145)

The presence of Thymol gives the antibacterial effect against bacteria like *Escherichia coli* and *Pseudomonas aeruginosa*. It has both bacteriostatic and bactericidal properties. The ethanolic and acetone extracts of *Crosani oman* was found to have potential inhibition also against *Salmonella typhi*, *Salmonella typhimurium*, *Shigella flexneri*, *Staphylococcus aureus*, *Enterococcus faecalis* and *Klebsiella Pneumonia*. The essential oil extracts were found to be effective against fungi *Aspergillus*, *Chrysosporium*, *Candidaspecies* and *Trichophyton* species. (146)

18. Seenikarkandu (Saccharum officinarum)

Saccharum officinarum also called Sugarcane is a very important perennial grass belongs to the family of Poaceae native to tropical South and Southeast Asia. It is distributed worldwide due to its medicinal and economic benefits. It possesses antimicrobial, antioxidant, antihyperglycemic, antihepatotoxic, diuretic, antithrombotic, radical scavenging activity with the presence of phytochemicals mainly apigenin and luteolin (flavonoids), hydroxycinnamic, and luteolin-8-C. It is used in the treatment of haemorrhage, dysuria, anuria, jaundice and other urinary infections. (147)Studies have been revealed that it shows potent inhibitory effects on the gram-negative bacteria *Escherichia coli* and *Pseudomonas aeruginosa* and mild effect on Gram positive bacterium *Staphylococcus aureus*. The inhibitory effect against *Pseudomonas aeruginosa* has been dose through whereas it is viceversa against *Escherichia coli*. (148)

Table 3. Siddha humoural action of the ingredients of Venpoosani Nei

S.No	Botanical Name	Part used	Taste	Potency	Division	Action on Trihumours (Pacify Pitham, Vatham, Kabam)
1.	<i>Benincasa hispida</i>	Fruit Juice	Innipu	Thatpam	Innipu	Pitham
2.	<i>Pandaon Odorattissimus</i>	Top root extract	Thuvarppu	Thatpam	Innipu	Pitham
3.	<i>Cocos nucifera</i>	Buds juice	Thuvarppu	Thadpam	Innipu	Pitham



4.	<i>Aloe vera</i>	Pulp of Aloe	<i>Siru Kaippu</i>	<i>Thatpam</i>	<i>Innipu</i>	<i>Pittham</i>
5.	<i>Cocus nucifera</i>	Tender coconut water	<i>Innipu</i>	<i>Thatpam</i>	<i>Innipu</i>	<i>Pitham</i>
6.	<i>Myristica fragrans</i>	Fruit	<i>Thuvarppu</i>	<i>Veppam</i>	<i>Karppu</i>	<i>Pitham</i>
7.	<i>Qercus infectoria</i>	Fruit	<i>Thuvarppu</i>	<i>Thattpam</i>	<i>Kaarppu</i>	<i>Pitham</i>
8.	<i>Terminalia chebula</i>	Fruit	<i>Thuvarppu, Inippu, Pullipu, Kaipu, Karrpu</i>	<i>Veepam</i>	<i>Innipu</i>	Pacify All the Three Humours
9.	<i>Phyllathus emblica</i>	Fruit	<i>Pullipu, Thuvarpu,</i>	<i>Thatpam</i>	<i>Innipu</i>	<i>Pitham</i>
10.	<i>Terminallia bellarica</i>	Fruit	<i>Thuvarpu</i>	<i>Veppam</i>	<i>Innipu</i>	<i>Pitham</i>
11.	<i>Cuminum cyminum</i>	Seed	<i>Thuvarppu, Inippu</i>	<i>Thatppam</i>	<i>Innipu</i>	<i>Pitham</i>
12.	<i>Eletaria cardomomum</i>	Seed	<i>Kaarppu</i>	<i>Veppam</i>	<i>Kaarppu</i>	<i>Kabam</i>
13.	<i>Piper cubeba</i>	Raw fruit	<i>Kaarppu</i>	<i>Veppam</i>	<i>Kaarppu</i>	<i>Kabam</i>
14.	<i>Woodfordia fruticosa</i>	Flower	<i>Kaarppu, Bitter</i>	<i>Veppam</i>	<i>Kaarppu</i>	<i>Kabam</i>
15.	<i>Rhus succedanea</i>	Gall	<i>Thuvarppu</i>	<i>Veppam</i>	<i>Kaarppu</i>	<i>Pitham</i>
16.	<i>Coriandrum sativum</i>	Seed	<i>Kaarppu,</i>	<i>Seedha Veppam</i>	<i>Karppu</i>	<i>Kabam</i>
17.	<i>Hyocyanusniger</i>	Seed	<i>Karppu Siru Kaippu</i>	<i>Veppam</i>	<i>Kaarppu</i>	<i>Kabam</i>
18.	<i>Saccharum officinarum</i>	Sugar	<i>Innipu</i>	<i>Thatpam</i>	<i>Innipu</i>	<i>Pitham</i>
19	Cow's ghee		<i>Innipu</i>	<i>Thatpam</i>	<i>Innipu</i>	<i>Pitham, Vatham</i>
20	Cows' milk		<i>Innipu</i>	<i>Thatpam</i>	<i>Innipu</i>	<i>Pitham</i>

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*Tastes :Inippu- Sweet, Pulippu-Sour, Karppu- Pungent, Kaippu- Bitter, Thuvarppu - Astringent, Uppu- Salty, Thatpam-cold potency, Veppam -Hot potency

The Siddha medicine formulations help in the management of symptoms as well as provide additional support to the female reproductive system. It has also come up with treatment strategies which promote the reproductive health of non-infectious healthy women without causing any untoward adverse effects without any complications. Since the root cause of *Vellai Noi* is *Pitham*, medication that

alleviates *Pitham* can be a boon to tackle this disorder as per line of treatment in Siddha. Hence the above Table 3. explores the Siddha concept of pharmacological action and Table-2 explains the scientific analysis of the ingredients.

