

Antimicrobial Effect of Herbal Ingredients in Sarvavishadi Oil

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Abstract- Sarvavishadi Thaila (SVT) is one of the widely used herbal preparations in the traditional system of medicine in srilanka. It has been used in the treatment of different type of diseases such as Thundikeri (Tonsilitis), Sarpavisha (Snake bites), Keetavisha (Insect bites), Ratharoga (Skin diseases), Krimiroga (Worm infections), Arshas (Haemorrhoids), Ullogam (Trush), Vruna (Ulcers), Vidradhi (Abscess) & Granthi shotha (Edema). Its formula is consisting with many herbs, oils, spices & minerals which are having different therapeutic Activities. Reviewing of antibacterial and antifungal effect of the medicinal plants used in this formula is the key objective of this study. Review is highlighted that the many studies reveal that the antibacterial and antifungal activities of the medicinal plant used in the formula of sarvavishadi thaila.

Index Terms- Sarvavishadi Thaila, Indigenous Medicine, Anti-microbial activity

I. INTRODUCTION

Many medicinal plants are useful in strengthening human health care system and the formulations based on such medicinal plants play an important role in modern medicine. The main benefits of using herbal medicine which is used in traditional medicine are relatively safer due to their less toxicity & free from side effects than synthetic drugs and offer deep therapeutic benefits (Tambekar & Dahikar, 2010). Selective combination of plant materials or plant materials with minerals in the formulation of traditional medicine is carrying a remarkable therapeutic effect. Polyherbal medicinal preparations may become more effective within the body than single herb, as well act as powerful catalysts by activating the individual healing energies which spread the entire organism and regulate cellular functions accordingly (Deattu et al, 2012).

Sarvavishadi Thaila (SVT) is a poly herbal medicine which is widely used in Sri Lanka for diseases such as Thundikeri (Tonsilitis), Sarpavisha (Snake bites), Keetavisha (Insect bites), Ratharoga (Skin diseases), Krimiroga (Worm infections), Arshas (Haemorrhoids), Ullogam (Trush), Vruna (Ulcers), Gadu, Visarpa, Vidradhi (Abscess), Granthi shotha (Edema) & etc. SVT is Ayurveda pharmacopoeia of Sri Lanka recommends to administer SVT in oral, nasal and topical routes because of contained herbo-mineral ingredients (Department of Ayurveda,

1976). Furthermore, the oil has been recommended for pregnant women to prevent the child from Ratha roga at the 10th month of her pregnancy (Anonymous, 2012).

Studying the therapeutic applications, the oil has been mostly instructed to use in infective and inflammatory diseases. Therefore, a review on antimicrobial effect of SVT is beneficial to ensure therapeutic applications at aforementioned ailments. The study was focused on antimicrobial effects of selected herbal ingredients in SVT.

Juice of the barks of *Moringa oliferra* Lam, *Acronychia pedunculata*, *Mallotus repandus* muell Arg.Mullarg, *Madhuca indica*, *Michelia champaka* Linn, *Mesua ferra* Linn, *Feronia limonia* Linn, *Mallotus philippineasi*, *Adathoda vasica*, *Vitex negundo*, *Erythrina indica*, *Tamarindus indica*, *Adenanthera pavonina* L., *Azadiracta indica*, *Cinnamomum zeylanicum*, *Rhcinus communis*, *Pongamia pinnata*, leaves of the *Moringa oliferra* Lam, *Madhuca indica*, *Mallotus philippineasi*, *Adathoda vasica*, *Asparagus recemosus*, *Withania somnifera*, *Argyrea populifolia*, *Gossypium herbacium* Linn, *Mallotus repandus* muell Arg.Mullarg, *Adenanthera pavonina* L., *Azadiracta indica*, *Cinnamomum zeylanicum*, *Rhcinus communis*, *Pongamia pinnata*, whole plants of *Crotalaria Laburnifolia* Linn, *Capparis zeylanica*, *Gynandropis penlaphyllata* DC, *Anisomeles indica* Linn, *Barieria prionitis*, *Cleome visvosa* L., Rhizomes of *Asparagus recemosus*, *Zingiber officinale*, Roots of *Moringa oliferra*, Coconut milk, Oils of the seeds of *Madhuca indica*, *Azadiracta indica*, *Rhcinus communis*, *Sesamum indicum* and Paste of *Allium sativum*, *Nigella sativa*, *Cuminum cyminum*, *Carum copticum*, *Terminalia belarica*, *Terminalia chebula*, *Phyllanthus emblica*, *Zingiber officinale*, *Piper longum*, *Piper nigrum*, *Ferula foetida*, *Myristica fragrams*, *Eugenia caryophyllata*, *Curcuma zedoaria*, *Pterocarpus santalinus* Linn, *Santalum album*, *Copper sulphate* and *Alum* are the ingredients of the formula of Sarvavishadi Thaila (Department of Ayurveda, 1976) (Anonymous, 2012).

II. METHODOLOGY

The literature review was done through peer-reviewed articles published in indexed journals on antimicrobial, anti-inflammatory efficiencies and ethnomedicinal uses of each of herbal ingredients in SVT. Antibacterial and antifungal effects in each of ingredients were considered and compiled.

III. ANTI-MICROBIAL PROPERTIES OF PLANT MATERIALS USED IN SVT

3.1. *Acronychia pedunculata*-Ankenda (*Rutaceae*)

Juice of the bark of *Acronychia pedunculata* are been used in the formulation of SVT. *Acronychia pedunculata* (L.) are used in various Ayurveda herbal preparations against Diarrhea, Tussis, Asthma, Ulcers, Itchy Skin, Scales, Sores, Rheumatism, Cold, Cough (Rodrigo et al, 2007) and Intestinal infections. Steam distillates and extracts of *Acronychia pedunculata* have an Antibacterial activity against methicillin-sensitive and resistant strains of *Staphylococcus aureus*, *Enterococcus faecalis* and *Pseudomonas aeruginosa* (Jayasinghe et al, 2006). Methanol extracts of leaves and stem-bark of *A. pedunculata* exhibited good anti-Candidal properties against the *C. albicans* (ATCC 90028), *C. krusei* (ATCC 6258), *C. parapsilosis* (ATCC 22019), *C. tropicalis* (ATCC 13803), *C. glabrata* (ATCC 90030) and 8 clinical Candida isolates (Bagyawantha et al, 2014). Methanolic extracts of root, bark, leaves and fruits and seed-kernels of *A. pedunculata* exhibited antifungal activity against *Cladosporium cladosporioides* (Rodrigo et al, 2007).

