



# INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare &amp; Pharmascope Foundation

Journal Home Page: [www.pharmascope.org/ijrps](http://www.pharmascope.org/ijrps)

## Phytochemical Analysis and Antimicrobial activity of leaf and stem of *Ipomoea staphylina* Roem. & Schult.

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### Article History:

Received on: 24 Apr 2020

Revised on: 25 May 2020

Accepted on: 28 May 2020

### Keywords:

*Ipomoea staphylina* Roem. & Schult, phytochemical screening, antifungal activity, leaf and stem extracts, antibacterial activity

### ABSTRACT

*Ipomoea staphylina* Roem. & Schult. A plant belonging to Convolvulaceae is commonly found on hedges and bushes in the forests and wastelands. It is a perennial, woody and glabrous shrub with pink flowers. Traditionally *Ipomoea staphylina* is used for respiratory disorders. Traditionally genus *Ipomoea* is used as purgative, dyspepsia, anthelmintic, bronchitis. Medicinal plants are the primary sources of medicines in Ayurvedha, Siddha, and Folk medicine systems. In India, about 95% of all modern drugs are derived from medicinal plants and very likely most of these medicines are used by people to cure many ailments. The Ayurvedic literature "Sarangdhar Samhita" highlighted the concept of polyherbalism to achieve greater therapeutic efficacy. The active phytochemical constituents of individual plants are insufficient to meet the desirable therapeutic effects. When combining the multiple herbs in a particular ratio, it will give a better therapeutic effect and reduce the toxicity. Most of them are active even at a low dose and safe at a high dose. Thus they have superior risk to benefit ratio. Based on this the present study deals with physicochemical, phytochemical studies such as and biochemical estimation of medicinal plant of a combined mixture of polyherbal *Ipomoea staphylina*, also study evaluates the ethanol and methanol extracts of leaf and stem for their preliminary phytochemical analysis, antibacterial and antifungal activity. In the study of the phytochemical analysis reveals the presence of carbohydrate, protein, flavonoids, glycosides, alkaloids. The *Ipomoea staphylina* of ethanolic leaf and stem extract showed potent antimicrobial activity in all the tested concentrations against *E. coli*, *Staphylococcus aureus*, *Bacillus subtilis* and *Aspergillus niger*. *Ipomoea staphylina* could be exploited as a valuable source of antibacterial agent enriching with known antimicrobial compounds. Further studies needed for future drug development to treat various infectious diseases by microbes.



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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11i3.2759>

Production and Hosted by

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### INTRODUCTION

Plants are integral to nature. Nature reflects the creative power of living god. Plants are a source of medicine has been an ancient practice and is a crucial component of the health care system in India, Andaman, Nicobar Island, Eastern Himalayas and the Western Ghats were concentrated region in more than 45,000 medicinal plants available in India (Kumar and Masooda, 2013; Rao et al., 2012).

The plant produces a wide variety of phytochemical constituents, which are secondary metabolites and

are used either directly or indirectly in the pharmaceutical industry. For centuries man has effectively used various components of plants or their extracts for the treatment of many diseases, including bacterial infections (Murugan *et al.*, 2013).

Medicinal plants have played a pivotal role in primary healthcare and formed the basis of traditional systems of medicines. Plants have been bestowed us with food, spices, flavours, fragrances, medicines, etc.. plant is being used to treat many diseases or ailments viz. Infectious diseases, inflammatory disorders, skin diseases etc. since ancient time (F *et al.*, 1993; Houghton, 1995).

According to the World health organization (WHO), more than 80% of the world's population relies on traditional medicine for their primary healthcare. Needs medical plants to contain large varieties of chemical substances, which possess essential therapeutic properties that could be utilized in the treatment of human diseases.