Therefore, all ingredients have been analysed to have a multimodal action against most of the common urogenital pathogens along with



antispasmodic, antifungal action: antibacterial activity, anti-inflammatory activity and anti-leucorrhoea activity. The ingredients also have proven hepatoprotective and nephroprotective effects which confirm its safety even for a long term usage as indicated in (Table-2). Moreover, all the ingredients have been evaluated in the light of Siddha materia medica for its taste, potency and action on humours. *Pitham* which is considered to be the root cause of the origin of *Vellai Noi* has been found to be alleviated by all ingredients of *Venpoosani Nei*. This information has re confirmed its clinical efficacy of *Venpoosani Nei* which is commonly prescribed by all Siddha Physicians. This literary research would therefore substantiate the Siddha formulation *Venpoosani Nei* to be an evidence-based medicine through further clinical research.

CONCLUSION

The present review reveals the pharmacological activity of Siddha formulation *Venpoosani Nei* both scientifically as well as from traditional Siddha concepts of *Mukkutram* (Humoural theory). According to Siddha pathology, since *Pitham* is said to be the predominant cause of the origin of disease, all the ingredients have been explored to alleviate *Pitham*. Further scientifically, each of the herbal ingredients has been evaluated for its multimodal action against the various causes of Leucorrhoea. The review confirms the effectiveness of *Venpoosani Nei* and the need of further preclinical and clinical research in this regard.

References:

1. Sivakumar K, Ajay Raj S, Sujatha K.A, comparative interventional study on the efficacy of single and multiple dose combination drug regimen of leucorrhea among women in reproductive age group. Int J Community Med Public Health. April, 2017; 4(4):1230-1237.
2. UmaRani Y, Sarada D, Varalakshmi.D, RajaRajeswari.M, Padmaja.Y, Microbiological study of leucorrhoea with special reference to *gardnerella vaginalis*.

3. Phadatare S.S, Sara JK. Conceptual study on leucorrhoea with ayurvedic treatment and home remedies. Ayurlog: National Journal of Research in Ayurved Science. 2015; 3p.
4. Weström L, Pelvic inflammatory disease: bacteriology and sequelae. Contraception. Jul 1987; 36(1):111-28. doi: 10.1016/0010-7824(87)90064-3.
5. Eschenbach D.A, Buchanan T.M, Pollock H.M, Forsyth P.S, Alexander E.R, Lin J.S, Wang S.P, Wentworth B.B, MacCormack W.M, Holmes K.K, Polymicrobial etiology of acute pelvic inflammatory disease. N Engl J Med. 1975; 293(4):166-171.
6. Lata G, Kaur SP, Sharma S. Risk factors of pelvic inflammatory disease in rural population of Haryana. Int J Health Sci Res. 2019; 9(10):30-34
7. Abid.M, Jyoti Kumar.K, Khan.R, Ali.S, Chandra.P, Rani.R, Khan.N.A, Assessment of Leucorrhea diseases in female students. Journal of Scientific and Innovative Research 2016; 5(4): 116-118.
8. Malayappan, Sundaram M.M, Logamanian, Banumathi V, Evidence based siddha therapeutics in treating female infertility. International Journal of Current Research 2017; 9: 59703-59705.
9. Elkabbakh G.T, Elkabbakh G.D, Broekhuizen F, Griner B.T et al, Value of wet mount and cervical cultures at the time of cervical cytology in asymptomatic women. Obstet Gynecol 1995; 85(4): 449-503
10. M.Sanmugavelu, H.B.I.M, Siddha maruthuva noinadal noimuthal nadal thirattu (Part.1), Tamilnadu Govt. Siddha Medical Board, Chennai;2016.
11. Manoj S, Pagare, Patil L, Vilasrao J, Kadam Benincasa hispida: A Natural



