

## Anti-microbial activity of Siddha formulation “Avuri Mathirai”

\*G.Monica<sup>1</sup>, A.Harini<sup>1</sup>, B.Sanju Vikashini<sup>1</sup>, S.Mariselvi<sup>1</sup>, R.Abinayasundari<sup>1</sup>, M.Maheswari<sup>1</sup>,  
Thomas. M. Walter<sup>2</sup>.

<sup>1</sup>Second Year BSMS, Government Siddha Medical College, Palayamkottai, [monicaguna2000@gmail.com](mailto:monicaguna2000@gmail.com)

<sup>2</sup>Lecturer, Government Siddha Medical College, Palayamkottai, [siddhawalter@gmail.com](mailto:siddhawalter@gmail.com)

### ABSTRACT

Siddha medicine is a traditional system of medicine originated in India. According to this system, when the normal equilibrium of the three humors- *Vatham*, *Pitham*, and *Kabam* is disturbed, the disease is caused. They may be disturbed by environment, climatic conditions, diet, physical activities, and stress. *Avuri mathirai* (AV) is a siddha formulation indicated mainly for the disease *Narambu Silanthi* (*Dracunculiasis*). *Avuri* is mainly used as an antidote in Siddha system. It is also used for curing Jaundice. Its root is used to cure Acid Peptic disease, leucoderma, and poisonous bites. In this work, we have mentioned about the antimicrobial property of *Avuri mathirai* against *Staphylococcus aureus*, *Streptococcus mutans*, *Bacillus subtilis*, *Klebsiella pneumoniae*, *Proteus vulgaris* and *E.coli* by Agar disk diffusion method.

### KEYWORDS

Siddha medicine, Narambu silanthi, Avuri mathirai,

### INTRODUCTION

In recent days, there has been growing interest in researching and developing many antimicrobial agents from various plant sources. A variety of laboratory methods can be used to evaluate or screen the invitro antimicrobial activity of an extract. The most known and basic methods are disk diffusion and broth or agar dilution methods.

*Avuri mathirai* is used for treating *Narambu Silanthi* (*Dracunculiasis*) in Siddha system. The drug was tested for the antimicrobial property against *Staphylococcus aureus*, *Streptococcus mutans*, *Bacillus subtilis*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *E.coli* by Agar disk diffusion method. The result obtained from the study showed that AV has anti microbial property against

Staphylococcus aureus, Streptococcus mutans, Proteus vulgaris, Bacillus subtilis, Klebsiella pneumonia and E.coli.

## MATERIALS AND METHODS

The drug *Avuri mathirai* was selected from the book “*Gunapadam-Mooligai Part-1*” which is an approved text to take this medicine for research. The ingredients for this formulation are Indigofera tinctoria, Ferula asafoetida and Piper nigrum, which were bought from the raw drug store. This formulation when taken with the salt less diet, cures *Narambu Silanthi* (Dracunculiasis).

Table 1. Antimicrobial results of Avuri karpam

SAMPLE CODE	BACTERIAL STRAINS					
	Staphylococcus aureus(G+)	Streptococcus mutans(G+)	Bacillus subtilis (G+)	Klebsiella pneumoniae (G-)	Proteus vulgaris (G-)	E.coli(G-)
AV	14	12	14	11	13	12
PC	31	14	29	24	31	20
NC	NZ	NZ	NZ	NZ	NZ	NZ

**Note:** PC - Positive Control, NC - Negative Control, mm – Millimetre, G+ - Gram positive organism, G- - Gram negative organism, ‘NZ’ - No zone

## ANTI MICROBIAL ACTIVITY

### ANTI BACTERIAL ACTIVITY PROCEDURE

#### DILUTION

0.1g in 1ml

#### TEST ORGANISM

The test microorganisms used for the antimicrobial analysis, Streptococcus mutans, Staphylococcus aureus, Proteus vulgaris, Klebsiella pneumoniae, Bacillus subtilis, E.coli were purchased from the microbial type culture collection and Gene Bank(MTCC) Chandigarh. The bacterial strains were maintained on Nutrient Agar(NA).

#### NUTRIENT BROTH PREPARATION

Pure culture from the plate were inoculated into the nutrient agar plate and subcultured at 37<sup>0</sup>c for 24 hours. The inoculum was prepared by aseptically adding the fresh culture into 2ml of sterile

0.145mole/Liter saline tube and the cell density was adjusted to 0.5 MC Farland turbidity standard to yield a bacterial suspension of  $1.5 \times 10^8$  cfu/ml. Standardized inoculum used for antimicrobial test.