3.2. *Adathoda vasica*-Adathoda, Pavatta (*Acanthaceae*)

Juice of the leaves and bark of this plant is been used in the formulation of SVT. The crude ethanolic extraction of *A. vasica* has an Antimicrobial activity against *S. aureus*, *S. epidermidis*, *B. subtilis*, *Proteus vulgaris* & *Candida albicans* (Kumar et al, 2011). The methanol extract of *A. vasica* has an Antibacterial activity against *S. aureus*, *S. pyogenes*, *E. coli*, *P. aeruginosa*, *Proteus vulgaris* and *Klebsiella pneumoniae* rather than aqueous extract of *A. vasica* (Sheeba & Mohan, 2012). The alkaloids from *A. vasica* have excellent antibacterial activity against the most resistant bacteria such as *S. aureus*, *P. aeruginosa* and the highly pathogenic bacteria like *S. typhi* (Godghate & Swant, 2013).

3.3. *Adenanthera pavonina* L. - Madatiya (*Leguminosae*)

Juice of the leaves and bark of the plant is been used for the formulation of SVT. Various parts of this plant are used in traditional medicine for the various diseases such as Asthma, Diarrhea, Rheumatism, Tumor, Ulcers, Boils, and Inflammations (Ara et al, 2010), Burning sensation, Hyperdipsia, & Gout (Hussain et al, 2011). The extracts of *A. pavonina* have an antibacterial, antifungal, antioxidant, cytotoxic and blood pressure reducing activities (Ara et al, 2010). Extract of *A. pavonina* exhibit antibacterial activity against methicillin-sensitive and resistant strains of *S. aureus*, *E. faecalis* and *P. aeruginosa* (Jayasinghe et al, 2006) and root, bark and seed extracts of *A. pavonina* exhibited antifungal activity against *Cladosporium cladosporioides* (Rodrigo et al, 2007).

3.4 *Allium sativum* L. – Sudu lunu (*Alliaceae*)

Allium sativum is broadly used as antibiotic and used against diabetes, atherosclerosis, cancer, hypertension and hyperlipidemia (Akintobi et al, 2013). The aqueous & methanol extract of garlic has an antibacterial effect against *E. coli*, *Klebsiella pneumoniae*, *S. typhi*, *Bacillus cereus* & *S. mutans* (Saravanan et al, 2010). The aqueous extract of *A. sativum* bulbs

showed an Antifungal effect against the fungal skin pathogen *Trichophyton rubrum*, isolated from infected patients (Samuel et al, 2008).

3.5. *Anisomeles indica* L. – Yakwanassa (*Lamiaceae*)

Juice of *Anisomeles indica* Linn plant is been used for the formulation of SVT and the plant consists with Antipyretic, Analgesic, Anti-inflammatory, Antibacterial and Herbicidal activities. Antifungal activity of the essential oil of *Anisomeles indica* Linn was evaluated by poisoned food technique, that resulted in maximum activity against *Pithiumaphani dermatum* (ED50 51.58 µg/ml) followed by *Rhizoctonia bataticola* (ED50 72.80 µg/ml) (Kundu et al, 2013). Ethanol extract, pure constituents ovatodiolide (OVT) followed by acteoside, isoacteoside, and terniflorin of *Anisomeles indica* showed an antimicrobial activity against *Helicobacter pylori* (Rao et al, 2012).

3.6. *Argyrea populifolia*- Girithilla (*Convolvulaceae*)

The leaf juice of *Argyrea populifolia* is used for the preparation of SVT. It has Anti-inflammatory activity mediated via Anti-histamine action justifying its uses in traditional medicine (Rathnasooriya & Dharmasena, 2001).

3.7 *Asparagus racemosus* willd.-Hathavariya (*Asparagaceae*)

This plant has been use in stimulating the secretion of breast milk & it is used in the diseases such as aphrodisiacs, demulcent, rheumatism, diarrhea, dysentery, tuberculosis, diabetes, antioxidant, antitussive, nervous disorders, hyperacidity, general debility and it is considered as a rejuvenation medicine in Ayurveda (Wani et al, 2011). Mathur et al were reported the Antimicrobial, Antioxidant and anti-inflammatory properties of *A. racemosus*. The extract of *A. racemosus* showed high degree of activity against the *C. albicans*, *C. tropicalis*, *C. krusei*, *C. guillermondii*, *C. parapsilosis* and *C. stellatoidea*, which are isolated from vaginal thrush patients (Uma et al, 2009). As well, showed an Antifungal activity against *Aspergillus niger* but no activity against *C. albicans* (Mathur, 2011) and methanol extracts of roots has an antibacterial activity against the *E. coli*, *Shigella dysenteriae*, *Shigella sonnei*, *Shigella flexneri*, *Vibrio cholerae*, *S. typhi*, *S. typhimurium*, *Pseudomonas pectida*, *B. subtilis* and *S. aureus* (Alok et al, 2013).

3.8 *Azadirachta indica*-Kohomba (*Meliaceae*)

Juice of the Leaves and barks of *Azadirachta indica* is been used as the ingredient of SVT. It has an antifungal activity against *Tinea rubrum* and antibacterial activity against *Mycobacterium tuberculosis* (Biswas, 2002). Leaf and seed extracts of *A. indica* were effective against some dermatophytes such as *Trichophyton rubrum*, *T. violaceum*, *Microsporum anum* and *Epidermophyton floccosum* by the tube dilution technique and on *C. albicans* (Natarajan, 2003).

