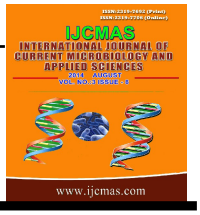
International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 3 Number 8 (2014) pp. 842-853**
http://www.ijcmas.com



Original Research Article

Antimicrobial Activity of Some Common Indian Medicinal Plants against some Selective Human Pathogen

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A B S T R A C T

Plants are very useful and utilized as medicine due to their therapeutic properties. Screening of plants for biologically active compounds against human pathogens is a renewed interested research field. In this study, we used five medicinal plants namely Abutilon indicum, Adathodavisca, Daturastramonium Lantanacamara and tridaxprocumbens. Chemical compounds with antimicrobial activity isolated from plants have enormous therapeutic potential and are effective in the treatment of infectious diseases while mitigating many of the side effects that are often caused by Synynthatic antimicrobial agents. The methanol, ethanol and aqueous extracts of five medicinal plants were evaluated fora activity against medically important bacteria such as Staphylococcus species, Escherichia coli species and Bacillus species. The invitro antimicrobial activity was performed by disc diffusion method. The ethanolic and aqueous extracts showed minimum antimicrobial activity when compared to methanolic extracts. The methanolic extract of Daturastramonium and Lantana camara showed the maximum activity against Staphylococcus species in alkaloids fraction compare to the flavonoid and saponin. The Daturastramonium showed the moderate zone of inhibition against the Escherichia coli species and Bacillus species. The flavonoid extract of the lantana camara and daturastramonium showed the moderate zone of inhibition and the saponin showed the minimum zone of inhibition. The use of plant extracts with known antimicrobial properties can be of great significance in therapeutic treatments.

Keywords

Medicinal plants, ethanol, methanol and aqueous extracts, human pathogens, Antimicrobial activity

Introduction

Microbial infections pose a health problem all over the World, and plants are a potential source of antimicrobial agents (Burapadaja&Bunchoo, 1995).Medicinal plants contain active principles which can be used as a substitute to despicable and valuable herbal drugs against ordinary bacterial infections. The use of medicinal plants would be basis for relief from sickness and can be traced back over five millennium to written higher plants, or customized further synthetically, are documented in early civilization and are currently in use, though some of them are now being nearest, but it is beyond a shadow of a doubt an art as old as mankind. Plants

are good source of a more kind of economically important compounds such as phenolic compounds, nitrogen containing compounds, vitamins and minerals which have anti-oxidant, anti-tumor, anti-mutagenic, anti- carcinogenic and diuretic activities. Many ofthe plant materials used in traditional medicine are readily available in rural areas. Medicinal plants have been a valuable source of natural active constituents that products for maintain human health and treatment of many human disease(Stary F and Hans S. 1998).In recent years usage of commercial anti-microbial drugs against human pathogenic microorganisms increased extensively. Effective antimicrobials have been developed over the past years, several reports development of antibiotic resistance of human pathogens to available antibiotics (Martino et al., 2002).Due to the cost effectiveness, safety, increasing failure of chemotherapy and antibiotic resistance, search for plant resources has been increased for their potential antimicrobial activity (Hammer et al., 1999).According to world health organization medicinal plants would be the best source to obtain a variety of drugs in developed countries about 80 of plants are used in traditional medicine.

The number of multi-drug resistant microbial strains and the appearance of strains with reduced susceptibility to antibiotics are continuously increasing. This increase has been attributed to indiscriminate use of broad-spectrum antibiotics, immunosuppressive agents, intravenous catheters, organ transplantation and ongoing epidermidis of human immunodeficiency virus (HIV) infections **(**Dean DA., and Gonalez 1996).This situation provided the impetus to the search for new antimicrobial substances from various sources like medicinal plants (Cordell G A.et al,.2000). Synthetic drugs are not only expensive and inadequate for the treatment of diseases but are also often with adulterations and side effects. Therefore, there is a needto search for new infection-fighting strategies to control microbial infections (Sieradzki K, et al,.1999). Plant extracts have been used for centuries as a popular method for treating several health disorders. Numerous studies have been carried out on various natural products screening their antimicrobial activity. In the present work, 5 different medicinal plants belonging to different families were evaluated for their antibacterial properties.

Materials and Methods

Plant material

The following medicinal plants were selected for the study from the local area based on their basic information available. Abutilon indicum, Adathodavisca, Daturastramonium Lantanacamara and tridaxprocumbens. Fresh samples of plants were collected, washed and air dried. The dried leaves were powdered and stored in air tight bottles separately for further studies.

Preparation of Plant Extract

Aqueous Extraction

Samples of 10g were immersed in 100ml of distilled water, mixed and allowed to soak for 24hours. Then the mixer was filtered through WhatmannNo.4 filter paper to get pure extract.