The potential of higher plants as a source of new drugs is still largely unexplored. Among the estimated 2, 50,000 -5,00,000 plant species only a small % has been investigated phytochemical and the fraction submitted to the biological or pharmacological investigation of a given plant will reveal only a very narrow spectrum of its constituents. Historically pharmacological screening of compounds or synthetic origin have been the source of innumerable therapeutic agents. Random selection as a tool in discovering new biologically active molecule has been most productive in the area of antibiotics (Kwiecinski *et al.*, 2008).

Plants are considered not only as a dietary supplement to living organisms but also traditionally used for treating many health problems, and the medicinal value of many plants remains unexplored. Investigations of plants are carried out to find novel drugs or templates for the development of new therapeutic agents.

Over 60% of the world human population, 80% in developing countries depends directly on plants for their medicinal purposes (Anushia *et al.*, 2009).

Phytochemicals are non-nutritive plant chemicals that have protective or disease preventive properties plant produces these chemicals to protect itself. Still, recent research demonstrates that many phytochemicals in fruits and herbs and each works differently (Dhillions *et al.*, 2000). Many plant extracts have been shown to inhibit the growth of micro-organisms. These extracts consist of chemicals and are usually considered to play a role in defence reactions of plants against infections by pathogenic

micro-organisms (Argal and Pathak, 2006).

Plants are the vital storehouse of many chemical metabolites. The medicinal value of plants has assumed a more critical dimension in the past two decades mainly owing to the discovery that extracts from plants contain many minerals, primary metabolites and secondary metabolites with antioxidant potential chemical metabolites present in green plants are grouped into primary and secondary metabolites (phytochemicals). Phytochemicals are good source medicinal drugs, for instance, that with antimicrobial effect are used for the treatment of microbial infections (Alkinmoladun *et al.*, 2007).

Since time immemorial plants have been widely used as sources of food, construction tools, clothing, spices, dyes and medicine. In various countries across the world, plants are used in primary healthcare either singly, or specific combinations by traditional medicinal practitioners countries, e.g. India, China, Bangladesh, Pakistan, Bhutan, Thailand and several European, American and African countries widely employ several plant species as medicine to cure several ailments or disorders. Plant-based medicines are prevalent in developing and under-developing countries as the high cost of modern drugs and no access to advanced medications to remote places. Plants have also been an indispensable component of traditional medicinal systems, namely Ayurveda, Siddha, (TCM) Traditional Chinese medicine and Unani drugs viz.. Aspirin, Quinine, Digoxin, Artemisinin, codeine and several others are from plant origin.

Plant-based drugs have been used worldwide in traditional medicines for the treatment of various diseases. India is the largest producer of medicinal herbs and appropriately called the botanical garden of the world (Jaiswal *et al.*, 2016). The pharmacology provides an alternative approach for the discovery of antimicrobial (activity) agents, namely the study of medicinal plants with a history of traditional use as a potential source of substance with significant pharmacological and biological activities pharmacological and biological activities such as antioxidant anti-cancerous and hepatoprotective.

The systemic screening of antimicrobial plant extracts represents a continuous effort to find new compound with the potential to act against multi-resistant pathogenic bacteria and fungi. phytochemical studies have attracted the attention of plant scientists due to the development of new and sophisticated techniques. These techniques played a significant role in the search for additional resources of raw material for the pharmaceutical

industry.

Phytochemicals such as flavonoids, terpenoids, alkaloids are plant-derived natural products, which have received considerable attention in recent years due to their diverse pharmacological properties, including cytotoxic and cancer chemoprotective effects (Kwiecinski *et al.*, 2008). Over 50% of the drugs isolated from the natural source were used in clinical trials for anti-tumour activity (Seifert *et al.*, 2008). In India, about 65% of the population relies on ethnomedicine for their primary health care needs, which is the only source of medicines.

Knowledge of herbs has been handed down from generation to generation for thousands of years. The revival of interest in natural drugs started in the last decade, mainly because of the widespread belief that green medicine is healthier than synthetic products. In the recent past, there has been a tremendous increase in the use of plant-based health products in developing as well as developed countries resulting in an exponential growth of herbal products globally. According to WHO, about 80% of the population in the world rely on traditional medicine for the treatment of various diseases (Padmaa *et al.*, 2018).