- medicine. Research J. Pharm. And Tech, 2011; 4(12):1941-1944.
12. Prafulla P, Adkar, Bhaskar V.H, Pandanus odoratissimus (Kewda): A Review on Ethnopharmacology, Phytochemistry, and Nutritional Aspects. Advances in Pharmacological Sciences 2014; 19p.
 13. Seneviratne K.N, Dissanayake D.M.S, Variation of phenolic content in coconut oil extracted by two conventional methods. Inter J Food Sci Technol, 2008; 43: 597–602.
 14. Costa C.T, Bevilaqua C.M, Morais S.M, Camurca-Vasconcelos A.L, Maciel M.V, Braga R.R et al. Anthelmintic activity of *Cocos nucifera* L. on intestinal nematodes of mice. Res Vet Sci. 2010; 88:101–103.
doi: 10.1016/j.rvsc.2009.05.008.
 15. Lima E.B.C, Sousa C.N.S, Meneses N.C, Ximenes M.A, Santos Júnior G.S, Vasconcelos N.B.C, Lima M.C.A, Patrocínio D, Macedo S.M.M. Vasconcelos. *Cocos nucifera* (L.) (Arecaceae): A phytochemical and pharmacological review. Braz J Med Biol Res 2015; 48 (11).
 16. Vogler B.K, Ernst E. Aloe vera: A systematic review of its clinical effectiveness. Br J Gen Pract. 1999; 49:823–8.
 17. Andriana Y, Xuan T.D, Quy T.N, Tran H.D, Le Q.T, Biological Activities and Chemical Constituents of Essential Oils from Piper cubeba Bojer and Piper nigrum L. Molecules 2019; 24:1876.
 18. Nadhlala A.R, Amoo S.O, Stafford G.I, Finnie J.F, Van Staden J, Antimicrobial, anti-inflammatory and mutagenic investigation of the South African tree aloe (*Aloe barberae*) J Ethnopharmacol. 2009; 124:404–8.
 19. Eamlamnam K, Patumraj S, Visedopas N, Thong-Ngam D. Effects of *Aloe vera* and sucralfate on gastric microcirculatory changes, cytokine levels and gastric ulcer healing in rats. World J Gastroenterol. 2006; 12: 2034–9.
 20. Marapana, Raju, Chandrasekara, CMKV, Aponso, Minoli, Nutrient fortified king coconut water as an isotonic thirst-quenching beverage for sports men and women. International Journal of Chemical Studies 2017; 5: 1494-1498.
 21. Sonavane G.S, Sarveiya V.P, Kasture V.S, Kasture S.B. Anxiogenic activity of *Myristica fragrans* seeds. *Pharmacology Biochemistry and Behavior* 2002; 71(1-2):239–244.
 22. Zaidi S.F.H, Yamada K, Kadowaki M, Usmanghani K, Sugiyama T, Bactericidal activity of medicinal plants, employed for the treatment of gastrointestinal ailments, against *Helicobacter pylori*. *Journal of Ethnopharmacology* 2009; 121(2): 286–291.
 23. Jaiswal P, Kumar P, Singh V.K, Singh DK, Biological effects of *Myristica fragran*. *Annual Review of Biomedical Sciences* 2009; hbg3t 11: 21–29.
 24. Upadhye A.S. Standardization and preclinical studies on 'Kakadshringi': Leaf galls used in Ayurvedic system of medicine. Pharm Anal Acta. 2010; doi: 10.4172/2155-9872.1000012.
 25. Muhammad HS, Muhammad S. The use of *Lawsonia inermis* linn. (henna) in the management of burn wound infections. Afr J Biotechnol. 2005 ;4 :934–937.
 26. Kaur G, Hamid H, Ali A, Alam M.S, Athar M, Anti-inflammatory evaluation of alcoholic extract of galls of *Quercus infectoria*. J Ethnopharmacol. 2004; 90:285–292.
 27. Govt. of India. The Ayurvedic pharmacopoeia of India. New Delhi: Government of India Ministry of Health and Family Welfare Department of Indian System of Medicine & Homoeopathy; 2001;47p.



28. Jamwal K.S, Sharma I.P, Chopra C.L, Pharmacological investigation on the fruits of *Emblica officinalis*. *J Sei Ind Res* 1959; 18c:180-l.
29. Jayashri S, Jolly C.I, Phytochemical antibacterial and Pharmacological investigations on *Momordica charantia* and *Emblica officinalis*. *Indian J Pharm Sei* 1993;6-13.
30. Anila L, Vijayalakshmi N.R, Beneficial effects of flavonoids from *Sesamum indicum*, *Emblica officinalis* and *Momordica charantia*. *Phytother Res* 2000;14:l-4
31. Anila L, Vijayalakshmi N.R, Antioxidant action of flavonoids from *Mangifera indica* and *Emblica officinalis* in hypercholesteromic rats. *Food Chem* 2003; 83:569-74
32. Panda S, Kar A, Fruit extract of *Emblica* ameliorates hyperthyroidism and hepatic lipid peroxidation in mice. *Pharmazie* 2003; 58:753-761.
33. Deb A, Barua S, Das B. Pharmacological activities of *Baheda* (*Terminalia bellerica*): A review. *Journal of Pharmacognosy and Phytochemistry* 2016; 5(1): 194-197.
34. Khan A.U, Gilani A.H, Pharmacodynamic Evaluation of *Terminalia bellerica* for its Anti-Hypertensive Effect. *Journal of Food and Drug Analysis*. 2008; 16 :6-14.
35. Alam B, Antioxidant, Antimicrobial and Toxicity studies of the Different Fractions of Fruits of *Terminalia bellerica* Roxb. *Global Journal of Pharmacology*. 2011; 5(1):07-17
36. Shukla S, Jadon A, Bhadauria M. Protective effect of *Terminalia bellerica* Roxb and gallic acid against carbon tetra chloride induced damage in albino rats. *Journal of Ethnopharmacology*. 2006; 109:214-218.
37. Choudhary G.P, Anti-ulcer activity of the ethanolic extract of *Terminalia bellerica* Roxb. *Int. J. of Pharmaceutical and Chemical Sci*, 2012; 1(4):1293-97
38. Rai N, Yadav S, Verma A.K, Tiwari L, Sharma R.K, A monographic profile on quality specifications for a herbal drug and spice of commerce- *Cuminum cyminum* L. *International Journal of Advanced Herbal Science and Technology* 2012; 1(1): 1-12.
39. Allahghadri T, Rasooli I, Owlia P, Nadooshan M.J, Ghazanfari T, Taghizadeh M, Astaneh S.D, Antimicrobial property, antioxidant capacity, and cytotoxicity of essential oil from cumin produced in Iran. *J Food Sci* 2010; 75(2): H54-61
40. Aruna K, Sivaramakrishnan V.M, Anticarcinogenic effects of some Indian plant products. *Food and Chemical Toxicology* 1992; 30(11): 953–956.
41. Ashokkumar K, Murugan M, Dhanya M.K, Warkentin T.D, Botany, traditional uses, phytochemistry and biological activities of cardamom [*Elettaria cardamomum* (L.) Maton] – A critical review, *Journal of Ethnopharmacology* 2019; doi: <https://doi.org/10.1016/j.jep.2019.112244>.
42. Aghasi M, Ghazi-Zahedi S, Koohdani F, Siassi F, Nasli-Esfahani E, Keshavarz A, Qorbani M, Khoshamal H, Salari-Moghaddam A, Sotoudeh G, The effects of green cardamom supplementation on blood glucose, lipids profile, oxidative stress, sirtuin-1 and irisin in type 2 diabetic patients: a study protocol for a randomized placebo-controlled clinical trial. *BMC Complement Altern Med* 2018; doi: 10.1186/s12906-017-2068-6
43. Bhattacharjee S, Rana T, Sengupta A. Inhibition of lipid peroxidation and enhancement of GST activity by cardamom and cinnamon during chemically induced colon carcinogenesis in Swiss albino mice. *Asian Pac J Cancer Prev* 2007; 8:578-582.