3.9. *Barleria prionitis*-Katu karandu (Acanthaceae)

Juice of the *B. prionitis* plant is been used in the formulation of SVT. Extracts and isolated phytochemicals of *B. prionitis* has anti-microbial activity without any toxic effect (Banerjee et al, 2012), anthelmintic activity, antifertility activity, antidiabetic activity, anti-diarrheal activity, enzyme inhibitory effects, anti-inflammatory activity, anti-arthritic activity, cytoprotective activity, hepatoprotective activity, diuretic effect, antinociceptive activity etc. (Kapoor et al, 2014). The acetone, methanol and ethanol extracts of *Barleria prionitis* Linn bark exhibited antifungal activity against oral pathogenic fungus *Saccharomyces cerevisiae* and two strains of *C. albicans* (Aneja et al, 2010). Petroleum ether, dichloromethane and ethanol extract of from different parts of *Barleria prionitis* showed fungistatic and fungicidal activities against *C. albicans* (Amoo et al, 2011).

3.10. *Capparis zeylanica* L. - Vellangiriya (Capparaceae)

The plant is used to treating diseases such as snake bites, swelling of testicles, smallpox, cholera, boils, colic, hemiplegia, neuralgia, sores, cough, cold, diabetes, convulsive seizure, pneumonic and pleurisy (Amit et al, 2010). Petroleum ether, chloroform, ethanol and water extracts of *C. zeylanica* leaves were showed antimicrobial activity against *Bacillus pumillus*, *S. aureus*, *Bacillus subtilis*, *E. coli*, *Klebsiella pneumoniae*, *Proteus vulgaris* and none of the extract showed antifungal activity against *C. albicans* and *A. niger* (Chopade et al, 2008).

3.11. *Carum copticum*-Asamodagam (Umbelliferae)

Carum copticum has an antimicrobial activity against *S. typhi*, *E. coli*, *Staphylococcus aureus*, *B. subtilis*, *A. niger* and *C. albicans*. Carum oils could be used as safe and effective natural antioxidants to improve the oxidative stability of fatty foods during storage and to preserve foods against food burn pathogens (Kavoosi et al, 2013). Goudarzi et al, 2011 was reported that the oil showed an antibacterial effect against food poisoning bacteria *Salmonella thyphimorium*, Enteropathogenic *E. coli* and *S. aureus* except *P. aeruginosa* and Methanol extract of *Carum copticum* plant have an antibacterial activity against multi-drug resistant *S. typhi*.

3.12. *Cinnamomum zeylanicum*-Kurundu (Lauraceae)

Juice of the leaves and bark of *C. zeylanicum* is been used in the formulation of SVT. *C. zeylanicum* has an anti-bacterial activity against the food spoilage bacteria *E. coli*, *P. aeruginosa* and *S. aureus* (Nimje et al, 2013). Essential oil of *C. zeylanicum* had an anti-fungal activity on *C. albicans*, *C. tropicalis* and *C. krusei* (Castro et al, 2013). It also has anti-inflammatory, anti-oxidant, anti-ulcer and anti-diabetic activities. *Cinnamomum zeylanicum* showed an antibacterial activity on *S. aureus*, *S. pyogenes*, *E. coli*, *Serratia marcescens*, *Enterobacter cloacae*, *Klebsiella pneumoniae*, *P. aeruginosa* and *Proteus mirabilis* (Hussein et al, 2014). Ethanol extract of Cinnamon showed an anti-bacterial activity against the *Pseudomonas sp.*, *E. coli*, *Bacillus subtilis* and *S. aureus*. Acetone extract of Cinnamon showed an antibacterial activity against *Pseudomonas sp.*, *E. coli*, *Bacillus subtilis*. Acetone extract of Cinnamon showed no activity against *Staphylococcus aureus* (Usha et al, 2012).

3.13. *Cleome viscosa* L.-Rammanissa (Capparidaceae)

Juice of *Cleome viscosa* plant is been used in the formulation of SVT. The pharmacological studies was reported that *Cleome viscosa* has various biological activities such as anthelmintic, antimicrobial, analgesic, anti-inflammatory, immunomodulatory, antipyretic, psychopharmacological, anti-diarrheal, and hepatoprotective activities (Mali et al, 2010) and the leaves and seeds of *Cleome viscosa* is used to treat infections, fever, rheumatism and headache. The whole plant is used to treat middle ear inflammations, wounds and ulcers. Methanol extract of *C. viscosa* has showed an antibacterial activity against *E. coli*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *P. aeruginosa*, *Bacillus subtilis*, *S. aureus* and *Streptomyces pneumoniae*, while the aqueous extract showed activity against *Klebsiella pneumoniae*, *P. vulgaris* and *P. aeruginosa* (Saradha and Rao, 2010).

3.14. *Cocos nucifera*-Coconut (Palmae)

Coconut milk is used as the component of Sarvavishadi oil. *Cocos nucifera* has antibacterial, antiviral, antioxidant, anti-neoplastic, and anti-inflammatory (Silva et al, 2013), antitumor, anthelmintic, antidotal, antiseptic, aperients, aphrodisiac, astringent, depurative, diuretic, hemostat, pediculicide, refrigerant, stomachic, styptic, suppurative and vermifuge activities (Singla et al, 2011). The oil of coconut shells are used against ringworm infections in India. The alcoholic extract of ripe dried coconut shell has antifungal activity against *Microsporium canis*, *M. gypseum*, *M. audouinii*, *Trichophyton mentagrophytes*, *T. rubrum*, *T. tonsurans* and *T. violaceum* (Venkataraman et al, 1980). The endocarp of *Cocos nucifera* fruit extracts showed antimicrobial activity against *B. Subtilis*, *P. Aeruginosa*, *S. Aureus*, *M. Luteus* and but not showed response against *E. coli* and clinical strains of bacterial and fungal microbes (Singla et al, 2011). *Cocos nucifera* mesocarp powder showed an anti-bacterial activity against *E. coli* and *salmonella typhi* (Verma et al, 2012).

3.15. *Crotalaria laburnifolia* Linn -Yakberiya (Leguminosae)

Scientific reported data were poor on *Crotalaria laburnifolia* Linn.

3.16. *Cuminum cyminum*-Suduru (Apiaceae)

Seeds of *Cuminum cyminum* is been used as a paste in the formulation of SVT. The Antifungal chemicals by *Cuminum cyminum* essential oil have natural inhibitors to control the growth of the most important pathogenic *Candida* species and alternative therapies for Candidiasis (Naeni et al, 2014). Essential oil of *Cuminum cyminum* has antiseptic, an analgesic, anti-inflammatory, hemolytic, or anti-enzymatic action, sedative, stimulant, stomachic effects and Seeds of *Cuminum cyminum* has carminative, aromatic, stomachic, stimulant, astringent and cooling effects (Chaudhry et al, 2012). The aqueous extract of *Cuminum cyminum* showed an antibacterial effect against *E.coli*, *S.aureus*, *Salmonella species*, *Bacillus cereus* and *Aspergillus niger* (Dua et al, 2013).