Methanol Extraction

Air dried powder of 10g was placed in a conical flask containing 100 ml of organic solvent (Methanol) plugged with cotton and then kept on a rotary shaker at 190-220 rpm

for 24 hours. Later, it was filtered through 8 layers of muslin cloth and centrifuged at 5000 rpm for 15 minutes. The supernatant was collected and then solvent was evaporated to make the upto final volume one-fourth of its original volume.

Ethanol Extraction

Ten gram of sample was soaked in 100ml of 95% ethanol and kept in room temperature for24hours. Then the extract solution was filtered through a Whatmann No.4 filter paper. Then the solvent was removed using a rotary vacuum evaporator until it reaches one-fourth of its volume. All the above extracts were stored at 4°C in air bottles for further studies.

Microorganisms

The investigated microorganisms consisted of Two Gram-positive bacteria: *Staphylococcus aureus* ATCC25923, *Bacillus subtilis* TCC6633; one Gram-negative bacterium: *Escherichia coli* ATCC25922. Microorganisms were obtained from the National Chemical Laboratory (NCL), Pune, India. Microorganisms were maintained at 4 °C on nutrient agar slants.

Antimicrobial susceptibility test

The antimicrobial assay was performed by agar disc diffusion method (Bauer AW, et al,. 1966).The 20ml of sterilized Muller Hinton Agar was poured into sterile petri plates, after solidification,100 µl of fresh bacterial culture were swabbed on the respective plates. Each of discs which are approximately 5mm in diameter was cut from Whatman filter paper. The sterile discs were kept over the agar plates using sterile forceps at various concentrations (2, 4, 6, 8, and 10µl). The plates were incubated for 24 hours at 37 □c. After incubation the diameter of inhibitory zones formed around each discs were measured (mm) recorded. (Nair R, KalariyaT,et al,.2005).

Results and Discussion

Antimicrobial potential of plants was compared according to their zone of inhibition against the several pathogenic organisms. The ethno botanical information of some traditionally used Indian plant species selected for antibacterial activity is given in the (Table 1). The result obtained for the antimicrobial test performed on different extract of medicinal plants and zone of inhibition of the individual plant extract with three type of bacterial pathogen were identified that is Escherichia coli, Bacillus subtitles, Staphylococcus aureas are shown in (Table 2).

(Figure 1): Represents the alkaloids antibacterial susceptibility test results for Escherichia coli, Daturastramonium and *Lantana camara* show the significance zone of inhibition that is the higest zone inhibition 2.0 cm was noted in the concentration of 10µl.*Adathoda visca* and tridaxprocumbens 1.6cm was noted in 10µl.
(Figure 2): Represents the alkaloids antibacterial susceptibility test results for Staphylococcus aureas,*Lantana camara* show the significance zone of inhibition 2.8cm was noted in the concentration of 10 µl and 2.7cm noted in the 8 µl and 2.6 for 6 µl . Datura stramonium is the second highest zone of inhibition 2.6cm was noted in the 10 µl.

(Figure 3): Represents the alkaloids antibacterial susceptibility test results for Bacillus subtitles. For Lantana camara, the highest zone of inhibition 2.6 cm was noted in the concentration of 10 µl, Datura stramonium,2.4 cm was noted in the

concentration of 10 µl, Abutilon indicum, 2.2 cm concentration of 10 µl, adathodavisca, 1.9 cm concentration of 10 µl, Tridaxprocumbens 1.8 cm concentration of 10 µl). From the above observation *Lantana camara* showed the significance zone of inhibition against the Bacillus subtitles.

(Figure 4): Represents the Flavonoids antibacterial susceptibility test results for Escherichia coli , For Lantana camara, the highest zone of inhibition 1.8 cm was noted in the concentration of 6 µl, 2.0 cm in 8 µl and 2.2 cm was noted in the concentration of 10 µl, the next highest zone of inhibition observed in the Daturastramonium, 1.6 cm in 6 µl , 1.8 cm in 8 µl and 2.0 cm was noted in the concentration of 10 µl, , adathodavisca, 1.3 cm in 6 µl ,1.4 cm in 8 µl and 1.6 cm in 10 µl was noted. Abutilon indicum, 1.2 cm in 6µl , 1.4 cm in 8 µl and 1.6 cm was noted in the 10 µl. Tridaxprocumbens showed the less zone of inhibition against E.coli, i.e 1.0 cm in 6 µl, 1.1 cm in 8 µl and 1.2 cm was noted in the concentration of 10 µl.From the above observation *Lantana camara* showed the significance zone of inhibition against the Escherichia coli.