44. Elguindy N.M, Yacouta G.A, El Azab E.F, Maghraby H.K, Chemoprotective effect of *Elettaria cardamomum* against chemically induced hepatocellular carcinoma in rats by inhibiting NF- κ B, oxidative stress, and activity of ornithine decarboxylase. *S Afr J Bot.* 2016; 105: 251–258.
45. Zuhair, Thukaa, Abdul-Jalil, Nasser, Ahmed, Piper cubeba: phytochemical and pharmacological review of a routinely used spices; 2020. 10.31838/ijpr/2020.SP1.119.
46. Kumaraswamy M.V, Kavitha H.U, Satish S, Antibacterial Potential of Extracts of *Woodfordia fruticosa* Kurz. on Human Pathogens. *World J Med Sci.* 2008; 3:93–6
47. Dubey D, Padhy R.N, Surveillance of multidrug resistance of two gram-positive pathogenic bacteria in a teaching hospital and *in vitro* efficacy of 30 ethnomedicinal plants used by an aborigine of India. *Asian Pac J Trop Dis.* 2012; 2:273–81.
48. Bharati K.A, Sharma B.L, Some Ethnoveterinary plant records for Sikkim Himalaya. *Indian J Tradit Knowledge.* 2010; 9:344–6.
49. Anonymous, The Wealth of India, Raw Materials; IX. CSIR: New Delhi 1972; 20p.
50. Lin Y.M, Flavin M.T, Schure R, Chen F.C, Sidwell R, Barnard D.L, Huffman J.H, Kern E.R, antiviral activities of bioflavonoids. *Planta Med.* 1999; 65:120.
51. Anonymous, The Useful Plants of India, CSIR: New Delhi 1994; 524.
52. Sahib N.G, Anwar F, Gilani A.H, Hamid A.A, Saari N, Alkharfy KM, Coriander (*Coriandrum sativum* L.): a potential source of high-value components for functional foods and nutraceuticals--a review. *Phytother Res.* 2013 Oct;27(10):1439-56. doi: 10.1002/ptr.4897. Epub 2012 Dec 19.
53. Khan F.Z, Alam M, Saleem R, Rashid I. Biological studies of indigenous medicinal plants--I: physicochemical and antimicrobial screening of non-alkaloidal constituents of some solanaceous seeds. *Pak J Pharm Sci.* 1992; 5:55–61.
54. Begum S, Saxena B, Goyal M, Ranjan R, Joshi V.B, et al, Study of anti-inflammatory, analgesic and antipyretic activities of seeds of *Hyoscyamus niger* and isolation of a new coumarinolignan. *Fitoterapia.* 2010; 81: 178–184.
55. Brown J.H, Taylor P, Muscarinic receptor agonists and antagonists. In: Hardman JG, editor. The pharmacological basis of therapeutics. New York: McGraw-Hill 1996; 141p.
56. Koh H.L, Chua T.K, Tan C.H, Singapore: World Scientific Publishing; A Guide to Medicinal Plants: An Illustrated Scientific and Medical Approach 2009; 13p.
57. Cáceres A, Girón LM, Alvarado SR, Torres MF. Screening of antimicrobial activity of plants popularly used in Guatemala for the treatment of dermatomucosal diseases. *J Ethnopharmacol.* 1987; 20:223–37.
58. Mas R. D-003: A new substance with promising lipid modifying and pleiotropic effects for atherosclerosis management. *Drugs future* 2004; 29(8):773-786.
59. Babu G, Singaravelu B, Vallapu S.R, Ramasundaram S, In- vitro antifungal activity of flower extract of *pandanus odoratissimus* against dermatophytic fungi. *Asian Journal of Pharmaceutical and Clinical Research* Sept 2018; 11(9): 325-7. doi:10.22159/ajpcr.2018.v11i9.2708 2.
60. Venkataraman S, Ramanujam T.R, venkatasubbu V.S, Antifungal