3.17. *Curcuma zedoaria*-Haran kaha (Zingibaraceae)

Rhizomes of *Curcuma zedoaria* is been used as a paste in the formulation of SVT. This plant is used in the treatment of digestive and gall bladder disorders, cough, hepatic disorders,

halitosis, inflammations, microbial infections (Bugno et al, 2007), menstrual disorders, dyspepsia, vomiting and cancer. The rhizomes of the *Curcuma zedoaria* plant are used to clean and heal ulcers, wounds and other kinds of skin disorders, flatulence, dyspepsia, cold, cough and fever. The extract of *Curcuma zedoaria* has an antifungal activity against *C. albicans*, *C. tropicalis*, and *C. glabrata* which is collected from the oral cavity of patients carrying HIV (Cristiane et al, 2011). The Leave extract with Methanol, Leave extract with Petroleum ether, Rhizome extract with Methanol and Rhizome extract with Petroleum ether showed an anti-microbial activity against Gram-positive bacteria (*B. cereus*, *B. megaterium*, *B. subtilis*, *S. aureus*, *Sarcina lutea*), gram-negative bacteria (*S. paratyphi*, *S. typhi*, *V. parahemolyticus*, *V. minicus*, *E. coli*, *Shigella dysenteriae*, *P. aureus*, *Shigella boydii*) and Fungi (*S. cerevaceae*, *C. albicans*, *A. niger*) (Das and Rahman, 2012).

3.18. *Erythrina indica-Erabadu* (Leguminosae)

The bark of *Erythrina indica* is used as a juice in the formulation of SVT. Root extract of *Erythrina indica* showed an antibacterial activity against methicillin resistant *S. aureus* and extracts of *E. indica* are showed an antimicrobial potential against *P. aeruginosa*, *B. subtilis*, *S. aureus* and *P. funiculosum* (Agarwal and sarin, 2014). The combined ethanol extracts of *Erythrina indica*, *Saraca indica*, *Symplocos racemosa*, *Hemidesmus indicus*, *Aloe vera*, *Asteracantha longifolia* and *Tribulus terrestris* has significant antimicrobial activity against the bacterial strains, *E. coli*, *Proteus mirabilis*, *Gardnerella vaginalis* and *P.aeruginosa* and the fungal strains, *C. albicans* and *A. niger* (Deattu et al, 2012).

3.19. *Eugenia Caryophyllata-Clove* (Myrtaceae)

Paste of the flowers of *Eugenia caryophyllata* is been used in the formulation of SVT. Essential oil of *Eugenia caryophyllata* has an Antiviral activity on *Herpes simplex* and *Hepatitis C virus*, Antibacterial effect against *E. coli*, *Helicobacter pylori*, *S. aureus* (Singh et al, 2012) and Antifungal activity on fungal strains of *C. albicans*, *A. niger* and *A. flavus* (Rahimifard et al, 2008).

3.20. *Feronia limonia Linn-Divul* (Rutaceae)

Juice of the bark of *Feronia limonia* is been used in the formulation of SVT. The leaves, bark and fruits of *Feronia limonia* used as traditional medicines due to their antimicrobial, antidiarrheal, antioxidant, hepatoprotective, antitumor, antidiabetic and CNS depressant activities. The leaves extract of the plant showed moderate antibacterial activity against Gram positive bacteria such as *Staphylococcus saprophyticus* and *Staphylococcus pyogenes* and Gram negative bacteria such as *E. coli*, *Shigella boydii*, *Shigella dysentery* and *Shigella flexneri* (Momin et al, 2013). The different extracts of *Feronia limonia* against various bacterial and fungal strains (bacterial strains *Salmonella typhimurium*, *Klebsiella pneumonia*, *E. coli*, *P. aeruginosa* and fungal strains *A. niger*, *A. flavus*) indicate that the plant has powerful antibacterial and antifungal effects (Jayashree et al, 2014).

3.21. *Ferula foetida-Perunkayam* (Umbelliferae)

Paste of Oleo gum resin extracted from the roots and rhizome of *Ferula foetida* plant is been used in the formulation of SVT and

the resins of this plant is used to treat the diseases such as bronchitis, hysteria, stomach pain, insect bite, headache (Rahman et al, 2009), Whooping cough, Migraine, Cancer, Nervous disorders, Depression & Hysteria. The plant has an antifungal activity against *Microsporeum gypseum* and *Trichophyton interdigitale* and aqueous and alcoholic extracts of *F. foetida* has antimicrobial activity against various bacterial and fungal strains such as *B. subtilis*, *S. aureus*, *E. coli*, *P. aeruginosa*, *C. albicans* and *P. chrysogenum* (Kareparamban et al, 2012).The aqueous extract of *Ferula foetida* aerial parts has inhibitory and candidacidal effect against *Candida albicans* (Jafari et al, 2014).

3.22. *Gossypium herbaceum-Kapu* (Malvaceae)

Juice of the leaves of *Gossypium herbaceum* is been used in the formulation of SVT. Gossypol (A compound of *Gossypium herbaceum*) and its derivatives have antimicrobial activity and wound healing effect (Velmurugan et al, 2014). Free Flavonoids fraction extract of seeds and free flavonoids of the callus tissues of species of *Gossypium herbaceum* showed ant bacterial activity against *T. viride*, *B. cerus*, *S. thypimurium* and Free Flavonoids fraction extract of seeds showed activity against *B. cerus* and *S. epidermidis*. But this plant had not showed any activity against *Candida albicans* (Chathurdevi et al, 2010).

