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ANTIOXIDANT, ANTI-INFLAMMATORY AND ANTIMICROBIAL ACTIVITY OF WHOLE PLANT OF *TECOMA CAPENSIS* THUMB.

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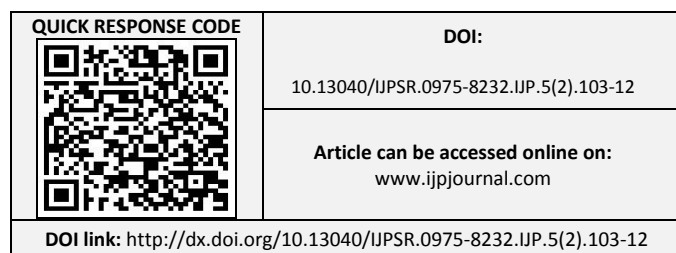
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ABSTRACT: Objective: The study was designed to explore the anti-oxidant, anti-microbial and anti-inflammatory activity of *Tecoma capensis* Thumb. (*T. capensis*) whole plant extract. **Material and method:** Antioxidant and free radical scavenging activity of extract of ethanolic extract of *Tecoma capensis* was investigated against 2, 2-Diphenyl-1-picrylhydrazyl (DPPH) assay, superoxide radical and hydroxyl radical scavenging activity compared with that of standard (ascorbic acid) and antimicrobial activity was evaluated against clinically important bacterial strain those were *Bacillus subtilis*, *Staphylococcus aureus* (Gram + ve), *Escherichia coli*, *Proteus vulgaris* (Gram-ve) and two fungal strain *Aspergillus niger*, *Candida albicans* using cup plate method. Anti-inflammatory activity was evaluated by Carrageenan induced rat paw edema method by the oral administration of EETC (100, 250 mg/kg). The data was statistically analyzed by ANOVA. **Result:** The IC₅₀ values were determined by radical scavenging activity of EETC by DPPH (21 ± 0.06), superoxide radical (37.2 ± 0.04) and Hydroxyl radical scavenging activity (12 ± 1.64). The average zone of inhibition for EETC against *S. aureus* (15 ± 0.816) and *E. coli* (15.2±0.5). Anti-inflammatory activity was evaluated by Carrageenan induced rat paw edema method by the oral administration of EETC (100, 250 mg/kg) exhibited significant and dose dependant anti-inflammatory activity. **Conclusion:** it is concluded that the EETC showed significant and dose dependent activities. Therefore, this plant can be used for new pharmacological research accomplishment.

INTRODUCTION: *Tecoma capensis* (*T. capensis*) Thumb. (Bignoniaceae), commonly called a cape-honey suckle, an evergreen and fast growing scrambling shrub which may up to 2-3 m high and spread more than 2.5 m.

The plant loses its leaves in colder climate. It has pinnately compound leaves that have oval leaflets with blunt teeth. Flowers are orange in colour, tubular and attracting nectar feeding insects and birds. The bark infusion is used to treat sleeplessness to induce sleeps¹ and also used as analgesic, anti-inflammatory and antipyretic². The leaves were used to treat pneumonia and intestinal trouble³.

The activities reported were antiulcer⁴, Antimicrobial⁵ anti-pyretic⁶, anti-inflammatory^{7, 8}, hepatoprotective⁹ and cytotoxic¹⁰.



Phytoconstituents reported were different iridoid glucosides from the leaves¹¹. In this article author wants to explain the detailed antioxidant activity by three methods, antimicrobial activity against two Gram +ve, two Gram -ve and two fungal strains and anti-inflammatory activity by carrageenan induced rat paw edema method which is not yet published.

MATERIAL AND METHODS:

Plant Material: The whole plant of *Tecoma capensis* Thumb (Bignoniaceae) was collected from Chandana Mohan Rao nursery gardens, Visakhapatnam and authenticated by the Botanical Survey of India (BSI/DRC/2015-16/Tech/684), Hyderabad, Telangana (state), India.

Preparation of Plant Extract: Whole plants were thoroughly washed with water. The collected plants were cut into small pieces and dried under shade. The dried pieces were ground into fine powder by using a mixer grinder and extracted by maceration with ethanol for 7 days with occasional shaking and stirring. Then, the liquid was concentrated under vacuum with rotary vacuum to get dried extract.

Animals: Anti-inflammatory activity experiment was carried out using 20 albino rats of weight 200-250g male/female of age 12 weeks. All the experimental procedure and protocols used in this study are reviewed and approved by the Institutional Animal Ethical Committee (IAEC) of the Raghu College of pharmacy contributed in accordance with the guidelines of the CPCSEA, government of India (1549/PO/Re/S/2011/CPCSEA).

All the rats were given a period of acclimatization for 14 days before starting the experiments. Rats were fed a pellet diet, and water *ad libitum*, temperature maintaining at 24 ± 2 °C and relative humidity 60 - 70 %. These rats were divided into four different groups, each containing five animals, the animals were marked individually.