- activity of the alcoholic extract of coconut shell *Cocos nucifera* Linn. *Journal of Ethnopharmacology* 1980; 2:291 -293.
61. Alviano D.S, Antonioli, Alviano C.S, Farias L.M, *In vitro* antioxidant potential of medicinal plant extracts and their activities against oral bacteria based on Brazilian folk medicine. *Arch Oral Biol.* 2008; 53:545–52.
 62. Saniasiaya J, Salim R, I Mohamad I, Harun A, Antifungal Effect of Malaysian *Aloe vera* Leaf Extract on Selected Fungal Species of Pathogenic Otomycosis Species in In Vitro Culture Medium. *Oman Med J.* 2017 Jan; 32(1): 41–46.
 63. Agarry O.O, Olaleye M.T, Michael B.C.O, Comparative antimicrobial activities of Aloe vera gel and leaf. *Afr J Biotechnol.* 2005; 4:1413–4.
 64. Kamga, Hortense, Essama, Francois-Xavier et al, In vitro Evaluation of Antifungal Activity of Virgin Coconut oil and White Palm Kernel Oil on *Candida* Species-Experimental Study. *Microbiology Research Journal International* 2019; 27:1-9.
 65. Jose M. Antimicrobial properties of *Cocos nucifera* (coconut) husk: An extrapolation to oral health. *J Nat Sci Biol Med.* 2014; 5:359–64.
 66. Cho J.Y, Choi G.J, Son S.W, Jang K.S, Lim H.K, Lee S.O, Sung N.D, Cho K.Y, Kim J.C, Isolation and antifungal activity of lignans from *Myristicafragrans* against various plant pathogenic fungi. *Pest Manag Sci.* 2007; 63(9):935-40. doi: 10.1002/ps.1420. PMID: 17659535.
 67. Shafiei Z, Shuhairi N.N, Yap M.S.N, Sibungkil H.C.A, Latip J, Antibacterial Activity of *Myristicafragrans* against Oral Pathogens. *Evid Based Complement Alternat Med.* 2012.
 68. Digrak M, Alma M.H, Ilcim A, Sen S, Antibacterial and antifungal effects of various commercial plant extracts. *Pharm Biol.* 1999; 37:216–20.
 69. Basri D.F, Tan L.S, Shafiei Z, Zin N.M, In-vitro antibacterial activity of Galls of *Quercus infectoria* Olivier against oral pathogens. *Evidence -Based Complementary and Alternative medicine.* 2012;632796;6
 70. Venkatachalam P, Chittibabu C.V, Antifungal activity of *Terminalia chebula* fruit extracts. *Current Botany* 2020; 216-220.
 71. Sharma C, Aneja K.R, Kasera R, et al, Antimicrobial potential of *Terminalia chebula* Retz. fruit extracts against ear pathogens. *World J Otorhinolaryngol* 2012; 2(2): 8-13
 72. Gandhi A.J, Kulkarni A, Bora M, Hiray L, Antimicrobial activity of *phyllanthus emblica* – a medicinal plant. *European Journal of Molecular & Clinical Medicine* 2020; 8(2): 2515-8260.
 73. Khan D.A, Hassan F, Ullah H, Karim S, Baseer A, Abid M.A, Ubaidi M, Khan S.A, Murtaza G, Antibacterial activity of *Phyllanthus emblica*, *Coriandrum sativum*, *Culinaris medic*, *Lawsonia alba* and *Cucumis sativus*. *Acta Pol Pharm.* Sep-Oct 2013;70(5):855-9.
 74. Dharmaratne M.P.J, Manoraj A, Thevanesam V et al, *Terminalia bellirica* fruit extracts: in-vitro antibacterial activity against selected multidrug-resistant bacteria, radical scavenging activity and cytotoxicity study on BHK-21 cells. *BMC Complement Altern Med* 2018; 18: 325.
 75. Romagnoli C, Andreotti E, Maietti S, Mahendra R, Mares D, Antifungal activity of essential oil from fruits of Indian *Cuminumcyminum*. *Pharm Biol.* 2010;48(7):834-8. doi: 10.3109/13880200903283715.
 76. Amalia R, Dewi S.U, Margono. A, Usman.M, Antibacterial Effects of *Cuminum cyminum* Extract Against *Enterococcus*