3.23. *Gynandropsis penlaphyllata DC-Vela* (Capparidaceae)

Juice of the whole plant is been used as the content of SVT. *Gynandropsis pentaphylla* Linn (Syn. *Gynandropsis gynandra* L., *Cleome gynandra* L.) is used in traditional medicine due to its antimicrobial and anthelmintic activity. The leaves are used to treat wounds to prevent the sepsis, headaches, earache, stomachache, constipation, conjunctivitis, thread-worm infections and decoction of roots are used to treat fever & whole plant is used in the treatment of malaria, piles, tumors and rheumatism. (Thenmozhi et al, 2013). Hexane and methanol extracts of the plant has an antibacterial activity against the gram positive bacteria named *B. cereus*, *B. subtilis* and *S. aureus* and gram negative bacteria named *E. coli*, *P. aeruginosa* and *S. faecalis*. It has an antifungal activity against the *C. albicans*, *Penicillium sp*, *Fusiparum oxyposirum* (yeasts); *A. niger* and *A. flavus*. *C. albicans* is the most sensitive and *A. niger* is the least sensitive (Ajaiyeoba, 2000).

3.24. *Madhuca indica-Mee* (Sapotaceae)

Juice of the leaves and bark of *Madhuca indica* (Syn; *Madhuca longifolia*) plant is the content of the formulation of SVT. The leaves of the plant are used in treatment of eczema and seeds are used to relive pain in muscle and joints. The flowers of the plant are used in treatment of cough and bronchiolitis and bark is used for treatment of ulcers and wounds. The plant is used externally for the skin infections. Methanol extract and aqueous extracts of *Madhuca indicia* showed significant antibacterial activity against the *S. aureus* and *E. coli* (Sarma et al, 2013), Methanol extract of the leaves of *Madhuca indica* have an antifungal activity and can be exploited against skin infections caused by *Candida*, *Aspergillus* and dermatophytic strains (Krishnamoorthi et al, 2014). The bark extracts of *M. indica* showed antibacterial activity against *Bacillus subtilis*, *S. aureus*, *S. epidermidis* and *E. coli* (Nimbekar et al, 2012).

3.25. *Mallotus Philippinensi* Mullarg- *Kampillaka* (Euphorbiaceae)

The juice of the leaves and bark of *Mallotus Philippinensi* Mullarg is ben used in the preparation of SVT and the bark of *Mallotus Philippinensi* Mullarg is used to treat typhoid, meningitis and stomach disorders such as diarrhoea, dysentery, worms and stomachic effect. Hexane, chloroform and ethanol leaf extract showed antibacterial activity against *S. pneumonia*, *P. vulgaris*, *P. aeruginosa*, *S. typhi*, *E. coli* and *Vibrio species*. Only the ethanol extract showed antimicrobial activity against the fungi *A. flavus* and *C. albicans* (Velanganni et al, 2011). The plant extracts also shows antibacterial activity against the *Escherichia coli*, *Salmonella typhi* (Sharma &Varma, 2013).

3.26. *Mallotus repandus* muell Arg-Kappetiya (Euphorbiaceae)

Juice of the leaves of *Mallotus Philippinensi* Mullarg is the content of the formulation of SVT. The compounds derived from the plant shows an antioxidant, antiviral, antimicrobial, anti-inflammatory or cytotoxic activities (Riviere et al, 2010).

3.27. *Mesua ferrea* Linn- *Na tree* (Guttiferae)

Juice of the bark of *Mesua ferrea* is been used in the formulation of SVT. *Mesua ferrea* has different biological activities include carminative, expectorant, cardiotonic, diuretic, antipyretic (Chahar et al, 2013), anti-asthmatic, anti-inflammatory, antispasmodic activity, antimicrobial & anthelmintic activities (Chanda et al, 2013). Methanol extract of *M. ferrea* flowers shows significant antibacterial activity against *S. aureus*, *Bacillus spp.*, *Salmonella spp.*, *Pseudomonas spp.*, *S. pneumonia*, *Sarcina lutea*, *Proteus mirabilis* and *Lactobacillus arabinosus*. But the plant was less sensitive to *Klebsiella*, *V. cholera*, *E. coli*, *Shigella spp.* The light petroleum ether, chloroform and ethanol extracts of *M. ferrea* seeds, leaves and stem bark active against gram positive bacteria (*B. subtilis*, *B. megaterium*, *Str. β-haemolyticus*, *Str. aureus*, *Sarcina lutea*), gram negative bacteria (*Shigella sonnei*, *E. coli*, *Klebsiella species*, *Shigella shiga*, *S. boydii*, *S. flexneriae*, *S. dysenteriae*, *Salmonella typhi* and *Pseudomonas aeruginosa*) and pathogenic fungi (*Penicillium notatum*, *A. niger*, *Trichoderma viride*, *A. flavus*, *C. albican* and *Hensinela californica*) (Chahar et al, 2013).The hexane and methanol extracts of *Mesua ferrea* exhibited the high activity against the *P. vulgaris* and *B. subtilis* but there is any activity against *E. coli*. Methanolic extract of *Mesua ferrea* was most sensitive against *A. niger* and *A. flavus*. Extracts of *Mesua ferrea* seeds were inactive against *Candida albicans* but there are antimicrobial activity against various human pathogenic bacteria and fungus (Rawat et al, 2012).

3.28. *Michelia champaka* Linn- *Sapu* (Magnoliaceae)

The bark of *Michelia champaka* is used as the juice in the preparation of SVT. The plant shows antipyretic, analgesic, anthelmintic, antihyperglycemic, antiulcer, antioxidant, antifertility (Raja & koduru, 2014), anti-inflammatory, antimicrobial and anti-cancer activity. *Michelia champaca* has antibacterial activity against *P. aeruginosa*, *E. coli*, *S. aureus*, *B. subtilis*, *S. typhosa*, *S. paratyphi*. The crude extract exhibited high anticandidal activity on *C. albicans*. Methanolic, Ethanolic and aqueous extractions of the flowers of *Michelia champaca* has

antibacterial activity on *S. aureus*, *B. subtilis*, *E.coli*, *P. aeruginosa* (expect methanolic extract) and antifungal activity against a *Candida albicans* (kumar et al, 2011).