### **ANTIMICROBIAL TEST**

The medium was prepared by dissolving 38g of Muller Hinton Agar medium (HI Media) in 1000 ml of distilled water. The dissolved medium was autoclaved at 15 Lbs pressure at  $121^{\circ}\text{C}$  for 15 minutes (PH 7.3). The autoclaved medium was cooled, mixed well and poured into petriplates (25ml/plate) the plates were swabbed with pathogenic bacteria culture viz. Streptococcus mutans, Staphylococcus aureus, Klebsiella pneumoniae, Bacillus subtilis, E.coli, Proteus vulgaris. Finally the sample or sample loaded disc was then placed on the surface of Muller Hinton medium and the plates were kept for incubation at  $37^{\circ}\text{C}$  for 24 hours. At the end of the incubation, inhibition zones were examined around the disc and measured with interpreted as the absence of activity (Kohner et al.,1994: Mathabe et al.,2006). The activities are expressed as resistant, if the zone of inhibition was less than 7mm, intermediate(8-10 mm) and sensitive if more than 11 mm(Assam et al.,2010)

### **ANTIFUNGAL ASSAY BY DISC DIFFUSION METHOD (Bauer et al.,1966)**

Antibiotic susceptibility tests were determined by agar disk diffusion(Kirby-Bauer method). Fungi strains were swabbed using sterile cotton swab in SDA agar plate upto 40Microlitre of each concentration of the extract were respectively introduced in the sterile discussing sterile pipettes. The disk was then placed on the surface of SDA medium and the compound was allowed to diffuse for 5 minutes and then plates were kept for incubation at  $22^{\circ}\text{C}$  for 48 hours. At the end of incubation, inhibition zones were examined around the disk and measured with transparent ruler in millimeters.

#### **Staphylococcus aureus**

Staphylococcus aureus us an important pyogenic organism and lesions are localized in nature in contrast to streptococcal lesions which are spreading in nature.

#### ***(i)Cutaneous infections***

It includes pustules, boils, carbuncles, abscesses, styes, impetigo.

### ***(ii) Deep infections***

These include osteomyelitis, tonsillitis, pharyngitis, sinusitis, pneumonitis, empyema, endocarditis, meningitis, septicaemia and pyaemia.

### ***(iii) Food poisoning***

It is caused due to the ingestion of contaminated food.

### ***(iv) Nosocomial infections***

### ***(v) Skin Exfoliative diseases***

Stripping of the superficial layers of the skin from the underlying tissue occurs in the various exfoliative syndromes caused by Staphylococci.

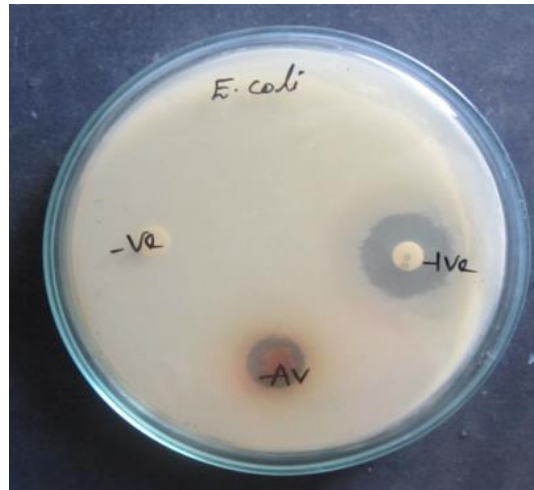
### ***(vi) Toxic shock syndrome (TSS)***

It is caused by toxic shock syndrome toxin and characterized by high fever, hypotension, vomiting, diarrhea and rashes.



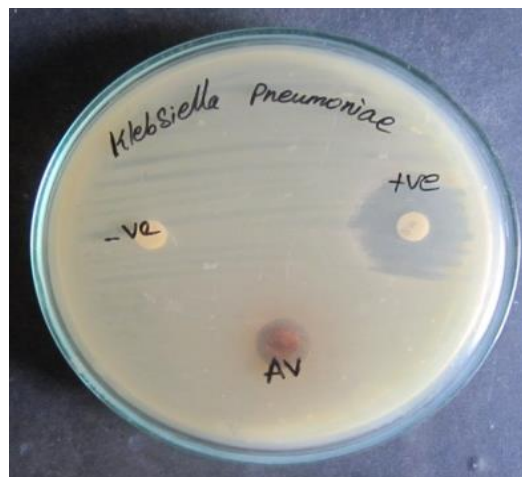
## **Escherichia coli**

Escherichia coli is a gram-negative, facultative, anaerobic, rod-shaped, coli form bacterium of the genus Escherichia that is commonly found in the lower intestine of warm-blooded organisms. There are four major types of clinical syndromes. They are UTI, diarrhoea, pyogenic infections, and septicaemia. Escherichia coli causing diarrhoeal diseases are of five groups are Enteropathogenic E.coli , Entero toxigenic E.coli, Enteroinvasive E.coli, Entero hemorrhagic E.coli, Entero-aggregative E.coli .It may cause wound infection, peritonitis, cholecystitis and neonatal meningitis. It is an important cause of neonatal meningitis.