Drugs and Chemicals: The chemicals used for these experiments were procured from various sources *i.e.* DPPH (CDH Pvt. Ltd. New Delhi), Ascorbic acid (Yarrow chem Mumbai), NBT (CDH Pvt. Ltd. New Delhi), Riboflavin (CDH Pvt. Ltd. New Delhi), EDTA (CDH Pvt. Ltd. New Delhi), Methanol (Fisher scientific Mumbai), sodium di

hydrogen phosphate (Yarrow Chem Mumbai), disodium hydrogen phosphate (Yarrow Chem Mumbai), de-oxy ribose (CDH Pvt. Ltd. New Delhi), Potassium di-hydrogen phosphate (Yarrow Chem Mumbai), Ferric chloride (Fisher Scientific Mumbai), Hydrogen peroxide (Yarrow chem Mumbai), Thio barbituric acid (CDH Pvt. Ltd. New Delhi), tri-chloroacetic acid (Fisher Scientific Mumbai), Carrageenan (Sigma), Indomethacin (Recon, Bangalore).

Antioxidant Activity:

2,2-Diphenyl-1-Picrylhydrazyl (DPPH) Assay:¹² The free radical scavenging activity of ethanolic extract of *Tecoma capensis* was measured by DPPH (1, 1-diphenyl-2-picryl-hydrazil) employing the method described by Blois, 1958 with slight modification. 0.1 mM solution of DPPH in ethanol was prepared and 1 ml of this solution was added to 3 ml of various concentrations (5, 10, 15, 20, 25, 30, 35, 40, 45, 50, µg/ml) of ethanolic extract. After 30 min, absorbance was measured at 517 nm. The percentage of inhibition was calculated by comparing the absorbance values of the control and test samples. Ascorbic acid was used as a reference compound. The capability to scavenge the DPPH radical was calculated using the following equation:

$$\% \text{ DPPH Scavenging Activity} = (\text{Abs Control} - \text{Abs test}) / \text{Abs Control} \times 100$$

Where Abs Control is the absorbance of the control reaction and Abs test is the absorbance in the presence of the sample of the extracts/standard. The antioxidant activity of the extract was expressed as IC₅₀. The IC₅₀ value was defined as the concentration (in µg/ml) of extracts that inhibits the formation of DPPH radicals by 50 %.

Hydroxyl Radical Scavenging Activity:¹³ Hydroxyl radical scavenging activity was measured by studying the competition between deoxyribose and EETC for hydroxyl radical generated by Fe³⁺-Ascorbate-EDTA- H₂O₂ system (Fenton reaction). The reaction mixture contained in a final volume of 1.0 ml, 100 µl of 28 mM 2-deoxy-2- ribose in 20 mM KH₂PO₄-KOH buffer of pH 7.4, 500 µl of the selected concentrations of extract (0.1, 0.5, 1, 5, 10, 20, 50, 100, 150, 200, 250, 300, 350, 450, 500, 700, 1000 µg/ml) in KH₂PO₄-KOH buffer (20 mM, pH 7.4), 100 µl of 1.04 mM EDTA, 100 ml 200 mM

FeCl₃, 100 µl of 1.0 mM H₂O₂ and 100 µl of 1.0 mM ascorbic acid was incubated at 37 °C for 1 h. 1.0 ml of thio barbituric acid (1%) and 1.0 ml of trichloroacetic acid (2.8 %) were added to the test tubes and were incubated at 100 °C for 20 min. After cooling, absorbance was measured at 532 nm against control containing deoxyribose and buffer. Ascorbic acid was used as a positive control. Reactions were carried out in triplicate. The percentage inhibition was determined by comparing the results of the test and control compounds by using the following formula

$$\text{Hydroxyl scavenging activity (\%)} = (\text{Abs Control} - \text{Abs test}) / \text{Abs Control} \times 100$$

Where Abs Control is the absorbance of the control reaction and Abs test is the absorbance in the presence of the sample of the extracts/standard.

Determination of Superoxide Radical Scavenging Activity:¹⁴ Super oxide is biologically important as it can form singlet oxygen and hydroxyl radical. Over production of super oxide anion radical contributes to redox imbalance and associated with harmful physiological consequences. Super oxide anion is generated in PMS-NADH system by the oxidation of NADH and assayed by the reduction of NBT resulting in the formation of blue formazan. 100 µl of Riboflavin solution [20 µg], 200 µl EDTA solution [12 mM], 200 µl methanol and 100 µl NBT (Nitro-blue tetrazolium) solution [0.1 mg] were mixed in test tube and the reaction mixture was diluted up to 3 ml with phosphate buffer [50 mM]. The absorbance of solution was measured at 560 nm using phosphate buffer as blank after illumination for 5 min.