3.29. *Moringa olifera* linn-Murunga (Moringaceae)

Juice of the leaves, barks and roots of the *Moringa olifera* is been used in the formulation of SVT. The plant shows an antibiotic, antitrypanosomal, hypotensive, antispasmodic, antiulcer, anti-inflammatory, hypocholesterolemic, and hypoglycemic activities (Fahey, 2005). *Moringa oleifera* exhibited high activity against *C.albicans*, *S.aureus* and *E. feacalis*, and weak activity against *E.coli*, *P.aeruginosa*, *Klebsiella pneumonia* and *S. tiphymurium* (Marrufo et al, 2013). Cold water extract of fresh leaves shows a significant antibacterial effect against *S. shinga*, *P. aeruginosa*, *S. sonnei*, *Pseudomonas spp.* and *S. aureus*, *B. cereus*, *S.-B-hemolytica*, *B. subtilis*, *S. lutea* & *B. megaterium*. Ethanol extract of fresh leaves also showed high antibacterial effect against Gram-negative bacteria (*S. shinga*, *P. aeruginosa*, *S. sonnei*, *Pseudomonas spp.*) and some Gram-positive bacteria (*B. cereus*, *B. subtilis*, *S. lutea*, *B. megaterium*) (Rahman et al, 2009).

3.30. *Myristica fragrams*-*Sadikka* (Myristicaceae)

Paste of the fruits of *Myristica fragrams* is been used as the content of SVT. Hexane, chloroform, ethanol and methanol extract of *Myristica fragrams* shows antifungal activity against *C. albicans* and *A. niger* strains. (Pooja et al, 2012).The plant extract have an antibacterial activity against *E. coli* strain while the non-pathogenic strains of *E. coli* are not and *Streptococcus mutans* are inhibited by the plant extract but the harmless bacteria in mouth cavity are unaffected. Ethanol and acetone extracts exhibited antibacterial activity against gram positive bacteria (*Bacillus subtilis* and *Staphylococcus aureus*) and there is no activity against gram negative bacteria such as *E. coli* and *P. aeruginosa* (Ibrahim et al, 2013).

3.31. *Nigella sativa*-*Kaluduru* (Ranunculaceae)

Paste of the seeds of *Nigella sativa* Linn is the content of the formulation of SVT and seeds has an anti-inflammatory, analgesic, antipyretic, antimicrobial and antineoplastic activity and it is used to the treatment for the diseases include asthma, diarrhea and dyslipidemia (Ali and Blunden, 2003). The essential oil of *Nigella sativa* Linn showed an antibacterial activity against the gram positive bacteria such as *S. aureus*, *S. epidermidis* and gram negative bacteria like *S. pyogenes*, *E. faecalis*, *S. agalactiae* and *P. aeruginosa*. But *Acinetobacter baumannii*, *Citrobacter freundii*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *P. vulgaris* and *Vibrio cholera* were insensitive to the oil (Salman et al, 2008).

3.32. *Phyllanthus emblica*- *Nelli* (Euphorbiaceae)

Paste of the fruits of *Phyllanthus emblica* (Syn: *Emblica officinale*) is been used in the formulation of SVT and the fruits have anti-viral, antibacterial, anti-cancer, anti-allergy, and anti-mutagenic properties (Aneja et al, 2010) and the plant used in conjunctivitis, inflammation, dyspepsia, ulcerative stomatitis, gastropheliosis, cough, diarrhoea, dysentery, diabetes, asthma, bronchitis, ophthalmopathy, colic, jaundice, emaciation, cardiac disorder, intermittent fever, hepatopathy, hemorrhages, menorrhagia and skin diseases (Patil et al, 2012). The fruits are

reported as the rich natural source of Vitamin C and it is used in the treatment of human scurvy due to the presence of Vitamin C (Govind and Panday, 2011). *E. officinale* fruit contain the antibacterial active compounds against *E. coli*, *S. aureus*, *K. pneumoniae* and *Pasteurella multocida* (Patil et al, 2012). The plant exhibit the significant antibacterial activity against *E. coli*, *K. ozaenae*, *K. pneumoniae*, *Proteus mirabilis*, *P. aeruginosa*, *S. paratyphi A*, *S. paratyphi B* and *Serratia marcescens* (Khan, 2009).

3.33. *Piper longum*-Thippili (*Piperaceae*)

Paste of the fruits of *Piper longum* is been used in the formulation of SVT. *Piper longum* is used in the treatment of bronchitis, diabetes mellitus, itching, flatulents, constipation and it is also used as nervine tonic and hepato-protective agent. The extracts of *Piper longum* exhibited a good antimicrobial activity against bacterial pathogens, such as *Staphylococcus albus*, *S. typhi*, *P. aeruginosa*, *E. coli* and *Bacillus megaterium* and chloroform, ethyl acetate, acetone and ethanol extracts of *Piper longum* exhibited antifungal activity against *A. niger*. Thippili has an antibacterial activity against two gram positive bacteria stains such as *S. faecalis*, *Streptococcus pyogenes* and two gram negative bacteria such as *E. coli* and *S. paratyphi* (sindhu et al, 2013).

3.34. *Piper nigrum*-Gammiris (*Piperaceae*)

Fruits of *Piper nigrum* (Pepper) are used as a paste in the preparation of SVT. The plant is used in traditional medicine as aphrodisiac, carminative, stomachic, antiseptic diuretic agent and for the treatment of cough, rheumatoid arthritis, peripheral neuropathy, melanoderma and leprosy. Piperine which is the major chemical constituent of *piper nigrum* has antimicrobial activity against *S. aureus*, *B. subtilis*, *P. aeruginosa*, *E. coli*, *Alternaria alternata*, *A. niger*, *A. flavus* and *Fusarium oxysporum* (Rani et al, 2013). The cold water and hot water extracts of the *Piper nigrum* showed an antibacterial activity against the gram positive organisms include *Staphylococcus aureus* and *Enterococcus faecalis* and gram negative bacteria include *E. coli*, *P. aeruginosa* and *S. typhae*. Methanol extract of the plant has significant antibacterial activity against *E. faecalis*, *E. coli*, *P. aeruginosa* and *S. typhae*, but there is no activity against *S. aureus* (Khan et al, 2013).