Medicinal plants have been tested for various kinds of activities such as antimicrobial, hypoglycemic, anthelmintic, hepatoprotective, antioxidant, analgesic, antipyretic activities. Medicinal plants such as *Ocimum gratissimum* and *Eugenia uniflora* are rich in volatile oils. It is also reported that they contain 75% thymol which has an antimicrobial effect against *Staphylococcus sp.*, *E. coli* and *Shigella sp.* They are also used in treatments like diarrhoea human ear infection.

Herbal medicines also offer therapeutics for age-related disorders like memory loss, osteoporosis, immune disorders etc. for which no modern medicine is available. The chemical constituents present in them are a part of the physiological functions of living flora, and hence they are believed to have better compatibility with the human body.

Therapeutic plants are generously available throughout the world. Therapeutic plants are now much more motivated than ever before because they are capable of producing numerous benefits to the community indeed to humanity, particularly inside the type of medication. These naturally occurring compounds are believed to form the building blocks of modern-day prescription medication as we recognize today (Sahu and Sharmistha, 2014; Owolabi *et al.*, 2007)

## MATERIALS AND METHODS

### Collection of plant

Collection of plant material fresh and healthy, disease-free leaves of *Ipomoea staphylina* were collected from Mandya Figure 1.



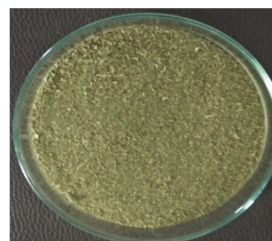
Figure 1: *Ipomoea staphylina*



Shade dried leaves



Shade dried stem



Powder of leaf



Powder of stem

Figure 2: Collection of plant and preparation of leaf and stem extract

### Preparation of leaf and stem extract

The aerial parts of plant fresh leaves and stem of *Ipomoea staphylina* leaves were two times washed thoroughly under running tap water and at last with sterile distilled water to remove the dirt and dried under shade dried at room temperature.

The shaded dried leaves were powdered in a blender or mixer grinder until fine, coarse powder obtained and stored in an airtight container at room temperature and they used for curd extraction Figure 2.

**Table 1: Phytochemical screening of *Ipomoea staphylina***

Sl.no	Test	Leaf			Stem		
		Ethanol	Petroleum ether	Aqueous	Ethanol	Petroleum ether	Aqueous ether
1	<b>Alkaloids</b>						
A	Mayer's test	+	-	-	-	-	-
B	Hager's test	-	-	-	-	---	-
2	<b>Carbohydrates</b>						
A	Fehling's test	+	-	+	+	+	-
B	Benedict's test	-	-	-	-	-	-
3	<b>Saponins</b>	-	-	-	-	---	-
4	<b>Glycosides</b>	-	+	+	+	+	+
5	<b>Flavonoids</b>						
A	Alkaline test	-	-	---	+	-	-
B	Ferric chloride	+	+	-	+	+	-
6	<b>Tannins</b>						
A	Iodine test	-	-	-	-	-	+
B	Nitric test	-	-	-	-	-	---
7	<b>Protein</b>						
A	Biuret test	-	+	-	-	-	-
8	<b>Steroids</b>	-	-	-	-	---	-

**Table 2: Antibacterial activity of *Ipomoea staphylina* against *Bacillus subtilis***

Sl.no	Extract used	Zone of inhibition in mm/conc. $\mu\text{g/ml}$					
		Positive control streptomycin	10	20	30	40	50
1	Leaf ethanol	29.6 $\pm$ 0.57	00 $\pm$ 00	6.33 $\pm$ 0.57	6.65 $\pm$ 0.57	6 $\pm$ 1	00 $\pm$ 00
2	Leaf pet.ether	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00
3	Leaf aqueous	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00
4	Stem ethanol	32.3 $\pm$ 0.57	7 $\pm$ 0	6.33 $\pm$ 0.57	00 $\pm$ 00	6 $\pm$ 0	5 $\pm$ 0
5	Stem pet.ether	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00
6	Stem aqueous	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00

values are represented as mean diameter of zone of inhibition in triplicates  $\pm$  standard deviation.