This is taken as control. 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, µg/ml of different concentrations of extract as well as standard preparation were taken and diluted up to 100 µl with methanol. To each of these, 100 µl Riboflavin, 200 µl EDTA, 200 µl methanol and 100 µl NBT was mixed in test tubes and further diluted up to 3 ml with phosphate buffer.

Absorbance was measured after illumination for 5 min. at 560 nm on UV visible spectrometer Shimadzu, UV-1601, Japan. The superoxide anion scavenging activity was calculated according to the following equation.

$$\% \text{ inhibition} = (\text{Abs Control} - \text{Abs test}) / \text{Abs Control} \times 100$$

Where Abs Control is the absorbance of the control reaction and Abs test is the absorbance in the presence of the sample of the extracts/standard. The IC₅₀ values for EETC as well as standard preparation were calculated^{15,16}.

Calculation of 50 % Inhibition Concentration:

The graph was plotted by taking concentration on X-axis and percentage inhibition on Y-axis, the graph was extrapolated to find the 50% inhibition concentration of the sample.

Antimicrobial Activity:

Test micro organism and inoculums preparation:

The test organisms used in this study were as follows: *Bacillus subtilis*, *Staphylococcus aureus* (Gram +ve), *Escherichia coli*, *Proteus vulgaris* (Gram-ve) and two fungal strain *Aspergillus niger*, *Candida albicans* for the antimicrobial tests, procured from MTCC (Microbial type culture collection), IMTECH (Institute of Microbial Technology), Chandigarh, (Punjab), maintained on nutrient agar slants (oxide) at 4 °C, a loop-full culture of all micro organism was inoculated into nutrient broth under sterile conditions, and incubated at 37 °C for 24 h in rotary shaker.

Antimicrobial Activity:¹⁷ The agar disc diffusion method was used to evaluate the antibacterial potentiality of EETC against various Gram +ve, Gram -ve, and fungal strain. A 100 µl of freshly prepared inoculum was spread onto the surface of sterile Mueller Hinton agar using sterilized glass spreader. A sterile borer was used to prepare the cups of 8 mm diameter in the agar medium spread with micro-organism and 0.1 ml of inoculums was spread on the agar plate by spread plate technique. Accurately measured (0.05ml) solution of each concentration and reference standard (Ciprofloxacin 50 µg/ml and Fluconazole 0.1 mg/ml) was added to the cups with a micropipette. All the plates were kept in a refrigerator at 2 °C to 8 °C for effective diffusion of test compounds and standards for 2 hours. Later, they were incubated at 37 °C for 24 hours. The presence of definite zone of inhibition of any size around the cup indicated antibacterial activity. The solvent control (DMSO 4.0%, v/v) was run simultaneously, which was used as vehicle.

The diameter of the zone of inhibition was measured and recorded.

Anti-inflammatory Activity:

Acute Toxicity: The acute toxicity of *Tecoma capensis* was assessed by using up and down method¹⁸. After the administration of one single dose of EETC (5, 50, 300, 2000 mg/kg) the survival of animals was observed during 24 hrs. If an animal survived at any given dose, the dose for the next animal was logarithmically increased; if it died, the dose was decreased.

Anti-inflammatory Activity:¹⁹ Male or female Albino rats are starved overnight and grouped into five. To ensure uniform hydration, the rats receive pure drinking water. At the time of experiment they were not allowed access to both feed and water. The rats are subjected to intra peritoneal injection of 0.05 ml of 1 % solution of carrageenan into the plantar side of the right hind paw. The three groups of rats an hour post intra peritoneal (IP) administration were subjected to 100, 250 mg/kg of test extract and 20 mg of standard. The standard and test drug is dissolve or suspended in the same volume. The vernier calipers [RSK, Mumbai] was used to measure paw width and thickness before and at 1st, 2nd, 3rd, 4th, 5th and 6th hour after injection of carrageenan the paw volume was then calculated from width (a) and thickness (b) measurement using the following Equation:

$$\text{Volume} = \pi \times a^2 \times b$$

The percentage inhibition of paw edema was calculated for each group with respect to its vehicle treated control group by using the formula:

$$\text{Percentage inhibition of edema} = (1 - V_t / V_c) \times 100$$

Statistical Analysis: The result were expressed as the mean \pm SD (standard deviation) for three parallel measurements using graph pad prism version 6.0 for windows and subjected to statistical analysis by student t-test for comparison between groups. In all the cases $P < 0.05$ was considered as statistically significant. Data were computed for statistical analysis by using graph PAD prism.

RESULT AND DISCUSSION:

Antioxidant Activity: In this study, the antioxidant activity of EETC was compared with ascorbic acid and shown in a various *in-vitro* tests *i.e.* DPPH

scavenging activity, Superoxide Radical Scavenging Activity and hydroxyl radical scavenging activity.