(Figure 5): Represents the Flavonoids antibacterial susceptibility test results for *Staphylococcus aureus*, For Daturastramonium, the highest zone of inhibition 2.3 cm was noted in the concentration of 6 µl, 2.4 cm in 8 µl and 2.6 cm was noted in the concentration of 10 µl, the next highest zone of inhibition observed in the *Lantana camara*, 2.2 cm in 6 µl , 2.4 cm in 8 µl and 2.5 cm was noted in the concentration of 10 µl., the next highest zone of inhibition observed in the *Adathoda visca*, 1.6 cm in 6 µl , 1.8 cm in 8 µl and 2.0 cm was noted in the concentration of 10 µl. *Adathoda visca* and abutilon indicum showed the moderate zone of inhibition. Tridaxprocumbens showed the less zone of inhibition against Staphylococcus aureas, from the above observation Daturastramonium showed the significance zone of inhibition against Staphylococcusaureas

(Figure 6): Represents the Flavonoids antibacterial susceptibility test results for Bacillus subtitles. For Daturastramonium , the highest zone of inhibition 2.3 cm was noted in the concentration of 6 µl, 2.4 cm in 8 µl and 2.6 cm was noted in the concentration of 10 µl, the next highest zone of inhibition observed in the Lantana camara, 1.9 cm in 6 µl , 2.0 cm in 8 µl and 2.1 cm was noted in the concentration of 10 µl. Abutilon indicum showed the moderate zone of inhibition. Tridaxprocumbens showed the less zone of inhibition against Bacillus subtitles, From the above observation Daturastramonium showed the significance zone of inhibition against Bacillus subtitles.

(Figure 7): Represents the Saponins antibacterial susceptibility test results for Escherichia coli ,For Datura stramonium , the highest zone of inhibition 1.0 cm was noted in the concentration of 6 µl, 1.1 cm in 8 µl and 1.2 cm was noted in the concentration of 10 µl, the second highest zone of inhibition was showed by abutilon indicum , 0.9 cm in 6 µl , 1.0 cm in 8 µl and 1.2 cm was noted in the concentration of 10 µl. Third highest zone of inhibition was showed by Tridax procumbens,0.8 cm in 6 µl , 1.0 cm in 8 µl and 1.3 cm was noted in the concentration of 10 µl. *Adathoda visca* and *Lantana camara* showed the less zone of inhibition against E .coli, From the above observation Datura stramonium showed the significance zone of inhibition against E.coli

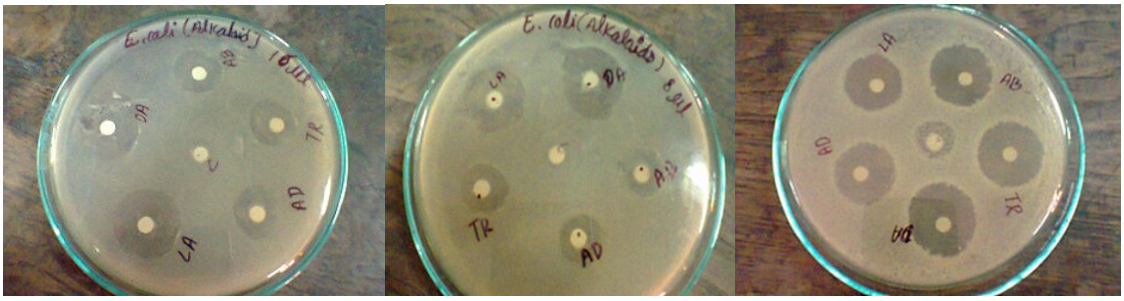
Table.1 Ethnobotanical information of some traditionally used Indian plant species selected for antibacterial activity

Plant species	Family	Common name	Part used	Therapeutic use
Abutilon indicum	Malvacee	Karandi	Leaf	Treatment of coughs, puerperal disease, urinary disorders, chronic dysentery, and fever.
Adathodavisca	Acanthaceae	Vasaka	Leaf	chronic bronchitis, expectorant and antispasmodic
Daturastramonium	Solanaceae	Thorn apple	Leaf	treatment of dental and skin infections, alopecia and anti-inflammatory property of all parts of the plant
Lantana camara	Verbenaceae	shrub verbena	Leaf	treatment of cancers, chicken pox,measles, asthma, ulcers, swellings, eczema, tumors, highblood pressure,
Tridaxprocumbens	Asteraceae	Jayanti.	Leaf	Anti-inflammatory, hepatoprotective, wound healing, immunomodulatory, antimicrobial, antiseptic, hypotensive and bradycardiac effects.