- Faecalis* Biofilms from Clinical Isolates. *Bras.OdontopediatriaClín. Integr.*2019;19.
77. Souissi.M, Azelmat.J, Chaieb.K, Grenier.D, Antibacterial and anti-inflammatory activities of cardamom (*Elettaria cardamomum*) extracts: Potential therapeutic benefits for periodontal infections. *Anaerobe.* 2020; 61:102089.
78. Rukayadi Y, Hwang J, In vitro antimycotic activity of xanthorrhizol isolated from *Curcuma xanthorrhiza* Roxb against opportunistic filamentous fungi. *Phytotherapy Research.* 2007; 21(5): 434-438.
79. Alqadeeri F, Rukayadi Y, Abbas F, Shaari K, Antibacterial and Antispore Activities of Isolated Compounds from *Piper cubeba* L. *Molecules.*2019;24(17):30 95.
80. Sujanamulk.B, Shyam.S, Babita.S,Rat nakar.P, Rajalakshmi.C, Maloth.K.N, Comparison of antifungal efficacy of ethanolic extracts of *Woodfordia fruticosa* leaf and *Punicagranatum* peel in uncontrolled diabetic patients wearing removable dentures: A randomized controlled clinical trial.*Curr Med Mycol.* 2020 Sep; 6(3): 15–20
81. Dubey.D, Patnaik.R, Ghosh.G, Padhy.R. N, In Vitro Antibacterial Activity, Gas Chromatography–Mass Spectrometry Analysis of *Woodfordiafruticosa*Kurz. Leaf Extract and Host Toxicity Testing With In Vitro Cultured Lymphocytes From Human Umbilical Cord Blood. *Osong Public Health and Research Perspectives.*2014; 5(5):298-312.
82. Shrestha S, Subaramaiha S.R, Subbaiah S.G, Eshwarappa R.S, Lakkappa D.B. Evaluating the antimicrobial activity of methonolic extract of *rhus succedanea* leaf gall. *Bioimpacts.* 2013;3(4):195-8.
83. Silva F, Ferreira S, Duarte A, Mendonça D.I, Domingues F.C, Antifungal activity of *Coriandrumsativum* essential oil, its mode of action against *Candida* species and potential synergism with amphotericin B. *Phytomedicine.* 2011 Dec 15;19(1):42-7.
84. Silva F, Ferreira S, Queiroz J.A, Domingues F.C. Coriander (*Coriandrumsativum* L.) essential oil: its antibacterial activity and mode of action evaluated by flow cytometry. *J Med Microbiol.* 2011 Oct;60(Pt 10):1479-1486.
85. Basaran dulger, nurcihan hacioglu, beyza s. Goncu†, fahrettin gucin†. Antifungal Activity of Seeds of *Hyoscyamusniger* L. (Henbane) Against Some Clinically Relevant Fungal Pathogens. *Asian Journal of Chemistry* 2010; 22, (8):6321-6324.
86. Dulger.B, Beyza.S, Goncu, Gučin.F, Antibacterial Activity of the Seeds of *Hyoscyamusniger* L. (Henbane). *Asian Journal of Chemistry.* 2010; 22(9):6879-6883.
87. Takara K, Ushijima K, Wada K, Iwasaki H, Yamashita M. Phenolic compounds from sugarcane molasses possessing antibacterial activity against carcinogenic bacteria. *J Oleo Sci.* 2007; 56:611–4.
88. Nadkarni K.M. *Indian materia medica* vol-1, Popular Prakasham pvt LTD 1954; 185p.
89. Al-Snafi A.E, The Pharmacological Importance of *Benincasa hispida*. A review. *International Journal of Pharma Sciences and Research* 165p.
90. Sharma R.K, Singh.R, Jha.KK, Abhishek B, Antibacterial and Antioxidant activity of *Benincasa hispida* using Hydrogen peroxide scavenging model. *Indian Journal of Pharmaceutical and Biological Research (IJPBR)*
91. NatarajanD, Lavarasan.R. J, Babu.S.C, Sahib.M.C.C, Refai.T,



- Ansari.L.H.T, Antimicrobial studies on methanol extract of benincasa hispida cogn., fruit. Ancient science of life, 2003; XXII (3):3DJHV.
92. KM Nadkarni. Indian materia medica vol-1. Popular Prakasham pvt LTD 1954; 894p.
93. Kumar D, Kumar.S, Kumar.S, Singh.J, Sharma.C, Aneja.KR, Antimicrobial and preliminary phytochemical screening of crude leaf extract of Pandanus odoratissimus l. Pharmacologyonline 2010; 2: 600-610.
94. Londonkar R, kamble A.K, Reddy.V.C, Anti- inflammatory activity of Pandanus odoratissimus Extract. International journal of pharmacology 2010; 6 (3): 311-314.
95. Sanjeeva, Kumar N.R, Padmalaxmi et al. R, Antioxidant activity of methanol extract of Pandanus fascicularis Lam. Pharmacologyonline 2011;1(29):833–841.
96. Udupa A.L, Ojeh.N, Gupta G et al. Analgesic activity of Pandanus fascicularis Lam. Pharmacologyonline 2011; 2: 837–840.
97. Rajeswari J, Kesavan K, Jayakar B. Antidiabetic activity and chemical characterization of aqueous/ethanol prop roots extracts of Pandanus fascicularis Lam in streptozotocin induced diabetic rats. Asian Pacific Journal of Tropical Biomedicine 2012;2(1): S170–S174.
98. Lima E.B.C, Sousa C.N.S, Meneses LN et.al., Cocos nucifera (L.) (Arecaceae): A phytochemical and pharmacological review. Braz J Med Biol Res 2015; 48(11) Ribeirão Preto.
99. KM Nadkarni. Indian materia medica vol-1. Popular Prakasham pvt LTD, 1954; 363p.
100. Singla R.K, Jaiswal.N, Bhat.V, Jagani.H, Antioxidant & Antimicrobial Activities of Cocos Nucifera Linn. (Arecaceae) Endocarp Extracts, Indo Global Journal of Pharmaceutical Sciences, 2011; 1(4): 357
101. Bassey E.E, Mohammed G.D, Cynthia.O, Antimicrobial Susceptibility Pattern of Coconut Oil Extract on Selected Bacterial and Fungi. Department of Applied Microbiology and Brewing. Nnamdi Azikiwe University, Awka, Nigeria. 2018;1(3).
102. Effiong Edet Bassey, Gwana Dam Mohammed, Okaro Cynthia. Upine publishers. Open Access L Interventions in Pediatric Dentistry: Open Access Journal Research
103. Sharma P, Kharkwal A.C et. Al., A Review on Pharmacological Properties of Aloe vera, Int. J. Pharm. Sci. Rev. Res., 2014; 29(2): 31-37.
104. Esaivani S, Susila R, Kavitha T, Usha A, Sathiyarajeswaran P, Management of Prolapsed Uterus-Grade I with Siddha External Therapy Aloe Vera and Tripala Bandage: A Case Study. Archives of Clinical and Medical Case Reports 4 (2020): 266-272.
105. Dhinagari.J, Effectiveness Of Aloe vera Juice Upon Leucorrhoea. A Dissertation Submitted To The Tamilnadu Dr.M.G.R.Medical University. Chennai. In Partial Fulfilment Of The Requirements For The Degree Of Master Of Science In Nursing, March.
106. Allan C, Sabaldica. A Primer on Medicinal Plants for Livestock Healthcare. Western Sustainable Agriculture Research and Education Professional Development Program Grant. 2011.
107. Yong J.W.H, Ge L, Ng Y.F, Tan S.N. The Chemical Composition and Biological Properties of Coconut (Cocos nucifera L.) Water. Molecules 2009; 14: 5144-5164.
108. Ajantha A, Kabilan.N, Review of Bhavana Panjankula Thailam: A Siddha medicine. Journal of