DPPH Scavenging Activity: The DPPH, stable radical has been widely used in the determination of primary antioxidant activity, *i.e.* the free radical activity of the pure antioxidant compound (standard) and the extract. The assay was based on the reduction of DPPH radicals in methanol, which cause the decreasing absorbance at 517 nm. The scavenging effect increased with increasing with the increasing concentrations of the test compounds. The IC₅₀ was calculated for the extract as well as standard and summarized in **Table 1** and graphically represented in **Fig. 1** and **2**. The IC₅₀ value of the extract by DPPH scavenging activity was 21 ± 0.06 and ascorbic acid was 12 ± 0.05 , which was comparatively lower than the standard. It means ethanolic extract of *Tecoma capensis* at higher concentration captured more free radicals formed by DPPH resulting in a decrease in absorbance and the increase in IC₅₀ value.

Hydroxyl Radical Scavenging Activity: The scavenging ability of EETC on hydrogen peroxide is shown in **Fig. 3** and **4** and compared with ascorbic acid as standard. The EETC was capable of scavenging hydrogen peroxide in an amount dependent manner. At a concentration of 1 mg/ml, the scavenging activity of the extract and the standard was found to be 87.49 ± 0.34268 and 90.05 ± 0.1743 respectively. The IC₅₀ value of the extract was (12 ± 1.64) was found to be more effective in quenching the hydroxyl radicals produced in the reaction mixture. The hydroxyl radical can induce oxidative damage to DNA, lipids and proteins.

Thus removing the H₂O₂ is very important for antioxidant defense in cell by various food materials like fruits, green leafy vegetables etc. The hydroxyl radical scavenging ability of extract was determined by its ability to compete with deoxyribose for hydroxyl radical. The extract diminishes the chromogen formation by competing with deoxyribose. In this assay 2-deoxy-2-ribose was oxidized when exposed to hydroxyl radicals generated by Fenton-type reaction. The oxidative degradation can be detected by heating the product with TBA under acidic conditions to develop a pink

chromogen (thiobarbituric acid reactive species) with a maximum absorbance at 532 nm²¹.

TABLE 1: IC₅₀ % VALUE OF IN-VITRO ANTIOXIDANT ACTIVITIES OF *TECOMA CAPENSIS*

S. no.	sample	DPPH radical scavenging activity	Hydroxyl radical scavenging activity	Superoxide radical scavenging activity
1	<i>Tecoma capensis</i>	21 ± 0.06	12 ± 1.64	37.2 ± 0.04
2	Ascorbic acid	12 ± 0.05	5 ± 1.18	23 ± 1.04