Table.2 Zone of inhibition of individual plant extracts

BACTERIA	**PLANTS**	**1% EXTRACT SOLUTION Concentration in (µl) and zone in (cm)**								
		Alkaloids			**Flavonoids**			**Saponins**		
		6 (µl)	**8 (µl)**	**10 (µl)**	**6 (µl)**	**8 (µl)**	**10 (µl)**	**6 (µl)**	**8 (µl)**	**10 (µl)**
ESCHERICHIA COLI	Abutilon indicum	**1.5**	**1.7**	**1.8**	**1.2**	**1.4**	**1.6**	**0.9**	**1.0**	**1.2**
	Adathodavisca	**1.3**	**1.5**	**1.6**	**1.3**	**1.4**	**1.6**	**0.6**	**0.8**	**1.0**
	Daturastramonium	**1.8**	**1.9**	**2.0**	**1.6**	**1.8**	**2.0**	**1.0**	**1.1**	**1.2**
	Lantana camara	**1.6**	**1.8**	**2.0**	**1.8**	**2.0**	**2.2**	**0.6**	**0.8**	**1.2**
	Tridaxprocumbens	**1.3**	**1.4**	**1.6**	**1.0**	**1.1**	**1.2**	**0.8**	**1.0**	**1.3**
STAPHYLO COCCUS AUREUS										
	Abutilon indicum	**2.1**	**2.3**	**2.6**	**1.4**	**1.6**	**1.8**	**1.6**	**1.8**	**2.0**
	Adathodavisca	**2.0**	**2.2**	**2.4**	**1.6**	**1.8**	**2.0**	**1.0**	**1.1**	**1.2**
	Daturastramonium	**2.3**	**2.5**	**2.6**	**2.2**	**2.4**	**2.6**	**1.4**	**1.6**	**1.8**
	Lantana camara	**2.6**	**2.7**	**2.8**	**1.9**	**2.0**	**2.1**	**1.4**	**1.6**	**1.8**
	Tridaxprocumbens	**1.7**	**1.9**	**2.0**	**1.0**	**1.1**	**1.2**	**1.0**	**1.2**	**1.4**
BACILLUS SUBTILIS										
	Abutilon indicum	**1.8**	**2.0**	**2.2**	**1.4**	**1.6**	**1.7**	**1.1**	**1.2**	**1.4**
	Adathodavisca	**1.4**	**1.6**	**1.9**	**1.6**	**1.8**	**2.0**	**1.0**	**1.1**	**1.2**
	Daturastramonium	**2.1**	**2.2**	**2.4**	**2.3**	**2.4**	**2.6**	**1.0**	**1.6**	**1.8**
	Lantana camara	**2.3**	**2.4**	**2.6**	**2.2**	**2.4**	**2.5**	**1.2**	**1.3**	**1.6**
	tridaxprocumbens	**1.6**	**1.7**	**1.8**	**1.2**	**1.4**	**1.6**	**1.0**	**1.1**	**1.2**

Figure.1 ***Escherichia coli*** **(6 µl) (8 µl) (10µl)**



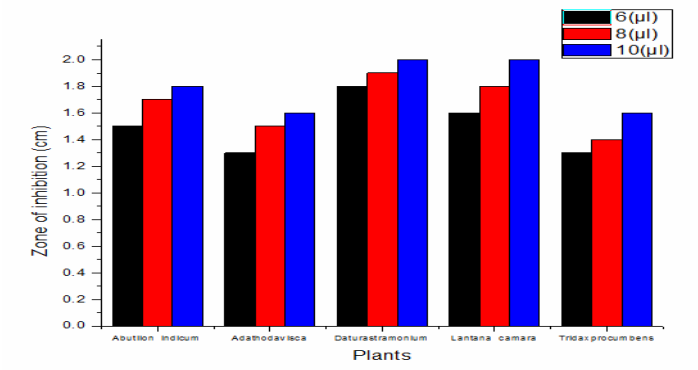
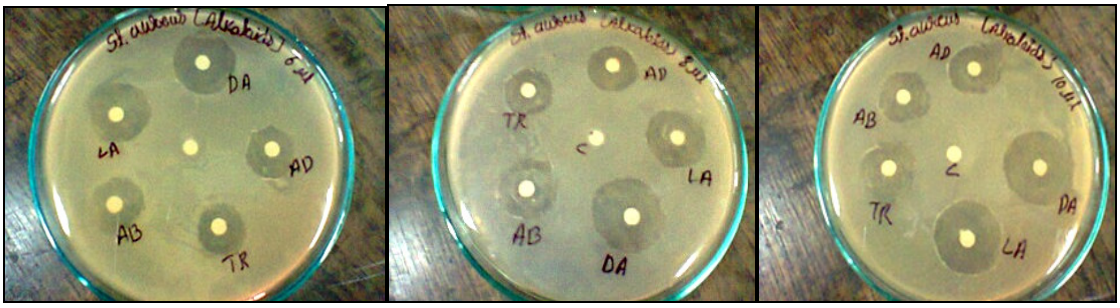