- Pharmacognosy and Phytochemistry 2019; 8(6): 655-658.
109. Mazaya et al. Turkish Journal of Agriculture - Food Science and Technology, 2020 8(5): 1090-1097.
 110. Widianingrum D.C et. al., Antibacterial and immunomodulator activities of virgin coconut oil (VCO) against *Staphylococcus aureus*, Elsevier, vol.5, issue 10, E02612, October 1, 2019.
 111. Nadkarni K.M, Indian materia medica. Vol-1, Popular Prakasham pvt LTD, 1954; p 830
 112. Lal M, Chandraker S.K, Shukla R, Antimicrobial properties of selected plants used in traditional Chinese medicine, Editor(s): Bhanu Prakash, Functional and Preservative Properties of Phytochemicals, Academic Press, 2020, Pages 119-143.
 113. Shafiei Z, Shuhairi N.N, ShahYap M.F, Sibungkil C.A.H, Latip J. Antibacterial Activity of *Myristica fragrans* Against Oral Pathogens. Evidence-Based Complementary and Alternative Medicine. 2012;1-7
 114. Anibijuwon I.I, Omojasola P F, Olayiwole A, Abioye JA, Odaibo D.O, Antibacterial Activity of *Myristica fragrans* and Curry Powder against Selected Organisms Public Health Laboratory Unit, Department of Microbiology, Faculty of Science, University of Ilorin, P.M.B 1515 Ilorin, Kwara State, Nigeria Nigerian Journal of Biochemistry and Molecular Biology 2013; 28 (1&2): 103-111.
 115. Asgarpanah J, Kazemivash N, Phytochemistry and pharmacologic properties of *Myristica fragrans* Hoyutt.: A review. African Journal of Biotechnology 14 aug 2012;11(65):12787-12793.
 116. Baharuddin N.S, Abdullah H, Wahab W.N.A, Anti-Candida activity of *Quercus infectoria* gall extracts against *Candida* species. J Pharm Bioallied Sci. 2015;7(1):15-20. doi:10.4103/0975-7406.148742.
 117. Fathabada A.E, Shariatifar NB, Mardania K, Mohammadpourfard B.I, Study on antibacterial and antioxidant activity of Oak gall (*Quercus infectoria*) extracts from Iran. Int j curr sci 2015, 14: E 44-50.
 118. Amilah WN, W.A.W, Masrah M, Hasmah A, Izani N.N.J, In vitro antibacterial activity of *Quercus infectoria* gall extracts against multidrug resistant bacteria, Tropical Biomedicine, 2014; 31(4): 1-9
 119. Bag A, Bhattacharyya S.K, Chattopadhyay R.R, The development of *Terminalia chebula* Retz. (Combretaceae) in clinical research. Asian Pacific Journal of Tropical Biomedicine 2013;3(3):244-252.
 120. Kumara M, Agarwala R.C, deyb S, Raib V.K, Johnsonc B, Antimicrobial activity of aqueous extract of *Terminalia chebula* retz on gram-positive and gram-negative micro-organism. International journal of current pharmaceutical research 2009; 1(1):56-60.
 121. Gantait S, Mahanta M, Bera S et al, Advances in biotechnology of *Emblca officinalis* Gaertn. syn. *Phyllanthus emblica* L.: a nutraceuticals-rich fruit tree with multifaceted ethnomedicinal uses. 3 Biotech 2021; 11: 62
 122. Hossain, Mir, Mazumder, Kishor, Hossen, Moazzem, Tanmy, T.T, Rashid J, In vitro antibacterial and antifungal activities of *Emblca officinalis*. Int. J. Pharma. Sci. Res. 2012; 3: 1124-1127
 123. Gupta A, Kumar R, Bhattacharyya P, Bishayee A, Abhay K, Pandey, *Terminalia bellirica* (Gaertn.) roxb. (Bahera) in health and disease: A systematic and comprehensive review, Phytomedicine. 2020;770944-7113
 124. Annavaram V, Posa V.R, Lakshmi D.V, Sumalatha J, Somala A.R,