Data are presented as mean ± SD

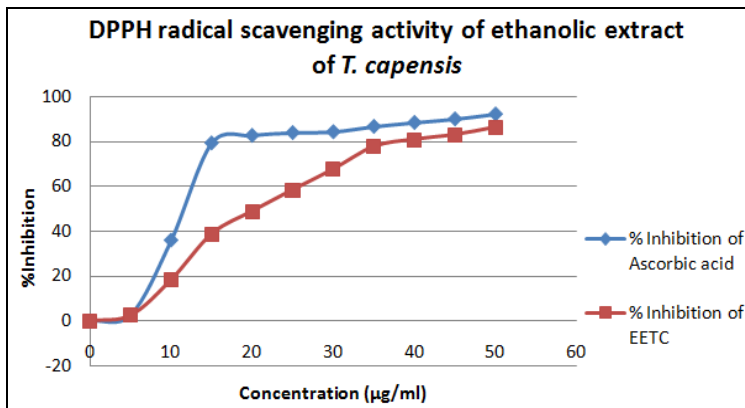


FIG. 1: DPPH RADICAL SCAVENGING ACTIVITY OF ETHANOLIC EXTRACT OF *T. CAPENSIS* AND ASCORBIC ACID

Data are presented as the percentage of DPPH radical scavenging, Mean ± SD

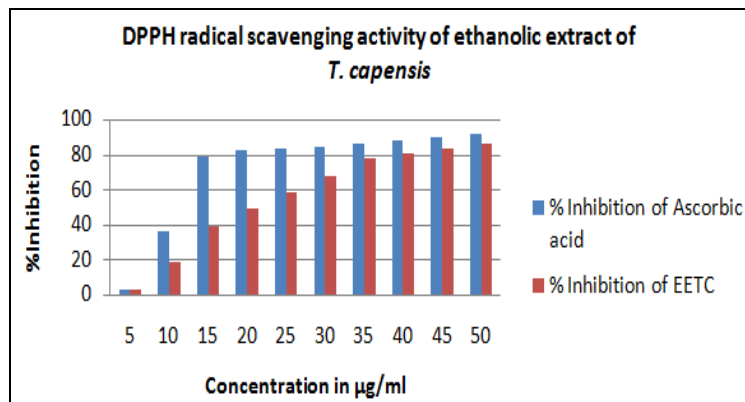


FIG. 2: DPPH RADICAL SCAVENGING ACTIVITY OF ETHANOLIC EXTRACT OF *T. CAPENSIS* AND ASCORBIC ACID

Data are presented as the percentage of DPPH radical scavenging, Mean ± SD

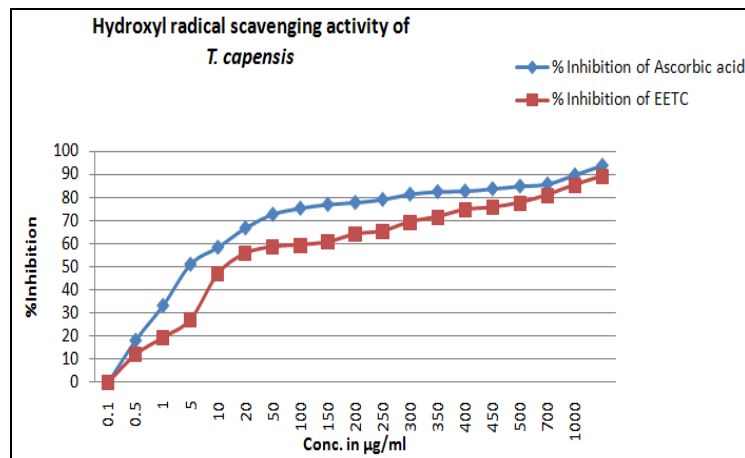


FIG. 3: DETERMINATION OF HYDROXYL RADICAL SCAVENGING ACTIVITY OF ETHANOLIC EXTRACT OF *T. CAPENSIS* AND ASCORBIC ACID

Data are presented as the percentage of hydroxyl radical scavenging, Mean ± SD

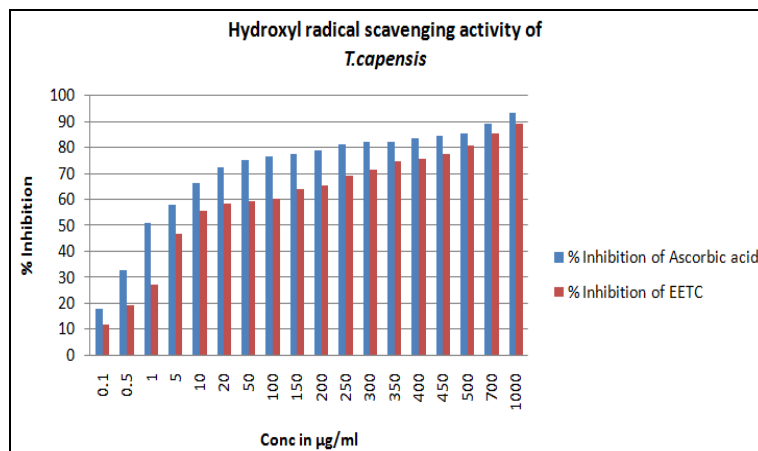


FIG. 4: DETERMINATION OF HYDROXYL RADICAL SCAVENGING ACTIVITY OF ETHANOLIC EXTRACT OF *T. CAPENSIS* AND ASCORBIC ACID

Data are presented as the percentage of hydroxyl radical scavenging, Mean ± SD

Superoxide Radical Scavenging Activity: Superoxide radical is one of the strongest ROS among the free radical and gets converted to other harmful reactive oxygen species such as hydrogen peroxide and hydroxyl radical damaging bio-

molecules which results in chronic diseases²². These radicals generated from dissolved oxygen by PMS-NADH coupling can be measured by their ability to reduce NBT.