Figure.2 ***Staphylococcus aureus*** **(6 µl) (8 µl) (10 µl)**



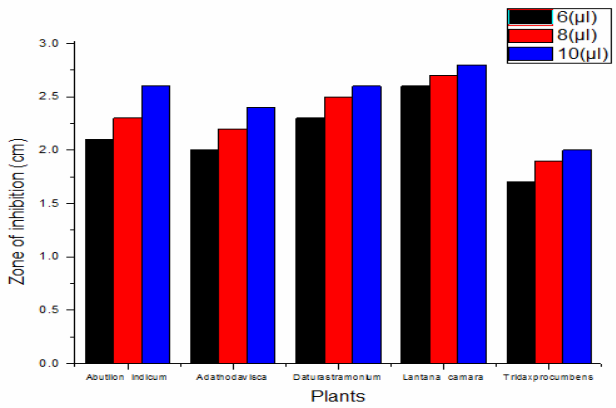
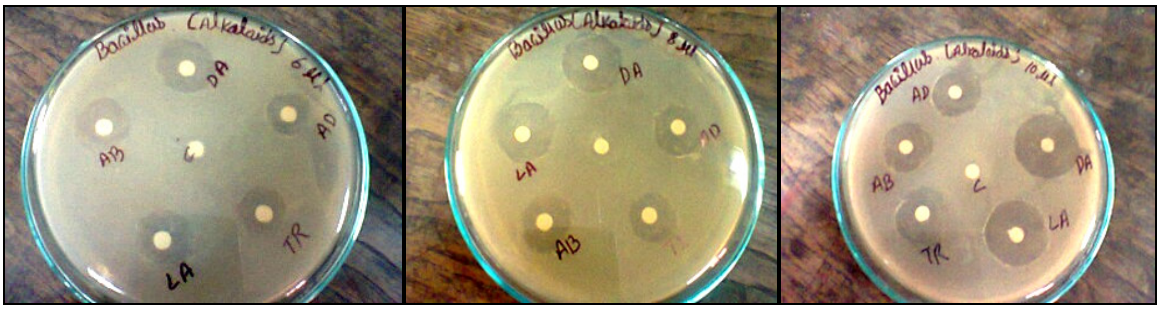


Figure.3 ***Bacillus subtilus*** **(6 µl) (8 µl) (10 µl)**



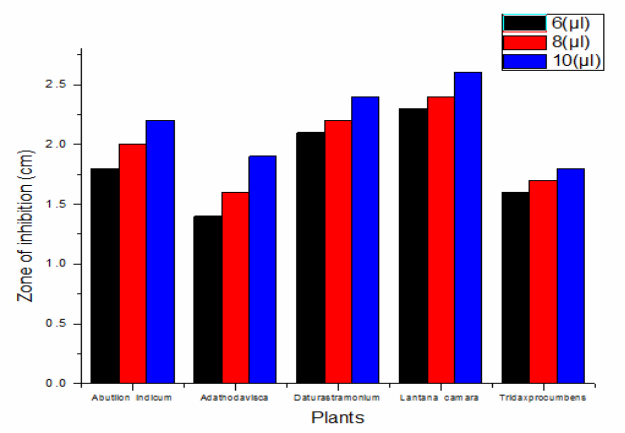
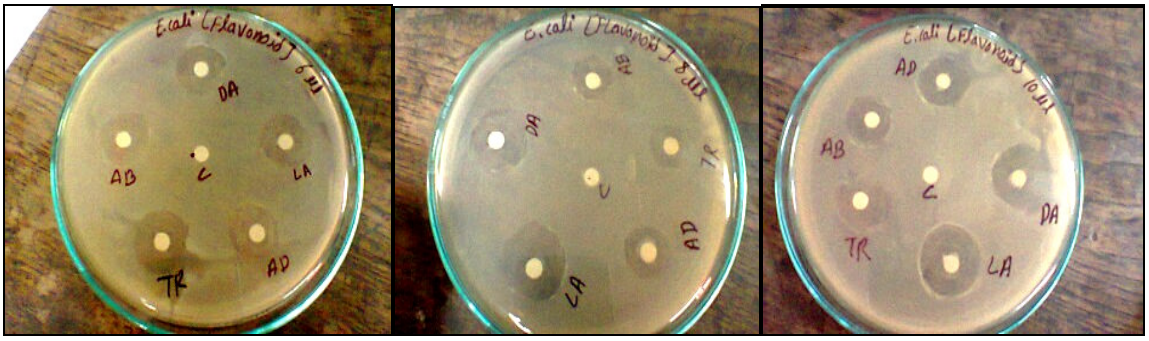


