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Comparative Study of Antibacterial Activity of *Trigonella Foenum &Terminalia Arjuna* with Ciprofloxacin

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ABSTRACT

The present investigation was performed to evaluate the antibacterial potential of Trigonella foenum-graecum (seeds) and Terminalia arjuna (bark) extracts. The plant extracts were prepared by hot percolation method using solvents methanol and distilled water. Antibacterial activity of these extracts was carried out by agar well diffusion method. The antibacterial activity of T. foenum- graecum seeds extracts along with T. Arjuna extracts was observed. Methanolic extracts of fenugreek and arjuna revealed an elevated antibacterial activity against S. aureus as compared to E. coli whereas water extract shows less activity compared to its methanolic extracts on both the strains. The result obtained in this study suggest that the methanol extract of T. Foenum Linn &T. Arjuna revealed a significant scope to develop novel broad spectrum of antibacterial herbal spectrum and further attention should be given for research work to identify the active compounds for their biological activities.

1. Introduction

Natural products have been a major source of new drugs. Medicinal plants are used by around 70-75% of the world population as the only available medicine in developing countries. Current research on natural molecules products primarily focuses on plant since they can be sourced more easily and be selected based on their ethno-medical uses. A wide range of medicinal plants parts is used to extract as raw drugs and they possess varied medicinal properties. While some of these raw drugs are collected in smaller quantities by local communities and folk healers for local use, many other raw materials are collected in larger quantities and traded in the market as the raw material for many herbal industries. Plants used for traditional medicines contain a wide range of substance that can be used to treat chronic as well as infectious diseases. Clinical microbiologists have great interest in screening of medicinal plants for new therapeutics. The active principles of these drugs found in plants are secondary metabolites. The antimicrobial activity of plant extracts may reside in a variety of different components, including aldehydes and phenol compounds. The development of drug resistance in human pathogens against commonly used antibiotics has necessitated a search for new antibacterial substances from other sources including plants. Screening of medicinal plants for antibacterial activity is important for finding potential new compounds for therapeutic use.[1, 2]

2. Materials and Methods

Materials

The species of Fenugreek (*T. foenum*) and Arjuna (*T.arjuna*) were collected from different retail markets of Gondia region of Maharashtra state, India in January 2017. The species were botanically identified. All the chemicals used are of analytical grade.

Method of extraction

Species of plant were cleaned with deionized water and dried in sunlight for 4 days and then in an oven over 40°for 24 hours. Then there materials were grinded to affine coarse powder by a grinding machine and then passed through a sieve of sieve number 20 to collect a uniform powder.

Out of it 100 gram of both fenugreek and Arjuna powder were placed separately for hot percolation. This hot percolation is one for 4 cycles using the solvent system of methanol and water. After the completion of the cycles for 2 days, the crude extract is obtained. This is then filtered by passing it through the whatman filter paper. It is then stored at 40°in a refrigerator in a sterile plastic bottle.[3]

3. Evaluation

Tested Bacteria

Antibacterial activity of powder of fenugreek and arjuna was investigated against gram positive and gram negative bacteria of *S. Aureus* and *E. coli* respectively. Both the strains were obtained from the Microbial Type Culture Collection (MTCC) of Department of Microbiology, Dhote Bandhu Science College, Gondia, and Maharashtra. These bacteria were cultured on the nutrient agar media at 37°Cfor 24 hours & its sub culturing is done and stored at 40° C[4]

Innoculump Reparation

10 ml of distill water was taken into the screw cap tube and pure colony of freshly cultured bacteria was added into the tube and vortex was done. [3]

Antibacterial Bioassay:

First in this, the antibacterial activities of the test sample were carried out by agar well diffusion method. The test cultures were spreaded by Spread plate method on plates. The well was prepared in plates by using cork borer that is sterlised by burning with absolute ethanol. Plant extract (0.1ml) were added

in the labeled wells and incubated at 32-37°**C**for 48 hours. Two well was prepared as control having 0.1 ml of each pure solvents of methanol and distill water respectively. The sensitivity of test organism to each extract was indicated by clear zones of inhibition around the well and the diameter of the clear zone of inhibition was measured.[5]