**Table 3: Antibacterial activity of *Ipomoea staphylina* against *Staphylococcus aureus***

Sl.no	Extract used	Positive control streptomycin	Zone of inhibition in mm/conc $\mu\text{g/ml}$				
			10	20	30	40	50
1	Leaf ethanol	39 $\pm$ 0	10 $\pm$ 1	13 $\pm$ 1	16.66 $\pm$ 2.08	16.33 $\pm$ 1.15	16.6 $\pm$ 0.57
2	Leaf pet.ether	66 $\pm$ 0	6 $\pm$ 1	00 $\pm$ 00	9 $\pm$ 1	6.3 $\pm$ 1.154	6 $\pm$ 0
3	Leaf aqueous	39 $\pm$ 0	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	17.6 $\pm$ 1.52	17.3 $\pm$ 1.52
4	Stem ethanol	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00
5	Stem pet.ether	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00
6	Stem aqueous	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00

values are represented as mean diameter of zone of inhibition in triplicates  $\pm$  standard deviation

**Table 4: Antibacterial activity of *Ipomoea staphylina* against *E.coli***

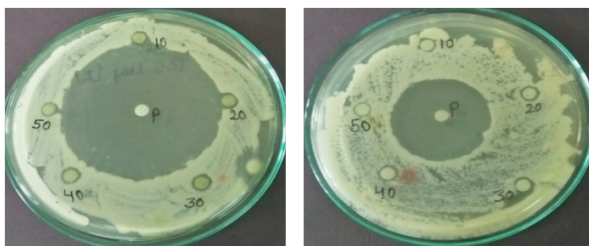
Sl.no	Extract used	Positive control streptomycin	Zone of inhibition in mm/conc. $\mu\text{g/ml}$				
			10	20	30	40	50
1	Leaf ethanol	38.3 $\pm$ 2.081	00 $\pm$ 00	00 $\pm$ 00	9 $\pm$ 1	8.33 $\pm$ 2.08	00 $\pm$ 00
2	Leaf pet.ether	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00
3	Leaf aqueous	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00
4	Stem ethanol	38 $\pm$ 1.73	6.66 $\pm$ 0.57	8 $\pm$ 0	29 $\pm$ 14	00 $\pm$ 00	6 $\pm$ 1
5	Stem pet.ether	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00
6	Stem aqueous	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00	00 $\pm$ 00

values are represented as mean diameter of zone of inhibition in triplicates  $\pm$  standard deviation

**Table 5: Antifungal activity of *Ipomoea staphylina* against *Aspergillus niger***

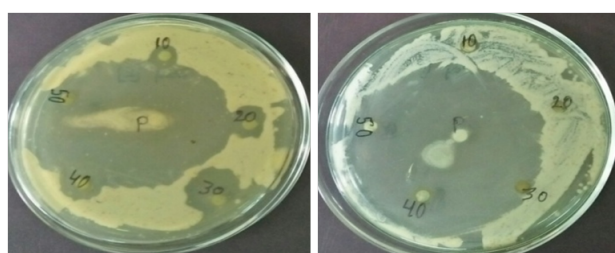
Sl.no	Extract used	Zone of inhibition in mm/conc. $\mu\text{g/ml}$	
		100	50
1	Leaf ethanol	-	9
2	Leaf pet.ether	-	-
3	Leaf aqueous	-	-
4	Leaf negative ethanol	-	-
5	Leaf negative pet.ether	-	-
6	Stem ethanol	-	-
7	Stem pet.ether	-	-
8	Stem aqueous	-	-
9	Stem negative ethanol	-	12
10	Stem negative pet.ether	-	-