Figure.4 ***Escherichia coli*** **(6 µl) (8 µl) (10 µl)**



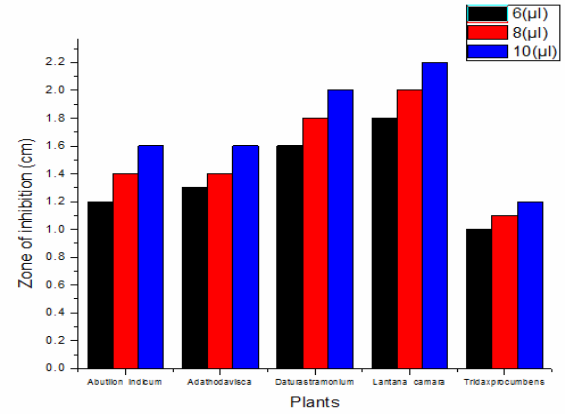
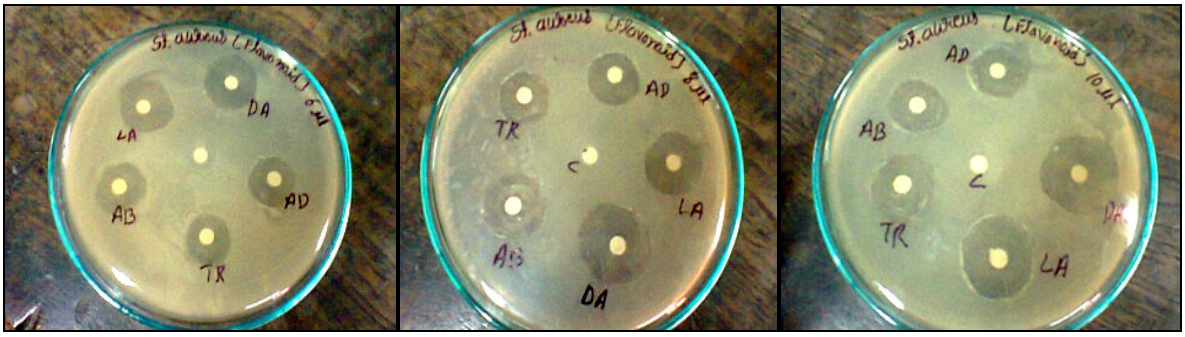


Figure.5 ***Staphylococcus aureus*****(6 µl) (8 µl) (10 µl)**



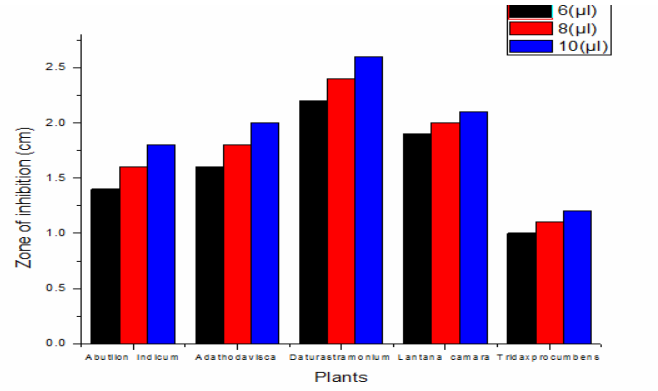
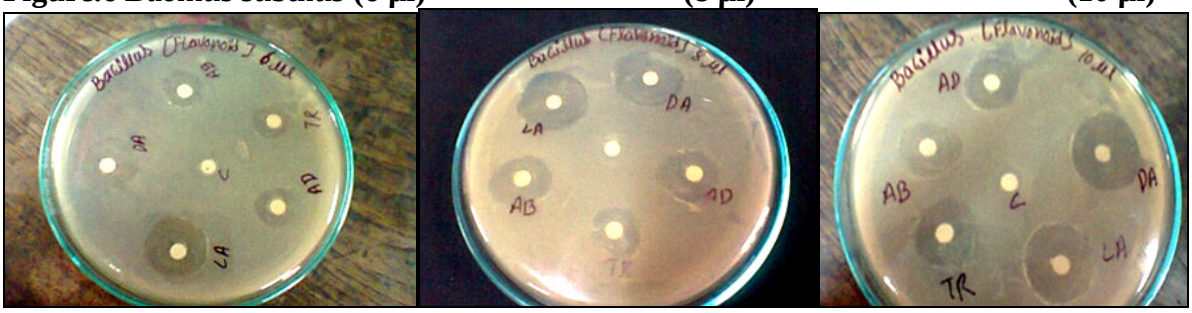


Figure.6 ***Bacillus subtilus*** **(6 µl) (8 µl) (10 µl)**



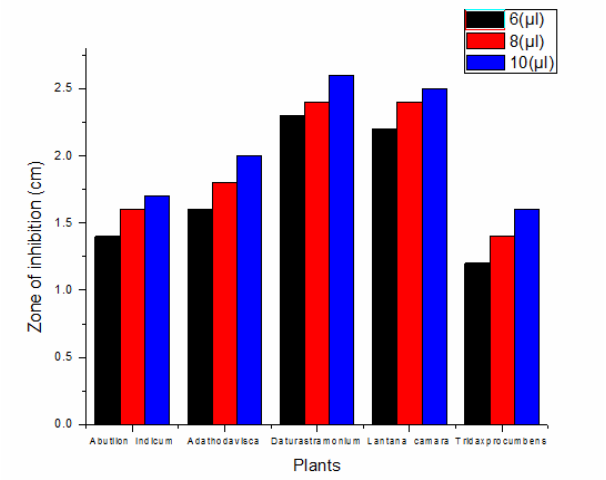
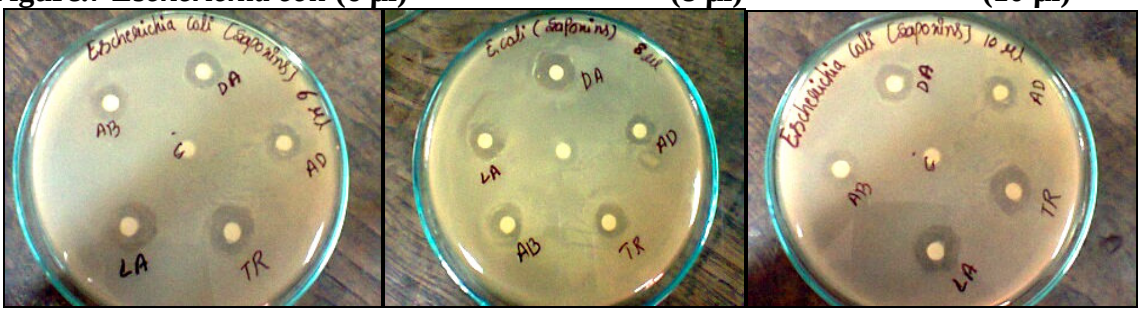