- Terminalia bellirica fruit extract-mediated synthesis of gold nanoparticles (AuNPs) and studies on antimicrobial and antioxidant activity, *Inorganic and Nano-Metal Chemistry*, 2017; 47(5): 681-687.
125. Sahana K, Nagarajan S, Rao L.J.M, Cumin (*Cuminum cyminum* L.) Seed Volatile Oil: Chemistry and Role in Health and Disease Prevention, Editor(s): Victor R. Preedy, Ronald Ross Watson, Vinood B. Patel, Nuts and Seeds in Health and Disease Prevention, Academic Press,2011;417-427
126. Minooeianhaghighi M.H, Sepehrian L, Shokri H, Antifungal effects of *Lavandula binaludensis* and *Cuminum cyminum* essential oils against *Candida albicans* strains isolated from patients with recurrent vulvovaginal candidiasis. *J Mycol Med.* Mar 2017;27(1):65-71. doi: 10.1016/j.mycmed.2016.09.002. Epub 2016 Oct 15. PMID: 27751723.
127. Petretto G.L, Fancello F, Bakhy K, Faiz C.A.L, Sibawayh Z, Chessa M, Zara S, Sanna M.L, Maldini M,Rourke J.P, Pintore G, Chemical composition and antimicrobial activity of essential oils from *Cuminum cyminum* L. collected in different areas of Morocco, *Food Bioscience*,2018; 22(2018): 50-58.
128. Kumar K.A, Murugan M, Dhanya M.K, Warkentin T.D, Botany, traditional uses, phytochemistry and biological activities of cardamom [*Elettaria cardamomum* (L.) Maton] – A critical review, *Journal of Ethnopharmacology* 2020; 246(2020): 112244, 0378-8741
129. Sengottuvelu S, Cardamom (*Elettaria cardamomum* Linn. Maton) Seeds in Health, Nuts and Seeds in Health and Disease Prevention, Academic Press, 2011; p285-291
130. Hero.S. Antibacterial Effect of Seed Extracts of Cardamom (*Elettaria cardamomum*) against *Staphylococcus aureus* and *Proteus mirabilis*. *Tikrit Journal of Pure Science*.2012; 17. 14-18.
131. Asghar A, Abdullah, Irshad M.A, Majeed M, Elucidating the therapeutic potential of nutraceuticals *Nutraceuticals*, Academic Press, 2016; p231-270,
132. Rezende K.C.S, Lucarini.R, Símaro G.V, Pauletti P.M et al., Antibacterial activity of (-)-cubebin isolated from *Piper cubeba* and its semisynthetic derivatives against microorganisms that cause endodontic infections, *Revista Brasileira de Farmacognosia*.2016;26(3);296-303.
133. Silva M.L.A, Coímbra H.S, Pereira A.C, Almeida V.A et al., Evaluation of piper cubeba extract, (-)-cubebin and its semi-synthetic derivatives against oral pathogens. *Phyther. Res.*2007; 21: 420-422.
134. Parekh, Jigna,Chanda, Sumitra, In vitro antibacterial activity of the crude methanol extract of *Woodfordia fruticosa* Kurz. flower (Lythraceae). *Brazilian Journal of Microbiology*.2007;38(2)204-207.
135. Raghuwanshi N, Kumari.P, Srivastava A.K, Vashisth.P, Yadav T.C, Prasad R, Vikas P, Synergistic effects of *Woodfordia fruticosa* gold nanoparticles in preventing microbial adhesion and accelerating wound healing in Wistar albino rats in vivo, *Materials Science and Engineering*. 2017;18;252-262
136. Kim D.H, Lee S.J, Oh D.S, Lee I.D, Eom J.S, Park H.Y, Choi S.H, Lee S.S. In vitro evaluation of *Rhus succedanea* extracts for ruminants. *Asian-Australas J Anim Sci.* October, 2018;31(10):1635-1642.
137. Khan, Shafqat. Antibacterial activity of *Rhus succedanea* Var. *Himalaica*. *Pure and Applied Biology*. 2017; 6. 10.19045/bspab.2017.60076.
138. Asgarpanah.J, Kazemivash.N, Phytochemistry, pharmacology and medicinal properties of *Coriandrum*



- sativum L. African Journal of Pharmacy and Pharmacology. August,2012;6(31); 2340-2345.
139. Freires I.D.A, Murata R.M, Furletti V.F, Sartoratto A, Alencar S.M.D, et al.,” Coriandrum sativum L. (Coriander) Essential Oil: Antifungal Activity and Mode of Action on *Candida* spp., and Molecular Targets Affected in Human Whole-Genome Expression. Plos one. Yr;(9)6; pg number,
140. Ali, Malik, Antimicrobial Activity of Coriander sativum. Journal of pharmaceutical research international.2020; 32(47): 74-81
141. Kothari S, Anti-Inflammatory Activity of Coriandrum sativum using HRBC Membrane Stabilizing Method. Int. J. Pharm. Sci. Rev. Res.,2017; 43(2) 68-70.
142. Khan N.T, Jameel N, Antifungal Activity of Ajawain Seeds (*Trachyspermum ammi*). J Biomol Res Ther. 2008; 7: 164.
143. Chumber A, Degolier T, The influence of common cuisine spices such as ajwain, cumin, dill, fenugreek, and papaya on the contractile behaviors of isolated strips of mouse uterine tissue, Journal of Pharmacognosy and Phytochemistry 2020; 9(2): 1145-1150.
144. Narendra K et al., Phytochemicals and Bioactive Potential of *Trachyspermum ammi* L. Der Pharmacia Lettre. 2018; 10 (8) ;48-56.
145. Singh A, Lal U.R, Mukhtar H.M, Singh P.S, Shah G, Dhawan R.K. Phytochemical profile of sugarcane and its potential health aspects. Pharmacogn Rev. 2015 Jan-Jun;9(17):45-54.
146. Uchenna E.F, Adaeze I.O.A, Steve A.C, Phytochemical and Antimicrobial Properties of the Aqueous Ethanolic Extract of *Saccharum officinarum* (Sugarcane) Bark. Journal of Agricultural Science. 2015;7(10); 1916-9760.
147. Ramesh Londonkar, Abhaykumar Kamble and V. Chinnappa Reddy, 2010. Anti-Inflammatory Activity of *Pandanus odoratissimus* Extract. International Journal of Pharmacology, 6: 311-314 (94)
148. Maharjan H, Radha, Nampoothiri P. Laxmipriya, Evaluation of biological properties and clinical effectiveness of Aloe vera: A systematic review, Journal of Traditional and Complementary Medicine. 2005; 5(1);21-26.

