

**ANTI-MICROBIAL PROFILING OF INDIGENOUS SIDDHA DRUG AAVARAI KARUKKU KUDINEER AGAINST GRAM POSITIVE PATHOGENS****S.Manju^{*1}, L.Sridevi², V.Rani³, N.Manju Hemamalini⁴**

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ABSTRACT

Acute nasopharyngitis infections accounts for 20–40% of outpatient and 12–35% of inpatient attendance in a general hospital. Upper respiratory tract infections including nasopharyngitis, pharyngitis, tonsillitis and otitis media constitute 87.5% of the total episodes of respiratory infections. Upper respiratory tract involving the nose, sinuses, pharynx and larynx. Symptoms of acute nasopharyngitis are similar to those of the common cold and include nasal congestion and discharge, facial pain over the sinuses, decreased sense of smell, and cough. Nasopharyngitis will be treated with either penicillin or amoxicillin, given their relatively low cost and low adverse effect profile. Amoxicillin is well-tolerated, but some common complaints can be gastrointestinal (GI) symptoms, such as nausea, vomiting, and diarrhoea. Another significant complication to be aware of is hypersensitivity reactions. Despite of its therapeutic efficacy recent emerging trends in anti-microbial drugs resistance among the infective pathogens triggers the search of alternate therapy. Traditional medicines pioneers the art of treating microbial infections and further it also minuses the chances of occurrence of resistance even upon chronic administration. Siddha is one of the oldest therapy emerged from southern zones of India that master the art of healing infections by its versatile formulations. Aavarai Karukku Kudineer (AVKK) is one such novel herbal preparation which claims to have broad spectral anti-microbial property as per the literature. Hence the present study aimed at evaluating the anti-microbial activity of the formulation AVKK by using disc diffusion assay. From the results of the present investigation it was evident that the sample AVKK possesses significant antimicrobial activity with maximal inhibitory zone of 18mm against *Staphylococcus aureus* in the concentration ranging from 250 and 2000 µg when compare to that of the standard drug streptomycin (20µg) which shows the maximum inhibitory zone of about 24 mm, were as the drug seems not effective against *Streptococcus* mutants. It was concluded that the siddha formulation AVKK possess significant anti-microbial activity against *Staphylococcus aureus* in a dose dependent manner

KEY WORDS: *Nasopharyngitis, Staphylococcus aureus, Resistance, Siddha formulation, Aavarai Karukku Kudineer, Anti-microbial*

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1. Introduction

Nasopharyngitis (common cold) is a frequent cause of upper respiratory tract infection and most patients with this diagnosis with present with nasal congestion (80%). Nasopharyngitis rarely presents with a fever causes are predictably due to microbial infection. Treatment of the common cold is symptomatic, and hand washing is the best prevention [1].

Staphylococcus aureus is a serious human pathogen known to cause numerous bacterial infections at the level of the bloodstream, respiratory tract, and skin and soft tissue [2]. Penicillin was initially highly effective for treatment of *S. aureus* infections. However, the widespread use of the penicillin led to the emergence of penicillin-resistant *S. aureus* (PRSA) [3]. With the release of beta-lactamase-resistant penicillins such as methicillin and oxacillin in the 1970s, methicillin-resistant *S. aureus* (MRSA) emerged and became an important cause of infectious diseases acquired in hospitals and communities worldwide [4].

It has been purported that secondary metabolites from medicinal plants have minimal adverse reactions and also can repress the growth of pathogens by diverse mechanisms than the currently used synthetic antibiotics. Often these secondary metabolites differ among the species of plants with respect to their quantity, diversity and biological activities [5]. The abundance and diversity of high-value secondary metabolites in plants render them a remarkable source of antibacterial agents for pharmaceutical industries. About 25–28 % of modern medicines are formulated from the diverse secondary metabolites of higher plants [6]. It is envisaged that the plant-derived drug market will grow from 29.3 billion US dollars in 2017 to around 39.2 billion by 2022 [7]. Therefore, the screening of medicinal plants could facilitate the discovery of novel and effective natural products suitable for biopharmaceutical sectors.

Siddha is one of ancient traditional practice adopted to rescue the health and wellbeing of the individual. Despite of its rich heritage on herbs in recent time the advancement in the technology explores the actual mechanism by which the drug acts. Herbal preparations possess biologically active therapeutics called secondary metabolites which has tendency to halt the progression of wide range of infections. By

considering the novelty each siddha formulation are actually a composite of multiple therapeutic ingredients so that the approach of anti-infective mechanism become complex and thereby greatly nullify the chance of anti-microbial resistance. Aavarai Karukku Kudineer (AVKK) is a novel herbal preparation claims to have broad spectral anti-microbial property as per the literature. Hence the present study aimed at evaluating the anti-microbial activity of the formulation AVKK by using disc diffusion assay.

2. Materials and Methods

2.1. Anti-Microbial Assay [8]

The antibacterial activities of the sample AVKK were carried out by agar cylinder diffusion method. The concentrations of the test compounds were used at the concentration of 250, 500, 1000 and 2000 µg/ml. The target microorganisms were cultured in Mueller–Hinton broth (MHB). After 24 h the suspensions were adjusted to standard sub culture dilution. The Petri dishes containing Muller Hinton Agar (MHA) medium were cultured with diluted bacterial strain. Cylinder with 6mm diameter is made aseptically with a sterile cork borer. Each concentration was inoculated to the cylinder. Standard drug Streptomycin (10µg) was used as a positive reference standard to determine the sensitivity of each microbial species tested. Then the inoculated plates were incubated at 37°C for 24 h. The diameter of the clear zone around the disc was measured and expressed in millimeters as its anti-microbial.