Figure.7 ***Escherichia coli*** **(6 µl) (8 µl) (10 µl)**



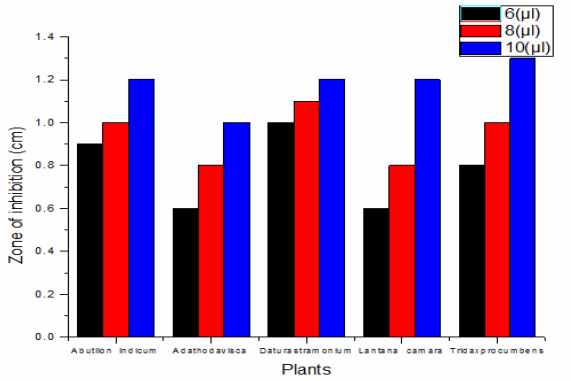
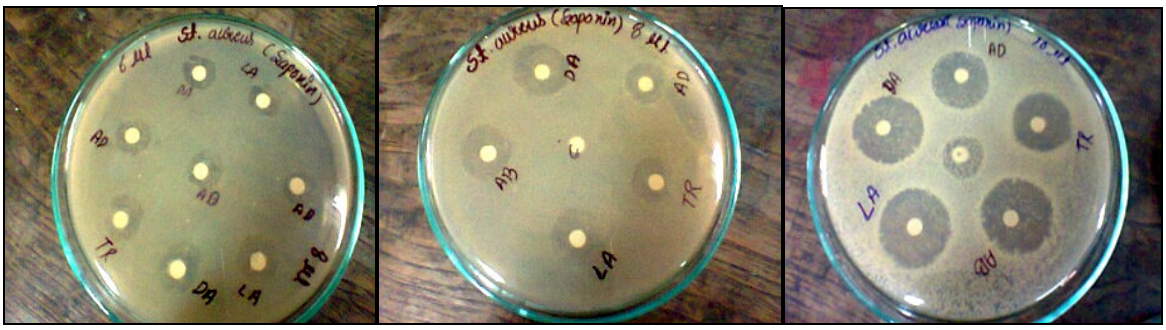


Figure.8 ***Staphylococcus aureus*** **(6 µl) (8 µl) (10 µl)**



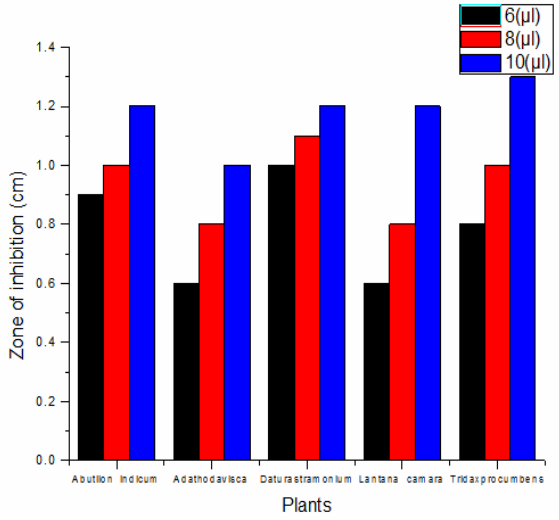
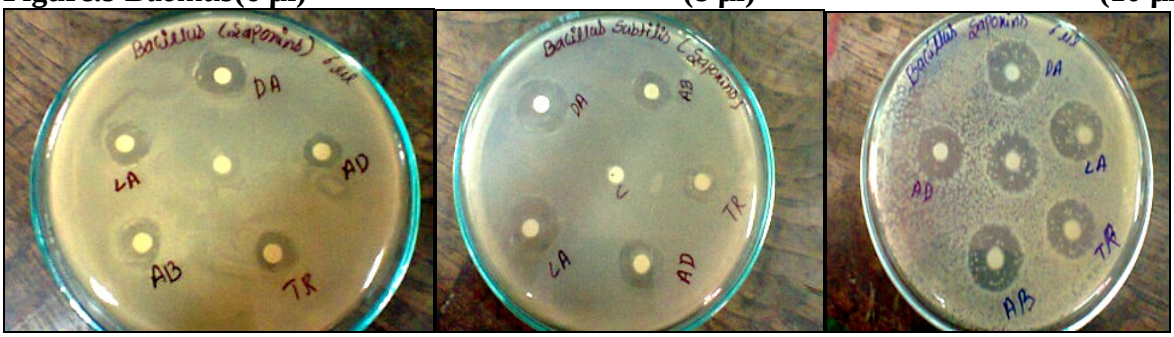
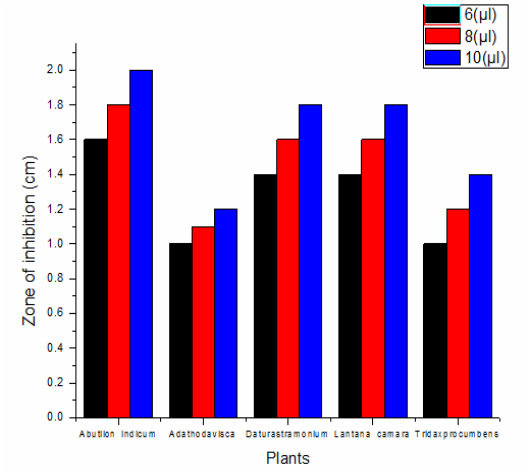