3.35. *Pongamia pinnata*-Magul Karanda (*Leguminosae*)

Paste of the leaves and bark *Pongamia pinnata* is used in as the component of the formulation of SVT and the plant is used in the treatment of tumors, piles, skin diseases such as leucoderma and leprosy, wounds, ulcers, muscular and articular rheumatism due to their anti-inflammatory, anti-plasmodial, anti-nonceptive, anti-lipidperoxidative, anti-diarrhoeal, anti-ulcer, anti-hyperammonic and anti-oxidant activity (Niranjan et al, 2013). The folwer extracts of *Pongamia pinnata* shows significant antibacterial activity against *E. coli*, *B. cereus*, *B. subtilis*, *K. pneumoniae*, *S. aureus* and *Enterobacter aerogenes* (Kagithoju et al, 2012). The methanol extracts of the leaves had significant antibacterial activity on bacterial pathogens such as *E. coli*, *S. aureus*, *K. pneumonia*, *B. subtilis*, *E. aerogenes*, *P. aeruginosa*, *S. typhimurium*, *S. typhi*, *S. epidermidis* and *P. vulgaris* (Arote et al, 2009 & Sirinivasan et al, 2001).

3.36. *Pterocarpus santalinus* Linn-Rath Handun (*Leguminosae*)

The stem of *Pterocarpus santalinus* is been used as the content of the formulation of SVT. There is significant antimicrobial activity against *B. subtilis*, *P. aeruginosa*, *S. aureus*, *E. coli* and *C. albican* (Gabriel & Onigbanjo, 2010). The stem bark extract of *pterocarpus santalinus* showed maximum activity against *Enterobacter aerogenes*, *Alcaligenes faecalis*, *E. coli*, *P. aeruginosa*, *P. vulgaris*, *B. cereus*, *B. subtilis* and *S. aureus*. The leaf extract of *pterocarpus santalinus* showed maximum activity against *E. coli*, *Alcaligenes faecalis*, *Enterobacter aerogenes* and *P. aeruginosa* (Manjunatha et al, 2010). Ethanol extracts of the leaves of *Pterocarpus santalinus* had significant antibacterial activity against Gram positive, *S. aureus* and Gram negatives, *Acinetobacter sp.*, *Chromobacterium violeceum*, *Citrobacter freundii*, *E. coli*, *Klebsiella sp.*, *Proteus sp.*, *P. aeruginosa*, *S. typhi* and *V. cholera* (Dubey et al, 2012).

3.37. *Ricinus communis*-Erandu (*Euphorbiaceae*)

The juice of the leaves and bark is been used in the formulation of SVT. The leaf, root and seed oil of *Ricinus communis* plant is used for the treatment of the inflammation, liver disorders, constipation, fever, ascitis, bronchitis, cough, leprosy, skin diseases, colic, asthma, diseases of the rectum and head, burns, arthritis, arthralgia, vaginal pain, elephantiasis and etc.(Ladda and Kamthane, 2014). *Ricinus communis* showed good antimicrobial activities against dermatophytic and pathogenic bacterial strains *S. progenies*, *S. aureus* as well as *K. pneumonia*, *E. coli* (Jena and Gupta, 2012). The essential oils of castor Seeds have an antibacterial activity against Gram positive bacteria include, *S. aureus*, *B. cereus*, *S. faecium*, *S. pyogenes*, *B. marcesene* and *S. mitis* while the Gram negative bacteria include, *E. coli*, *P. aeruginosa*, *Shigella dysenteriae*, *Salmonella enteritidis*, *S. typhimurium*, *K. pneumoniae* and *P. vulgaris* more than antifungal activity against *Fusariumoxysporum*, *Penicilliumoxalicum*, *C. albicans*, *Penicillium cinirium*, *A. flavus* and *A. niger* (Momoh et al, 2012).

3.38. *Santalum album*-Sudu handun (*Santalaceae*)

The stem of *Santalum album* is been used as the paste in the formulation of SVT. The plant used in traditional medicine to treat various diseases such as gastric irritability, dysentery, genital urinary disorders, prickly heat, skin diseases, fever (Sreedevi and Damodharam, 2015), Headaches, insomnia, nervous tension and antiviral effects and respiratory tract infections. The methanol extract of *Santalum album* activity against the Gram-positive organism the Gram-negative bacteria Such as *B. subtilis*, *S. typhi*, *S. aureus* and *P. aeruginosa* high activity against *C. albicans* and inactive against *E. coli*, *A. Niger* (Bakkiyaraj and Pandiyaraj, 2011). Ashok and Jayaprakash, 2012 reported that the stem of *Santalum album* shows antimicrobial activity on the strains of *S. aureus*, *E. coli*, *K. pneumonia* and *A. niger*. *Santalum album* showed antibacterial activity against gram-negative bacteria *Pasteurella multocida*, *E. coli* and three gram-positive bacteria *Bacillus cereus*, *Corynebacterium bovis* and *S. aureus* (Hussain et al, 2011).

3.39. *Sesamum indicum* (*Pedaliaceae*)

The oil of the seeds of *Sesamum indicum* is the content of the formulation of SVT and the seeds are rich source of oil which

has natural antioxidants such as Sesamol and Sesamin (Ogunsola and Fasola, 2014).

3.40. *Tamarindus indica*-Siyambala (*Leguminosae*)

The bark of *Tamarindus indica* is been used as the juice in the formulation of SVT and it has been used in traditional medicine in the treatment of the various diseases such as stomach disorders, general body pain, jaundice, and yellow fever, and as blood tonic and skin cleanser. Acetone and ethanol extracts of the *Tamarindus indica* were active against both gram positive and gram negative bacteria (*E. coli*, *Proteus mirabilis*, *P. aeruginosa*, *S. typhi*, *S. paratyphi*, *Shigella flexneri* for gram negative bacteria and *S. aureus*, *Bacillus subtilis* and *Streptococcus pyogenes* for gram positive bacteria) (Doughari, 2006). The aqueous and methanol extracts of fruits showed an antibacterial activity against *E. coli*, *S. typhi* and *P. aeruginosa* and the ethanol extract against *E. coli*, *S. typhi*, *P. aeruginosa* and *S. aureus*. The leaf ethanol and methanol extracts showed an antibacterial activity against *S. typhi* and *P. aeruginosa* (Ugoh and Haruna, 2013).