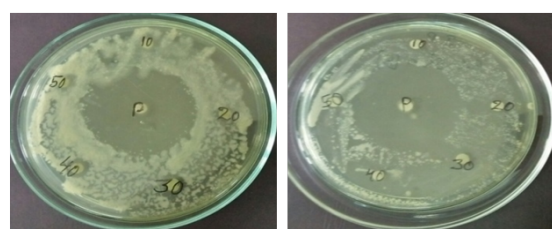
Ethanol leaf extract      Ethanol stem extract

**Figure 3: Antibacterial activity against *Bacillus subtilis***



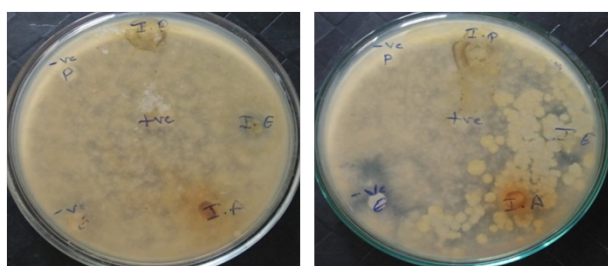
Ethanol leaf extract      Ethanol stem extract

**Figure 4: Antibacterial activity against *Staphylococcus aureus***



Ethanol leaf extract      Ethanol stem extract

**Figure 5: Antibacterial activity of against *E. coli***



Ethanol leaf extract      Ethanol stem extract

**Figure 6: Antifungal activity against *Aspergillus niger***

### Preparation of solvent extract

*Ipomoea staphylina* leaves, and stem extract was obtained by using three types of solvents (Petroleum ether, Ethanol, Aqueous). Take 40 gms of leaf and stem of fine powder in a 250 ml conical flask and add 100 ml of Ethanol, Petroleum ether, Aqueous in a conical flask and kept in a rotary shaker for 24 hrs. The extract was filtered through Whatman filter paper no.1, and the extract was kept for evaporate. Further, the dried residue was preserved in an airtight container or glassware for further analysis.

### Screening of Antibacterial activity

The Petroleum ether, ethanol and aqueous extracts of the plant were subjected to antimicrobial activity assay, by disk method. The bacteria inoculums were spread uniformly on the sterile nutrient agar plates with a sterile swab moistened with the bacterial suspension. Each organic solvent extract of *Ipomoea staphylina* (10, 20, 30, 40, 50  $\mu$ l from 100mg/ml stock solution) was taken in a micropipette separately, and they are loaded to the sterile discs.

Discs impregnated with organic solvent extracts at different concentrations, positive control was aseptically placed over bacteria seeded medium with the help of sterile forceps. The plates were incubated in an upright position at 37°C for 24 hrs, and the zone of inhibition was measured and expressed in mm.

Antimicrobial activity was recorded for each concentration of different extracts, including positive control by regulating the zone of inhibition in diameter surrounding the discs and each experiment performed in triplicates.

### Antifungal activity study

Antifungal activity was studied by using the paper disc diffusion method. The PDA medium was poured into a sterile Petriplate and allowed to solidify. The test fungal cultures were spread evenly over the media by sterile Cotton swabs. The discs were soaked in extracts of different concentration, and they are air-dried and stored in the refrigerator.

The pre-soaked disc was placed on the agar plate. Standard antibiotics disc and negative control were placed on the agar Petri plate in each set for each fungus which served as standard Petri plate were incubated at room temperature for 48 hrs. After the incubation period, the petriplates were observed for the occurrence of inhibitions, and the diameters were measured.

### PHYTOCHEMICAL TEST

Different extracts of *Ipomoea staphylina* were subjected to phytochemical analysis to detect the pres-

ence of the chemical Constituents. The chemical test was carried out to identify the presence of Phyto constituents in petroleum ether, ethanol and aqueous extract of *I. staphylyna* using the standard procedure.