Preparation of media

The media of nutrient agar was prepared in a sterile condition for the antibacterial bioassay [6]

TABLE 1: Preparation of nutrient agar

INGREDIENTS	QUANTITY
Peptone	5gm
Sodium chloride	5 gm
Beef extract	3 gm
Agar	20 gm
Distill water	1000 ml
PH adjusted to	7.2

4. Statistical Evaluation:

The antibacterial activity of the fenugreek and Arjuna extract was determined by measuring the diameter of the zone of inhibition. [6]

Determination of activity index(AI)

Activity index of all the extracts was calculated by using following formula:

Activity index = Inhibitionzone of the sample/ Inhibition zone of the standard. [7]

TABLE 2: Activity index of fenugreek

BACTERIA	EXTRACT	AI
E.Coli	Water	0.25
E.coli	Methanol	0.5
S.aureus	Water	0.23
S.aureus	Methanol	0.41

TABLE 3: Activity index of Arjuna.

BACTERIA	EXTRACT	AI
E. Coli	Water	0.16
E. Coli	Methanol	0.41
S. aureus	Water	0.17
S. aureus	Methanol	0.47

5. Results and Discussion:

Antibacterial activities of fenugreek and Arjuna:

Methanol extract of fenugreek was found sensitive to *E.Coli* and *S.aureus*. Crude methanol extract produce zone of inhibition of 6 mm, 7 mm against *E.coli* and *S. aureus* respectively. The methanol extract of Arjuna was found to give zone of inhibition of 5mm, 8mm against both *E.Coli* and *S.aureus* respectively.

The water extract of fenugreek was found to have less sensitivity compared to methanol exract in both the species and the zone of inhibition for this was found to be 3mm and 4 mm for *E.coli* and *S.aureus* respectively. Water extract of Arjuna was found to give zone of inhibition of 2 mm and 3 mm against *E.coli* and *S.aureus* respectively. [7]

Table 4: Activity of crude methanolic extract of fenugreek on E.coli and S.aureus.

BACTERIA	DIZ (Diameter of zone of inhibition in mm)	Negative control	Positive control (Ciprofloxacin 5mg/ml)
E.Coli	6	+	12
S.aureus	7	+	17

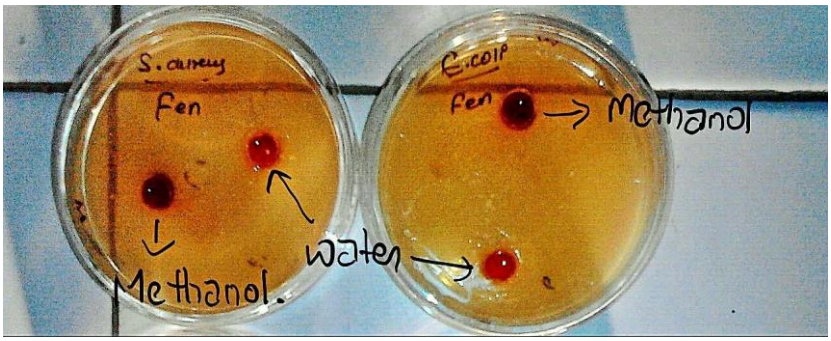

Figure 1. Antibacterial activity of Methanol and water extract of fenugreek

TABLE 5: Activity of crude water extract of fenugreek on *E.Coli* and *S.aureus*

BACTERIA	DIZ (Diameter of zone of inhibition in mm.)	Negative control	Positive control (Ciprofloxacin)
E. coli	3	+	12
S. aureus	4	+	17

TABLE 6: Activity of crude methanolic extract of Arjuna on *E.coli* and *S.aureus*

BACTERIA	DIZ (Diameter of zone of inhibition in mm)	Negative control	Positive control (Ciprofloxacin)
E.coli	5	+	12
S.aureus	8	+	17