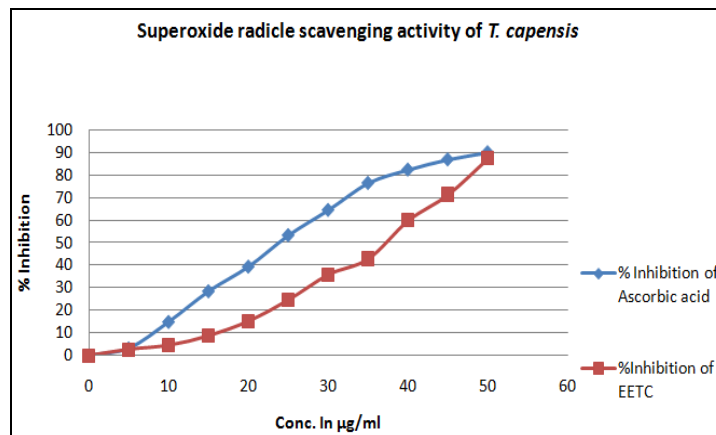


FIG. 5: DETERMINATION OF SUPEROXIDE RADICAL SCAVENGING ACTIVITY OF ETHANOLIC EXTRACT OF *T. CAPENSIS* AND ASCORBIC ACID

Data are presented as the percentage of superoxide radical scavenging, Mean ± SD

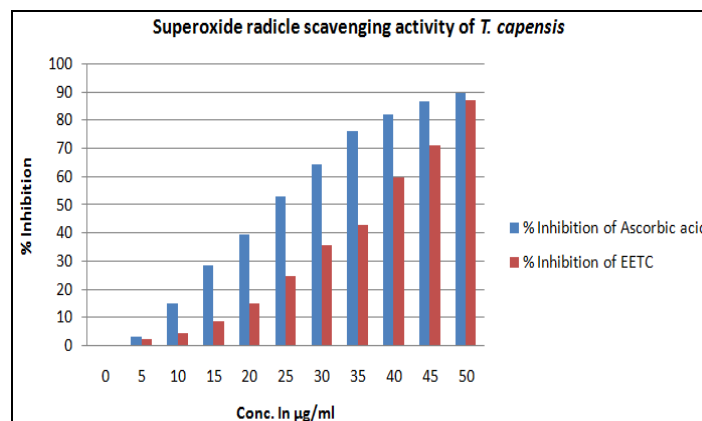


FIG. 6: DETERMINATION OF SUPEROXIDE RADICAL SCAVENGING ACTIVITY OF ETHANOLIC EXTRACT OF *T. CAPENSIS* AND ASCORBIC ACID

Data are presented as the percentage of superoxide radical scavenging, Mean ± SD

The decrease in absorbance at 560 nm with the plant extract (EETC) and the reference compound ascorbic acid indicates their abilities to quench superoxide radicals in the reaction mixture. The IC₅₀ value of the extract is 37.02 ± 0.04 and the standard is 23 ± 1.04 respectively shown in **Table 1** and **Fig. 5** and **6**.

Antimicrobial Activity: The antimicrobial activities of the plant extract (EETC) against four bacterial strains and two fungal strains were examined and assessed by the presence or absence of inhibition zones. The inhibition zones of the extract tested for antibacterial and antifungal activity are given in **Table 2, 3** and **Fig. 7, 8** shows

potential Gram +ve and Gram -ve activity but very less antifungal activity. *S. aureus* causes infections including superficial skin lesion, localized abscesses, and food poisoning²³.

B. subtilis causes meningitis, endocarditis, pneumonia, wound infection and lesions²⁴. *E. coli* is Gram negative bacteria causing severe type of food poisoning and also causes liver abscess, infra abdominal obstetric and gynecologic. Enteropathogenic strains of *E. coli* causes acute diarrhoea in children below 2 years and may cause acute death due to the dehydration and electrolyte imbalance²⁵ and *P. vulgaris* causes wound infection and urinary tract infection²⁶.

TABLE 2: ZONES OF GROWTH INHIBITION (mm) SHOWING ANTIBACTERIAL ACTIVITY OF ETHANOLIC EXTRACT OF *T. CAPENSIS*; WELL DIAMETER 8.0 mm

Name of the organism	Standard (Ciprofloxacin 50 µg/ml)	T ₁ (50mg of EEAN)	T ₂ (100mg of EEAN)	T ₃ (150mg of EEAN)	T ₄ (200mg of EEAN)	Control
<i>S. aureus</i> (Gram + ve)	24.83 ± 0.2886	12.25 ± 0.5	14 ± 0.8165	14.5 ± 0.5774	15 ± 0.816	-
<i>B. subtilis</i> (Gram +ve)	24.66 ± 0.5773	10.5 ± 0.5773	12.5 ± 0.5773	12.75 ± 0.5	14.5 ± 0.5773	-
<i>P. vulgaris</i> (Gram -ve)	24.33 ± 0.5773	12.5 ± 0.5773	13 ± 0.816497	13.5 ± 0.57735	14.75 ± 0.5	-
<i>E. coli</i> (Gram -ve)	24.51 ± 0.5	12.25 ± 0.5	13.25 ± 0.5	14.25 ± 0.5	15.25 ± 0.5	-