### **Klebsiella pneumonia**

*Klebsiella pneumoniae* causes a wide range of infections including pneumonia, UTI, bacteremia and liver abscesses. The most common condition caused by *Klebsiella* bacteria is pneumonia, typically in the form of bronchopneumonia and also bronchitis. Individuals with *Klebsiella pneumoniae* tend to cough up characteristic sputum as well as having fever, nausea, tachycardia and vomiting. It has toxin very similar to the heat-stable toxin of *E. coli*. The disease is characterized by a massive mucoid inflammatory exudate of lobar or lobular distribution involving one or more lobes of the lung. Necrosis and abscess formation are more frequent than in pneumococcal pneumonia.



### **Streptococcus mutans**

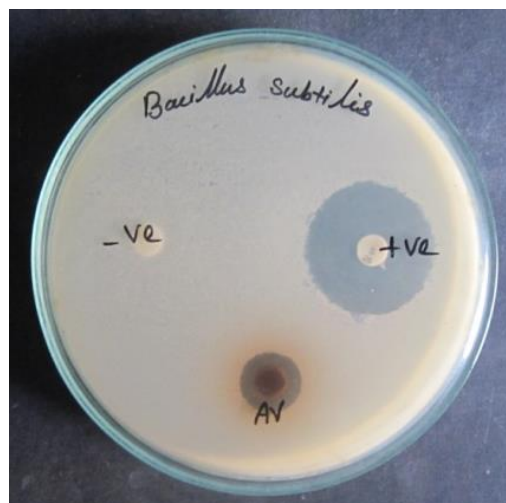
*Streptococcus mutans* is a facultatively anaerobic, gram-positive coccus commonly found in the human oral cavity and is a significant contributor to tooth decay. *Streptococcus mutans* are commensals still they have the capability to raise the severity of disease condition due to their

ability to produce glycan and lactic acid . Streptococcus mutans is known to be associated with bacteremia and infective endocarditis. Streptococcus mutans is implicated in the pathogenesis of certain cardiovascular diseases and is the most prevalent bacterial species detected in extirpated heart valve tissues, as well as in atheromatous plaques.



### **Bacillus subtilis**

Bacillus subtilis is a gram-positive, catalase-positive bacterium, found in soil and the gastrointestinal tract of humans. It is also known to cause abscesses, bacteremia, wound and burn infections, ear infections, endocarditis, meningitis, ophthalmitis ,osteomyelitis and peritonitis.



### **Proteus vulgaris**

Proteus vulgaris is a gram-negative bacterium that inhabits the intestinal tract of humans. It comes under Enterobacteriaceae and is an opportunistic pathogen of humans. It commonly causes UTI and it also causes cystitis, pyelonephritis, prostatitis, wound infection and burn infections.



## CONCLUSION

From the results of the present study, it is concluded that the medicine *Avuri mathirai* shows anti microbial activity against *Staphylococcus aureus*, *Streptococcus mutans*, *Proteus vulgaris*, *E.coli*, *Bacillus subtilis*, *Klebsiella pneumoniae*. The result shows more positive against *Streptococcus mutans*. So, AV may be effective against the diseases caused by *Streptococcus mutans* like dental caries, bacteremia, and infective endocarditis. Further researches are to be done in the future to prove its efficacy against *Narambu Silanthi* (*Dracunculiasis*).

## REFERENCES

1. K. S. Murugesu Mudhaliyar, Gunapadam Mooligai Part -I, 3<sup>rd</sup> edition(2018), Directorate of Indian medicine and Homeopathy, Chennai.
2. R. Ananthanarayan and C. K Jayaram Paniker, Textbook of Microbiology, 5<sup>th</sup> edition(1996), Orient Longman.
3. Dr.C.P.Baveja, Textbook of Microbiology,5<sup>th</sup>edition(2017),Arya publications.
4. T. V. Sambasivampillai, Siddha Medical dictionary, Vol IV(Part II), Department of Indian medicine and Homeopathy, Chennai.
5. T urnbull PCB. Bacillus. In: Baron S, editor. Medical Microbiology [Internet]. 4th ed. Galveston (TX): University of Texas Medical Branch at Galveston; 1996 [cited 2019 Jun 16]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK7699/>