3. Results

3.1. Effect of Aavarai Karukku Kudineer against Gram positive pathogens

From the results of the present investigation it was evident that the sample AVKK possesses significant antimicrobial activity with maximal inhibitory zone of 18mm against *Staphylococcus aureus* in the concentration ranging from 250 and 2000 µg when compare to that of the standard drug streptomycin (20µg) which shows the maximum inhibitory zone of about 24 mm. As shown in Table 1 and represented in figure 1&2. Were as the drug seems not effective against *Streptococcus mutans*.

Table 1: Table 1: Zone of Inhibition data of Anti-bacterial activity of Aavarai Karukku Kudineer

Sample Code	<i>Streptococcus mutants</i>				<i>Staphylococcus aureus</i>			
	250 µg	500 µg	1000 µg	2000 µg	25 µg	50 µg	100 µg	200 µg
AVKK	-	-	-	-	12	14	15	18
Streptomycin (10µg)	14				25			

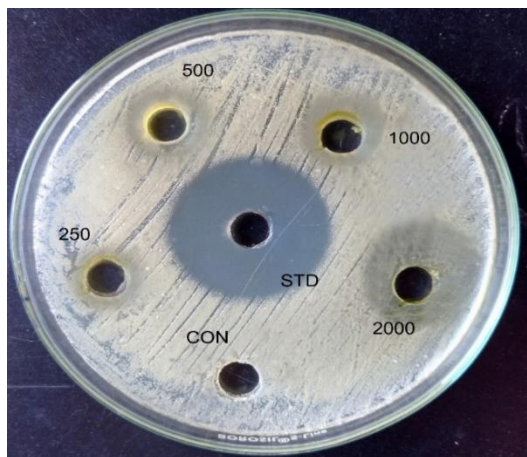


Figure 1: Anti- Microbial Effect of AVKK against *Staphylococcus aureus*

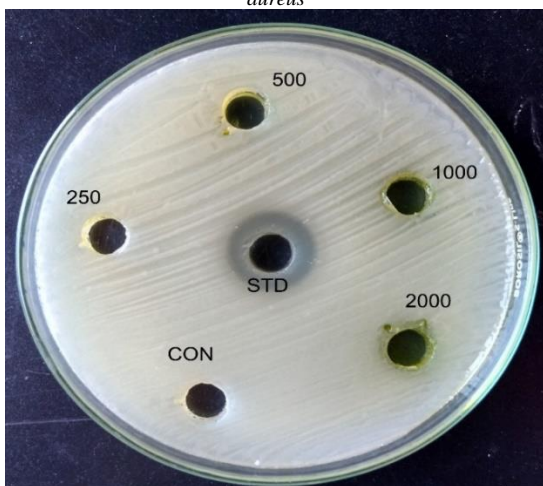


Figure 2: Anti- Microbial Effect of AVKK against *Streptococcus mutants*

4. Discussion

Acute pharyngitis is caused by viruses in more than 70 percent of cases in young children. Mild pharyngeal redness and swelling and tonsil enlargement are typical. Streptococcal infection is rare in children under five and more common in older children. In countries with crowded living conditions and

populations that may have a genetic predisposition, poststreptococcal sequelae such as acute rheumatic fever and carditis are common in school-age children but may also occur in those under five [9].

Clinical differentiation of viral, bacterial, and fungal pharyngitis is challenging owing to similarities in presentation. Sore throat, odynophagia, and fever are all common features. These symptoms typically peak within 3 to 5 days and resolve by day ten [10]. Although some pathogen-specific symptoms have been reported, predictive values have only been formulated for group A streptococcus (GAS) pharyngitis

Streptococcus (GAS) pharyngitis is the most common bacterial cause of pharyngitis in children and adolescents, with a peak incidence in winter and early spring [11]. Streptococcus pharyngitis is also more common in school-aged children or in those with a direct relation to school-aged children. A recent meta-analysis showed that the prevalence of bacterial pharyngitis in those less than 18 years old who present to an outpatient center for treatment for a sore throat was 37%, and for children younger than 5, it was 24% [12].

Those with bacterial nasopharyngitis shall be treated with either penicillin or amoxicillin. Regular usage of amoxicillin can lead to type-I, II, III, or IV reactions. It is important to differentiate between a type-I and type-IV hypersensitivity reaction because one may be more dangerous than the other [13]. A type-I reaction is an IgE-mediated hypersensitivity to a sensitized patient that triggers widespread histamine release leading to an urticarial like pruritic rash or even more severe systemic symptoms, such as anaphylaxis. Crystalluria, nephritis, and hemolytic anemia can happen with prolonged administration.

From the ancient time, herbal medicines have been used for the welfare of mankind as medicines to cure the series of diseases. New drugs of plant derivation are crucial because they are cheap, have little side effects and in accordance with WHO, about 80% of the world population are still depends mainly on plant based drugs [14, 15]. As of now, it is well established that medicinal plants serve as lead molecules in modern medicines and nutraceuticals because of their derived phyto-constituents [16]. That involves with the development of essential drugs against a variety of pharmacological targets. From the results of the

present investigation it was evident that the sample AVKK possesses significant antimicrobial activity with maximal inhibitory zone of 18mm against *Staphylococcus aureus* in the concentration ranging from 250 and 2000 µg when compare to that of the standard drug streptomycin (20µg) which shows the maximum inhibitory zone of about 24 mm, were as the drug seems not effective against *Streptococcus* mutants.

5. Conclusion

Growing recognition of natural products the demand for medicinal plants has been increasing all over the world. They have minimal toxicity, are cost effective and pharmacologically active, and provide an easy remedy for many human ailments as compared to the synthetic drugs which are a subject of adulteration and side effects. It was concluded that the siddha formulation Aavarai Karukku Kudineer possess significant anti-microbial activity against *Staphylococcus aureus* in a dose dependent manner.

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6. References

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