INTRODUCTION

Medicinal plants are natural medicines useful in several ways for the treatment of different diseases [1]. A. vera is a succulent plant belonging to family Xanthorrhoeaceae, species has been distributed in temperate and tropical regions of the world (Fig 1). A. vera has been used throughout history in folk medicine as valuable ingredient for the food, pharmaceutical and cosmetic industries [2]. A. vera has been used for medicinal purposes in several cultures for millennia: Greece, Egypt, India, Mexico, Japan and China [3]. The herb is used internally to treat digestive problems, including constipation, poor appetite [4], gastrointestinal reflux disease, peptic ulcers, diabetes, immune system enhancement and used for topical treatment for skin infections, minor and major wounds. A. vera leaf possesses antitumor, anti-ulcer, anti-inflammatory, antioxidant, antihyperlipidemic, antiviral and antibacterial activities. The aqueous and chloroform extracts of A. vera decreased the edema induced in the hind-paw and the number of neutrophils migrating into the peritoneal cavity [5]. The chemistry of the plant has revealed the presence of more than 200 different biologically active substances. The A. vera plant contains different nutrient contents including vitamins, minerals, enzymes, sugars, phenolic compounds, lignin, saponins, sterols and amino acids. Many biological properties associated with Aloe species are contributed by inner gel of the leaves [6]. Anthraquinones and tricyclic aromatic quinines are the major secondary metabolites that are abundantly present. Among the naturally occurring anthraquinone derivatives, Aloe emodin and chrysophanol are the major compounds [6, 7].

MATERIALS AND METHODS

Collection of plant material

Aloe vera plants were collected from Pamidi Kothapalli Village, Anantapuramu district.

Preparation of plant extract

The leaf samples were washed thoroughly 2-3 times with running tap water and once with sterile water, air-dried and crushed to small pieces and powdered in an electric grinder. Twenty grams of powdered plant materials mixed with 100 ml of methanol. After complete solvent evaporation, extracts were dissolved in 10 % dimethyl sulphoxide (DMSO) to a final concentration of 50 mg/ml and stored at 5° C.

Preliminary phytochemical analysis

The methanolic extract of A. vera subjected to preliminary phytochemical screening by using standard procedures of Trease and Evans, 1978 [8].

Thin Layer Chromatography

TLC plates were prepared by using Silica Gel as adsorbent. Silica gel-G (15 gm) was mixed with 30 ml of distilled water to make slurry. The slurry was immediately poured on to the plates. Plates were then allowed to air dry for one hour and layer was fixed by drying at 100°C for one and half hours. Using a micropipette, about 10 µl of extracts were loaded gradually over the plate and air dried. The plates were developed by using two different solvent systems. Solvent system I consist of Chloroform: Methanol (12:2) and Solvent system II consist of Ethyl acetate: Formic acid (2.2:1.1:1.1). The Rf values of methanolic leaf extract in solvent system I is 0.66 and solvent system II is 0.42. The methanolic leaf extract of A. vera exhibited antimicrobial activity on S. aureus ATCC 25923 and MRSA. Maximum zone of inhibition was observed at 50 mg/ml of methanolic leaf extract of A. vera.

Conclusion: The present results suggest that methanolic leaf extract of A. vera have significant antibacterial activity against Staphylococcus aureus ATCC 2592 and Methicillin Resistant Staphylococcus aureus (MRSA).

Keywords: Thin layer chromatography, phytochemicals, antimicrobial, phenolic compounds.
Antibacterial activity evaluation by Agar well diffusion assay

In vitro antibacterial activity was evaluated by Agar well diffusion method using Mueller Hinton Agar (MHA). Working stock was prepared as 1 ml of each bacterial strain was initially inoculated in 100 ml of sterile Mueller Hinton broth and incubated for 37° C for 24 hr respectively. Then 0.2 ml of each test organisms from the working stock were seeded into 100 ml sterile MHA medium and cooled to 48° C to 50° C in a sterile petri dish respectively. When the MHA solidifies, six holes of uniform diameter (7 mm) were made using sterile aluminum borer. Then, 70 µl of each methanolic leaf extracts standard solution (10, 20, 30, 40, 50 mg/ml) respectively and control (Ciprofloxacin 25 mg/ml) were placed in each hole separately under aseptic condition. The plates were then maintained at room temperature for 2 hr to allow the diffusion of the solution into the medium. All the bacterial plates were then incubated at 37° C for 18 hr and the zone of inhibition was measured (mm, including the diameter of the hole) and the results were recorded.

Result and Discussion

Preliminary phytochemical analysis

The preliminary phytochemical analysis showed the presence of carbohydrates, glycosides, amino acids, phenolic compounds, steroids, terpenoids, tannins, saponins, flavonoids and alkaloids were present in methanolic leaf extract of A. vera (Table 1). Phytochemical constituents seemed to have the potential to act as a source of useful drugs and also to improve the health status of the consumers due to the presence of various compounds [10].

<table>
<thead>
<tr>
<th>Phytoconstituents</th>
<th>Mobile phases</th>
<th>Spraying reagent</th>
<th>Rf values</th>
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<tbody>
<tr>
<td>Alkaloids</td>
<td>Chloroform:</td>
<td>Dragendorff reagent</td>
<td>0.66</td>
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<tr>
<td>Phenols</td>
<td>Ethyl acetate: Toluene: Formic acid (2.2:1.1:1.1)</td>
<td>FeCl3 reagent</td>
<td>0.42</td>
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</tbody>
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Fig 2: TLC fingerprinting of methanolic leaf extract of A. vera in solvent system I and II.

Antimicrobial activity

The inhibition zone diameter of methanolic leaf extract against selected bacterial strains was shown in Table 3. The methanolic leaf extract of A. vera exhibited antimicrobial activity on S. aureus ATCC 25923 and MRSA. S. aureus ATCC 25923 was more sensitive to methanolic leaf extract of A. vera when compared to MRSA. Maximum zone of inhibition was observed at 50 mg/ml of methanolic leaf extract of A. vera on S. aureus ATCC 25923 and MRSA.

Table 3: Antimicrobial activity of methanolic leaf extract of S. aureus ATCC 25923 and MRSA (Means±SD).

<table>
<thead>
<tr>
<th>Microorganisms</th>
<th>Zone of Inhibition measured in mm</th>
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<tbody>
<tr>
<td></td>
<td>Leaf aqueous extract (mg/ml)</td>
</tr>
<tr>
<td></td>
<td>Ciprofloxacin 10 20 30 40 50 mg/ml</td>
</tr>
<tr>
<td>S. aureus ATCC 25923</td>
<td>27.23 ±0.23 14.12 16.23 20.58 24.22 26.69</td>
</tr>
<tr>
<td>MRSA</td>
<td>26.3 ±2.36 10.69 12.36 14.45 16.12 18.24</td>
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<td>±0.36 ±1.25 ±2.36 ±2.06 ±0.13 ±1.26</td>
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CONCLUSION

It is concluded that A. vera plant is a richest source of phytochemical constituents and has antimicrobial activity on S. aureus ATCC 25923 and MRSA. Further studies are needed to identify and evaluate the efficiency of the A. vera plant compounds against S. aureus ATCC 25923 and MRSA.

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REFERENCES