EETC=Ethanollic extract of *T. capensis*, data are presented as Mean±SD

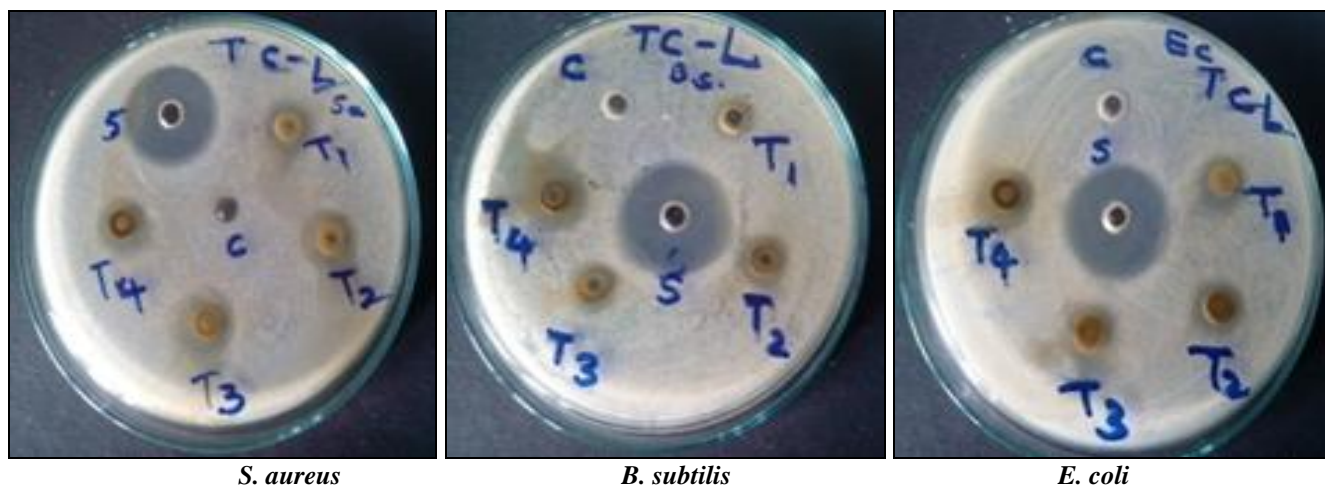


FIG. 7: ANTIBACTERIAL ACTIVITY OF ETHANOLIC EXTRACT OF *T. CAPENSIS*

T₁=50 mg EETC; T₂=100 mg EETC; T₃=150 mg EETC; T₄=200 mg EETC; S=standard (Ciprofloxacin 50 µg/ml); C=Control (DMSO)

TABLE 3: ZONES OF GROWTH INHIBITION (mm) SHOWING ANTIFUNGAL ACTIVITY OF ETHANOLIC EXTRACT OF *T. CAPENSIS*; WELL DIAMETER 8.0 mm

Name of the organism	Standard Fluconazole (0.1 mg/ml)	T ₁ (50mg of EEAN)	T ₂ (100mg of EEAN)	T ₃ (150mg of EEAN)	T ₄ (200mg of EEAN)	Control
<i>A. niger</i>	16 ± 0.11	10.5 ± 0.5773	11.5 ± 0.5773	12.5 ± 0.5773	14.25 ± 0.5	-
<i>C. albicans</i>	16 ± 0.16	12.25 ± 0.5	13.25 ± 0.5	14.25 ± 0.5	15.25 ± 0.5	-

EETC=ethanollic extract of *T. capensis*, data are presented as Mean ± SD

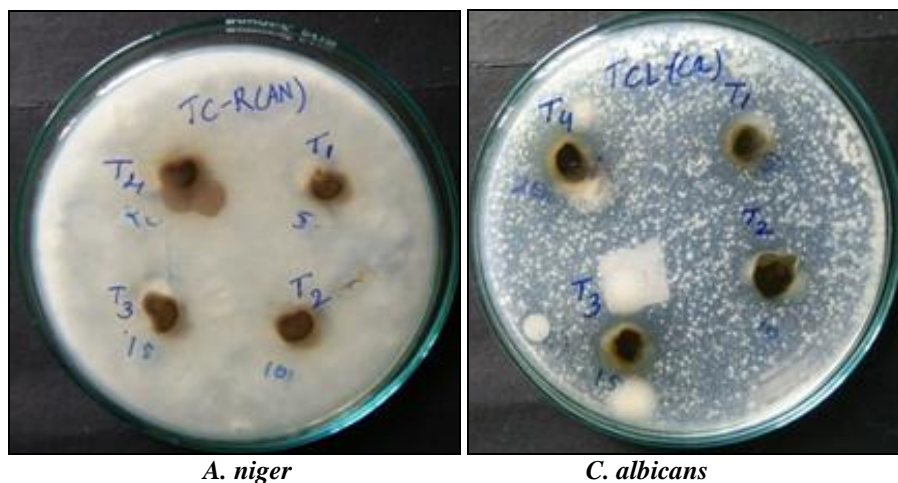


FIG: 8: ANTI FUNGAL ACTIVITY OF ETHANOLIC EXTRACT OF *T. CAPENSIS*
 T1=50 mg EETC; T2=100 mg EETC; T3=150 mg EETC; T4=200 mg EETC

These infections can be treated with many standard drugs, but not all strains can be successfully treated by these drugs, further evaluation of this plant is needed. The extract shows moderate activity against microbes. This could be the beginning for further research on the screening approach by taking in to consideration the extract preparation and the mechanism of action.

Anti-inflammatory Activity: Inflammation can be defined as a reaction of a living cell or tissue to injury, infection, irritation or infiltration. It is characterized by pain, swelling, redness and heat/fever. Prostaglandins and leukotrienes are released by a host of mechanical, thermal, chemical, bacterial and other insults and they contribute importantly to the signs and symptoms of inflammation²⁷.