#### **TEST FOR CARBOHYDRATES**

##### **Benedict's test**

1ml of the extract was treated with benedict's reagents and heated gently orange-red precipitate indicates the presence of reducing sugar.

##### **Fehling's test**

The plant extract was dissolved in 5ml of distilled water and filter. The filtrate was treated with 1ml of Fehling's solution [A&B] and heat in a boiling water bath. A reddish-orange precipitate is obtained.

#### **TEST FOR SAPONINS**

##### **Foam test**

Extract was treated with distilled water to 20ml, and this was shaken in a graduated cylinder for 15 min resulting in the formation of 1cm layer of foam indicates the presence of saponins.

#### **TEST FOR TANNINS**

##### **Iodine test**

Leaves and bark extract were treated with diluted Iodine solution and appearance of transient red colour indicates the presence of tannins.

##### **Nitric acid test**

Leaf and bark extract were treated with diluted Nitric acid and formation of reddish to yellowish colour indicates the presence of tannins.

#### **TEST FOR PROTEINS**

##### **Biuret test**

Leaf and bark extract were treated with 1ml of NaOH [10%] solution, and 1-2 drops of CuSO<sub>4</sub> solution is added. A violet colour indicates the presence of proteins.

#### **TEST FOR FLAVONOIDS**

##### **Alkaline test**

Extract was treated with a few drops of lead acetate solution. After a few minutes appearance of yellow colour, precipitate indicates the presence of flavonoids.

##### **Ferric chloride test**

To a small quantity of the extract dissolved in methanol and a few drop of neutral ferric chloride solution was added. If phenols and enols are present, it gives a green, blue, violet colour.

#### **TEST FOR GLYCOSIDE**

0.2g of the extract is dissolved in 1ml of glacial acetic acid containing one drop of ferric chloride solution then 1ml of concentrated sulphuric acid is added slowly. A brown ring obtained at the interface indicates the presence of glycosides.

#### **TEST FOR STEROIDS/TRITERPENOIDS AND THEIR GLYCOSIDES**

##### **Liebermann-Burchardt reagent**

Few mg of extract was dissolved in chloroform. To this 1-2ml of chilled acetic anhydride was added and mixed well. Then 2-3 drops of chilled concentration sulphuric acid were added along the sides of the test tube. The colour developed at the junction of the two liquids was observed. Steroids/triterpenoids gives a characteristic colour [red/pink/violet].

#### **TEST FOR ALKALOIDS**

The extracts were stirred with a few ml of dilute Hydrochloric acid and filtered. The filtrate was tested with various alkaloid reagents as follows:

##### **Mayer's test**

To a few ml of filtrate, 2-3 drops of Mayer's reagent was added along the sides of the test tube. A white (or) creamy precipitate indicates the presence of alkaloids.

##### **Hager's test**

To a few ml of filtrate, 2-3 drops of Hager's reagent was added along the sides of the test tubes. A yellow precipitate indicates the presence of alkaloids.

#### **RESULTS**

In the present study, the results were recorded for the phytochemical and antimicrobial activity of *Ipomoea staphylyna*. The phytochemical analysis of Ethanol, Petroleum ether, Aqueous extracts of *Ipomoea staphylyna* of leaf and stem showed in Table 1. The ethanol extract of the leaf shows the presences of Alkaloids, Carbohydrates and Flavonoids. The stem extract of ethanol shows the presences of Carbohydrates, Glycosides and Flavonoids. The petroleum ether extract of the leaf shows the presences of Glycosides, Flavonoids and Protein. The stem extract of petroleum ether shows the presences of Carbohydrates, Glycosides and Flavonoids. The aqueous extract of the leaf shows the presences of Carbohydrates, Glycosides. The aqueous extract of stem shows the presences of Tannins and Glycosides. The leaf extract of ethanol shows the absences of Saponins, Glycosides, Tannins and Protein. The stem extract of ethanol shows the absences of Alkaloids, Tannins and Protein.