3.41. *Terminalia belerica*-Bulu (*Combretaceae*)

Paste of the fruits of *Terminalia belerica* is been used in the formulation of SVT. The fruits of *Terminalia belerica* is used to cure several ailments such as cough, cold, hoarseness of voice, asthma, arrest bleeding, boost hair growth, impart black colour to hair, conjunctivitis (Devi et al, 2014), diarrhea, skin diseases and oral thrush. Methanol extract of *Terminalia bellerica* dry fruit is highly effective against *S. aureus* & has potential broad spectrum antimicrobial activity (Elizabeth et al, 2005). Aqueous extract exhibited significant activity against the bacteria such as *E.coli*, *P. aeruginosa*, *Klebsiella pneumonia*, *Shigella flexneri* and *S. typhi* and fungal strains such as *A. niger*, *Mucor species*, *A. fumigatus*, *Rhizopus species* and *A. flavus* (Devi et al, 2014). Ethanolic, methanolic, chloroform, ethyl acetate and aqueous extracts of *Terminalia belerica* possess high antimicrobial potential against Gram- positive bacteria: *Bacillus subtilis*, *Bacillus cereus*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Enterococcus faecalis*, *Micrococcus luteus*, *Listeria monocytogenes* and Gram-negative bacteria: *Salmonella enterica*, *Klebsiella pneumoniae*. This study reported that the crude extracts and essential oil of *T. belerica* shows an antifungal activity to control *Aspergillus sp.*, *Fusarium sp.* and *Alternaria alternata* strains (Saxena and Pal, 2013).

3.42. *Terminalia chebula*-Aralu (*Combretaceae*)

Paste of the fruits of *Terminalia chebula* is been used in the formulation of SVT. *Terminalia chebula* has multiple pharmacological and medicinal activities, such as antioxidant, antimicrobial, antidiabetic, hepatoprotective, anti-inflammatory, antimutagenic, antiproliferative, radioprotective, cardioprotective, antiarthritic, anticaries, gastrointestinal motility and wound healing activity (Bag et al, 2013) and used to cure several diseases such as fever, cough, diarrhea, gastroenteritis, skin diseases, candidiasis, urinary tract infection and wound infections. The *T. chebula* fruit extract was highly effective against *S.typhi*, *S.epidermidis*, *S.aureus*, *B.subtilis* and *P.aeruginosa* (Kannan et al, 2009). The extracts of *T. chebula* showed an antibacterial activity against several bacterial strains.

It is effective in inhibiting *Helicobacter pylori*, *Xanthomonas campestris*, *Salmonella typhi* and dental caries causing microorganisms such as *Streptococcus mutans*, *S. aureus*, *Lactobacillus acidophilus* and two yeasts *C. albicans* and *Saccharomyces cerevisiae* (Aneja and Joshi, 2009).

3.43. *Vitex negundo*- Nika (*Verbenaceae*)

Juice of the leaves and bark of *Vitex negundo* is been used in the formulation of SVT. The plant is used as an antimicrobial agent against *salmonella paratyphi*, *klebsiella pneumonia*, *vibrio cholera*, *streptococcus mutans* and *E. coli* (Rose and Cathrine, 2011). Flavonoids (free and bound) of *Vitex negundo* Linn showed significant antimicrobial activity against the gram positive bacteria such as *S. aureus* and *P. aruginosa*, gram negative bacteria such as *E. coli* and *Proteus mirabilis* and four fungi (*A. flavus*, *A. niger*, *C. albicans*, *Trycophyton mentegrophyte*) (Keerti and Padma, 2012). Crude extract of hexane, chloroform and methanol of leaf and flower exhibited potential bactericidal properties and the plant can be used in treating diseases caused by *B. cereus*, *B. subtilis*, *S. epidermidis*, *Enterobacter aerogenes*, *E. coli*, *K. pneumoniae*, *P. vulgaris*, *P. aeruginosa*, *P. putida* and *S. typhimurium* (Srinivas et al, 2010).

3.44. *Withania somnifera*- Ashwagandha (*Solanaceae*)

Juice of the leaves and rhizome of the plant is been used in the formulation of SVT. *Withania somnifera* has pharmacological value as an antibacterial, antioxidant, adaptogen, aphrodisiac, liver tonic, anti-inflammatory agent. Ethanol, methanol, Ethyl acetate, acetone, chloroform, Petroleum ether, hexane, hot water, and extracts of *Withania somnifera* has an antibacterial activity against *E. coli*, *Micrococcus luteus*, *P. aeruginosa*, *B. cereus*, *K. pneumonia* and *S. aureus* and it has an antifungal activity against *A. niger*, *C. albicans*, *C. tropicalis*, *Cryptococcus neoformans* and *Candida kefyr* (Velu et al, 2002 & Mehrotra et al, 2011).

3.45. *Zingiber officinale*- Inguru (*Zingiberaceae*)

The Rhizome of *Zingiber officinale* is been used as the paste in the preparation of SVT and the plant is well-known as spice in Asian countries and it is used in traditional medicine in the treatments of ailments such as cold-induced disease, nausea, asthma, cough, colic, heart palpitation, swellings, dyspepsia, loss of appetite, rheumatism and etc. (Benerjee et al, 2011). The antifungal and antibacterial activity of ginger has been attributed to gingerol and shagelol derived from the ethanol extracts of ginger. The Ethanol extract of Ginger powder has noticeable inhibitory activities against *Candida albicans* (Supreetha et al, 2010). Fresh ginger juice showed antibacterial activity against *A.niger*, *Sacharomyces cerevisiae*, *Mycoderma spp.* and *Lactobacillus acidophilus*. The aqueous extract of ginger roots showed an antibacterial activity against various Gram-negative and Gram-positive bacteria such as *Klebsiella pneumoniae*, *Proteus vulgaris*, *Streptococcus pyogenes* and *Staphylococcus aureus* (Ahmed et al, 2012).

IV. CONCLUSION

Sarvavishadi Thaila is active against *Pseudomonas aeruginosa*, *Staphylococcus aureas*, *Salmonellae typhi*, and *Klebsiella*. Liyange et al, 2015 in the proceeding of National conference on

Indigenous system of Medicine- 2015 was reported that the Sarvavishadi Thaila showed poor Antifungal activity against the *Candida albicans*. According to the reports on the antimicrobial activity of the plant ingredients of the Sarvavishadi thaila, the preparation should have antibacterial and antifungal activities.

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