Figure.9 *Bacillus*(6 µl) (8 µl) (10 µl)





(Figure 8): Represents the Saponins antibacterial susceptibility test results for Staphylococcus aureas, For Abutilon indicum , the highest zone of inhibition 1.6 cm was noted in the concentration of 6 µl, 1.8 cm in 8 µl and 2.0 cm was noted in the concentration of 10 µl, the second highest zone of inhibition was showed by Datura stramonium and *Lantana camara* , the less zone of inhibition was noted in the *Adathoda visca* and tridax procumbens. From the above observation Abutilon indicum showed the significance zone of inhibition against Staphylococcus aureas.

(Figure 9): Represents the Saponins antibacterial susceptibility test results for Bacillus subtitles. For Daturastramonium, the highest zone of inhibition 1.0 cm was noted in the concentration of 6 µl, 1.6 cm in 8 µl and 1.8 cm was noted in the concentration of 10 µl, the second highest zone of inhibition was showed by the *Lantana camara* , 1.2 cm in 6 µl , 1.3 cm in 8 µl and 1.6 cm was noted in the concentration of 10 µl. The moderate zone of inhibition was showed by the abutilon indicum and adathodavisca. The less zone of inhibition was showed by the tridaxprocumbens against *Bacillus subtilis*, From the above observation Daturastramonium showed the significance zone of inhibition against Bacillus subtitles. From the above observation it was noted that the alkaloids and flavonoids fractions showing the significance zone inhibition compare to thesaponins fraction.

Many antibiotics are used nowadays to control the diseases. The increased awareness of the environmental problems associated with these antibiotics has led the search for nonconventional chemicals of biological origin, for the management of

disease. Bactericides of plant origin can be one approach to disease management because of the eco-friendly nature (Al-Mezaine,.et al, 2005). Screening is important not only for therapeutic efficacy of the medicinal plants, but also for the validation of their historical utilization by traditional healers and herbalists (A.Rekha,et al,.2011).The plants have traditionally provided a source of hope for novel drug compounds, as plant herbal mixtures boast large contributions to health and well-being. The utilization of plant extracts with recognized antimicrobial properties can be of great significance for therapeutic treatment.The present study is an attempt to evaluate plans as source of potential chemotherapeutic agents and antimicrobial activity (Cledson.V, et at,.2007). The search of novel bioactive compounds including antimicrobial ones continues. This is largely so because some pathogens have developed resistance to certain currently used drugs and some disease have yet to be treated chemotherapeutically (Chin .Y,et al,.2006). Medicinal plants are stipulation for the scientific point of vision, to establish a balanced relationship between chemical biological and therapeutical activities of folklore medicine (Harborne J.B, 1973).

In this study stated that the antimicrobial activities of five medicinal plants (Abutilon indicum, Adathodavisca, Daturastrarmonium, Lantana camara, tridaxprocumbens) due to the presence of the following phytochemicals namely, alkaloids, flavonoids, Saponins and Tannins. The potential of antimicrobial properties of plants are related to their ability to synthesize compounds by the secondary metabolism (Clark AM,et al,.1993). It has also been shown that tannins are biologically active, against E. coli, S. aureus and Bacillus subtilius. Results obtained from the current work, indicated that, the plant extracts showed the strongest antimicrobial activity than the commercially available antibiotics. The antimicrobial activity of methanolic extract of Daturastarmonium and *Lantana camara* showed the signifince antimicrobial activity various phytopathogens.

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