The leaf extract of petroleum ether shows the absences of Alkaloids, Carbohydrates, Saponins

and Tannins. The stem extract of petroleum ether shows the absence of Alkaloids, Saponins, Tannins and Protein. The leaf extract of aqueous shows the absence of Alkaloids, Saponins, Tannins, Flavonoids and Protein. The stem extract of aqueous shows the absence of Alkaloids, Carbohydrates, Saponins, Flavonoids and Protein.

#### **Antibacterial activity of *Ipomoea staphylina* by paper disk diffusion method**

In the present investigation, the antibacterial activity of *Ipomoea staphylina* was carried out by disk diffusion method, against three bacterial strains viz., *B. subtilis*, *S. aureus* were Gram-positive, and *E. coli* were Gram-negative bacteria. Antimicrobial activity against all the test pathogens was conducted using three different solvents, namely Ethanol, Petroleum ether and aqueous extracts. The inhibition zone of different extract of *I. staphylina* was observed at a various concentration (10,20,30,40,50  $\mu\text{g/ml}$ ) after 24 hrs of incubation. An antibiotic Streptomycin is used as a positive control.

#### **Antibacterial activity of *Ipomoea staphylina* of different solvents against *B. subtilis***

In the petroleum ether extract of leaf and stem, no zones are formed. In the ethanol extract of leaf 20  $\mu\text{l}$  concentration shows the 19 mm of the zone. In the 30  $\mu\text{l}$  concentration shows the 20 mm. In the 40  $\mu\text{l}$  concentration shows the 18 mm. In the stem extract, 10  $\mu\text{l}$  concentration shows the 21 mm. In the 20  $\mu\text{l}$  concentration shows the 19 mm. In the 40  $\mu\text{l}$  concentration shows the 18 mm. In the 50  $\mu\text{l}$  concentration shows the 15 mm. In the aqueous extract of leaf and stem, no zones are formed, as shown in Figure 3 & Table 2.

#### **Antibacterial activity of *Ipomoea staphylina* different solvents against *S. aureus***

In the petroleum ether extract of leaf 10  $\mu\text{l}$ , con. shows the 18 mm zone. In the 30  $\mu\text{l}$  con. Shows 27 mm. In the 40  $\mu\text{l}$  con. Shows 19 mm. In the 50  $\mu\text{l}$  con. Shows 18 mm. In the stem extract, no zones are formed. In the Ethanol extract of leaf 10  $\mu\text{l}$  con. shows 30 mm. In the 20  $\mu\text{l}$  con. Shows 39 mm. In the 30  $\mu\text{l}$  con. shows 50 mm. In the 40  $\mu\text{l}$  con. shows 49 mm. In the 50  $\mu\text{l}$  con. shows 49 mm. In the stem extract of the stem, no zones are formed. In the aqueous extract of leaf 40  $\mu\text{l}$  con. shows 53 mm. In the 50  $\mu\text{l}$  con. shows the 52 mm. In the stem extract, no zones are formed, as shown in Figure 4 & Table 3.

#### **Antibacterial activity of *Ipomoea staphylina* different solvents against *E. coli***

In the petroleum ether extract of leaf and stem shows no zone, in the ethanol extract 30  $\mu\text{l}$  con. shows the 27 mm. In the 40  $\mu\text{l}$  con. shows 25 mm. In

the stem extract 10  $\mu\text{l}$  con. shows 20 mm. In the 20  $\mu\text{l}$  con shows the 24 mm. In the 30  $\mu\text{l}$  con. shows the 27 mm. In the 50  $\mu\text{l}$  con. shows 18 mm. In the aqueous extract of leaf and stem, no zones are formed, as shown in Figure 5 & Table 4.