TABLE 7: Activity of crude water extract of Arjuna on *E.coli* and *S.aureus*

BACTERIA	DIZ(Diameter of zone of inhibition in mm)	Negative control	Positive control
E. Coli	2 mm	-	12
S. Aureus	3 mm	-	17

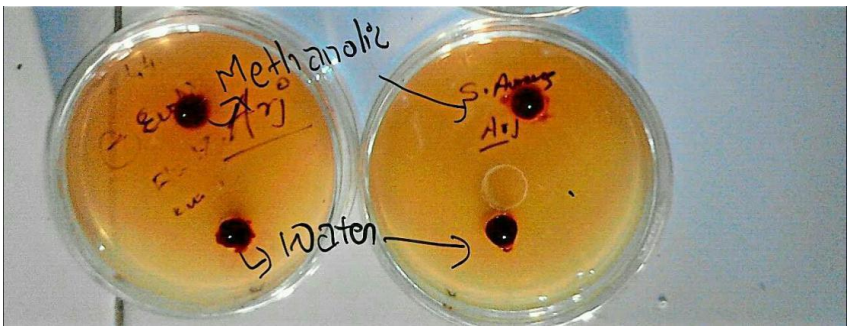

FIGURE 2. Antibacterial activity of methanol and water extract of arjuna

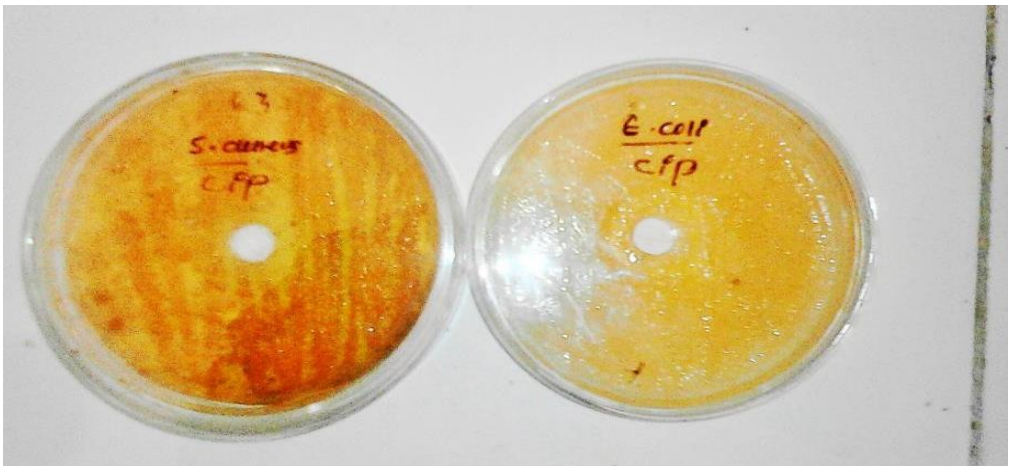

FIGURE 3. Antibacterial activity of standard (Ciprofloxacin 5µg/ml)

6. Discussion

The main objective of this work is to increase the utilization of biomass from species in order to isolate new biologically active compound. This study deals with two deadly pathogenic bacterial strains. In the present work, the antibiotic potential of the methanol and water extract of fenugreek and Arjuna had been determine against *E.coli* and *S.aureus.*

In this study, crude methanolic extract of fenugreek and arjuna was found to be effective in inhibiting the growth of E. coli and *S.aureus.* On the other hand, crude water extract of fenugreek and Arjuna showed antibacterial activity against *E.coli* and *S.aureus.* Only methanolic extract of fenugreek and Arjuna showed highest inhibitory activity against *S.aureus*. The extract of fenugreek and Arjuna had been reported to possess antibacterial activity. Blank disc produced no zone of inhibition of E.coli and S.aureus indicating that the solvents of methanol and water did not posses any antibacterial effect on the pathogen.

7. Conclusion

The extract of *T. foenum* and *T. arjuna* was found to be an effective antibacterial agent against water born pathogen. This study indicates that the further attention should be given for research work to identify the active compounds for their biological activities

Conflict of interest

This is an original research work does not involved any conflict of interest.

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