TABLE 4: ANTIINFLAMMATORY ACTIVITY OF *TECOMA CAPENSIS* CARRAGEENAN INDUCED RAT PAW EDEMA METHOD

S. no.	Name of the sample	Dose (mg)	% inhibition of paw volume at various time intervals (hr)					
			1	2	3	4	5	6
1	Control	--	0	0	0	0	0	0
2	Standard (Indomethacin)	20	25.30 ± 0.41	42.90 ± 0.40	57.5 ± 0.43	63.09 ± 0.42	64.29 ± 0.31	72.35 ± 0.43
3	Test extract -100 (EETC)	100	20.64 ± 0.11	37.5 ± 0.12	45.94 ± 0.12	53.21 ± 0.11	56.36 ± 0.23	58.97 ± 0.11
4	Test extract -250 (EETC)	250	25.30 ± 0.12	40.58 ± 0.13	56.25 ± 0.14	62.48 ± 0.13	62.97 ± 0.12	71.73 ± 0.14

EETC=Ethanolic extract of *Tecoma capensis*, each value is presented as Mean ± SD of three values

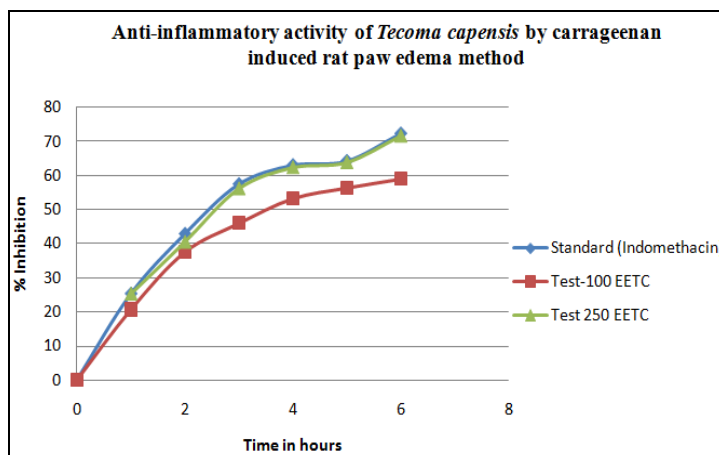


FIG. 9: ANTIINFLAMMATORY ACTIVITY OF *TECOMA CAPENSIS* BY CARRAGEENAN INDUCED RAT PAW EDEMA METHOD

Data is represented as mean ± SD

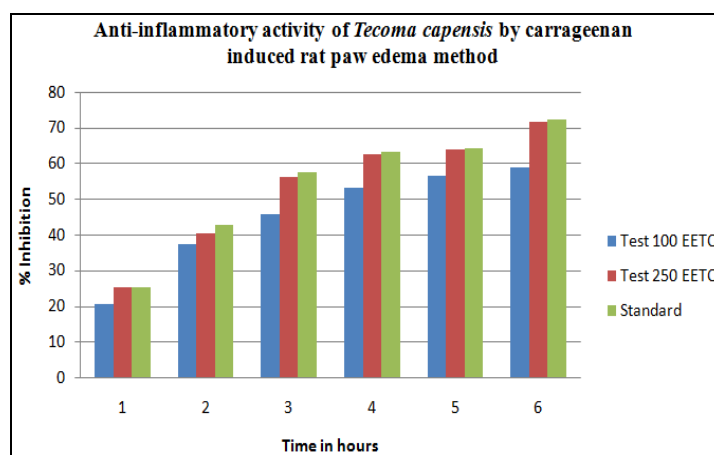


FIG. 10: ANTIINFLAMMATORY ACTIVITY OF *TECOMA CAPENSIS* BY CARRAGEENAN INDUCED RAT PAW EDEMA METHOD

Data is represented as mean \pm SD

Mast cell which is very rich in histamine has membrane receptors both for a special class of antibody (IgE) and for complements components- C3a and C5a mast cell can be activated to secrete inflammatory mediators through these receptors and also by direct physical damage. A trans membrane protein CD40, expressed on monocytes, neutrophils and platelets also play roles in inflammation²⁸. Our results clearly show anti-inflammatory activity of the *Tecoma capensis*. Generally, the effect of the ethanolic extract of *Tecoma* with inhibition ranging from 58.97 ± 0.11 to 71.73 ± 0.14 , nearly equal to the standard Indomethacin. Mechanism possibly involved in this anti-inflammatory activity includes inhibition of the action of inhibitory mediators such as histamine, prostaglandins, nitric oxide, platelets activating factors and substance P, effect on adreno corticoid hormone and immune suppression.

This work is at present is limited to only animals, further clinical trials must required.

CONCLUSION: The results of the present study revealed that *T. capensis* extract possesses potent free radical scavenging ability, anti-inflammatory and antimicrobial activity. The activity may be due to the presence of flavonoids, phenols and triterpenoids. Further, we conclude that this plant can be used as a natural anti oxidant, anti inflammatory and anti microbial purpose.

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CONFLICT OF INTEREST: Nil

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