#### **Antifungal activity of *Ipomoea staphylina* against *Aspergillus niger***

The positive control of 100  $\mu\text{l}$  con. shows no zones. The leaf extract of ethanol of 50  $\mu\text{l}$  con. shows 9 mm, the stem extract of negative control in 50  $\mu\text{l}$  con. show 12 mm, as shown in Figure 6 & Table 5.

## **DISCUSSION**

Herbal preparations are other supplement systems of medicine for the treatment of disease caused by bacteria (Amani *et al.*, 2014). Considering the vast potentiality of plants as sources for antibacterial drugs with references to antimicrobial activity from the plant *I. staphylina*. Members of Convolvulaceae are medicinally essential plants. Compounds present in *I. staphylina* are known to be biologically active and therefore aid the antimicrobial activities. The cold extraction method was carried out dried powdered leaf and stem *I. staphylina* by soaking the powder in 3 different solvents viz., ethanol, petroleum ether, aqueous.

Alkinmoladun *et al.* (2007) showed that the antimicrobial activity of leaf extract *I. asarifolia* against gram +ve and -ve bacteria. The gram -ve bacteria *E. coli* of aqueous leaf extract shows the high inhibition 21 mm. The gram +ve *S. aureus* of aqueous leaf extract shows the low inhibition 20 mm. According to our study in *Ipomoea staphylina* the gram +ve bacteria *S. aureus* of aqueous leaf extract shows the 17.6 mm of inhibition in *E. coli* absent of inhibition.

Kiruthiga *et al.* (2014) showed that the antimicrobial activity from the latex *I. staphylina* against gram +ve and -ve bacteria. The gram +ve bacterial *S. aureus* shows the very high inhibition at 1 ml con. And the gram -ve bacterial the 700 ml and 1 ml both the con. shows very high inhibition.

According to our study, the different solvent extract of different bacteria among them the *E. coli* and *B. subtilis* of leaf and stem extract of ethanol shows the high inhibition at 30  $\mu\text{l}$  con. The *S. aureus* of the aqueous leaf has shown the inhibition at 40  $\mu\text{l}$  con.

Antifungal activity against *Aspergillus niger* the stem extract of -ve ethanol shows 12 mm at 50  $\mu\text{l}$  con. The leaf extract of ethanol shows 9 mm at 50  $\mu\text{l}$  con. Phytochemical analysis conducted on the plant extracts revealed the presence of constituents which are known to exhibit therapeutic as well as physiological activities. Analysis of the plant



extract revealed the presence of phytochemicals such as alkaloids, carbohydrate, glycosides, tannins, flavonoids.

The result obtained in this study thus suggests the identified phytochemical compounds may be the bioactive constituents and these plants are proving to be an increasingly valuable reservoir of bioactive compounds of substantial medicinal merit.

## CONCLUSION

Nature has gifted the humankind with plant wealth which has been used for traditional medicines as they contain components of therapeutic values. Plants are natural sources of antimicrobial agents. They contain a wide range of metabolites that can be extracted from them and used to treat infectious and chronic diseases. Most of the aromatic and medicinal plants are botanical raw material also known as herbal drugs, that are primarily used for therapeutic, aromatic and culinary purposes as compounds of cosmetics, medicinal products, health foods and other natural health products.

The present study was formulated to study the phytochemical analysis and antimicrobial activity. In the study of the phytochemical analysis revealed the presence of carbohydrate, protein, flavonoids, glycosides, alkaloids.

The *Ipomoea staphylyna* leaf and stem extract showed potent antimicrobial activity against *E. coli*, *Staphylococcus aureus*, *Bacillus subtilis* and *Aspergillus niger*. The plant extract could be used as drugs for various ailments.

## ACKNOWLEDGEMENT

The authors are profusely thankful to the Department of Biotechnology, Davangere University, Davangere for providing facilities.

## Conflict of Interest

We declare that no conflict of interest.

## Funding Support

None.

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