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# Phytochemical Screening, Anti-microbial Activity and GC-MS Analysis of *Corchorus tridens* L.

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## Abstract
The plant *Corchorus tridens* Lbelonging to the family Malvaceae form the part of the traditional medicine system. The species of this family useful for the prevention of anemia, general healers and a remedy for heart disease, enemas, parturition and febrifuges. The whole plant *(Corchorus tridens* L*)* were washed with normal water and shade dried, powdered and extracted by soxhlet apparatus using solvents like ethanol and petroleum ether. The extracts were screened for major phyto constituents using standard procedures. The extracts of the plant revealed the presence of alkaloids, carbohydrates, flavonoids, quinines, steroids, tannins, phenol etc. The antimicrobial activity was carried out by Disc Diffusion Technique at Periyar Pharmaceutical College, Trichy. The plant constituents were characterized by UV (Ultra violet), FT-IR (Fourier Transform Infrared) and GC-MS analysis. The functional groups present were confirmed by FT-IR analysis. The antibacterial activity has confirmed the potential medicinal activity of the plant.
**Keywords:** *Corchorus tridens*L,soxhlet apparatus, antimicrobial activity, UV, FT-IR, and GC-MS analysis

## 1. Introduction
Plants are the richest resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs due to presence of various types of bioactive phytochemicals, essential mineral elements and other pharmacological properties [1, 2]. The drugs are derived either from the whole plant or from different parts like leaves, stem, bark, root, flower and seed. Plants used in traditional medicines contain a wide range of ingredients that can be used to treat chronic as well as infectious diseases. The bioactive compounds like alkaloids, flavonoids, tannins and phenolic compounds are the reason for the medicinal value of plants that produce a definite physiological action on the body [3].

Now a days about 80% of the developed countries used traditional medicine, which has compounds derived from medicinal plants [4] and more than 30% of the modern pharmacological drugs are derived directly or indirectly derived from plants and the plants are the cheapest and safer alternative sources of drugs [5, 6]. Phytochemicals are not essential nutrients and are not required by the human body for sustaining life, but have important properties to prevent or to fight some common diseases. Many of these benefits suggest a possible role for phytochemicals in the prevention and treatment of disease, Because of this property; many researchers have been performed to reveal the beneficial health effects of phytochemicals. The purpose of the present review is to provide an overview of the extremely diverse phytochemicals presents in medicinal plants [7]. *Corchorus tridens* L is familiarly known as naruvalli belongs to malvaceae family, Annual herb up to 1 m tall, usually erect and branched; stems reddish, fibrous and tough, often somewhat woody. The decoction of the root and leaves are used for fever, to treat genital ulcers, to prevent Anemia. The extract significantly inhibited the castor oil-induced diarrhea. The ethanol extract of *Corchorus tridens* L leaf has significant antimicrobial activity and substantiates the use of this herbal remedy as a nonspecific treatment for fever in folk medicine.

## 2. Materials and Methods
### 2.1 Collection and Identification of Plant Materials
Fresh plant *Corchorus tridens* L of Malvaceae family was collected from cultivated area of Sankagiri, Salem district, Tamilnadu, India and authenticated by Dr. C. Sebastian Rajasekaran, Associate Professor of Botany and Vice Principal of Bishop Heber College, Tiruchirappalli, Tamilnadu, India.

**2.2 Preparation of Plant powder**

The plant of *Corchorus tridens* L was thoroughly washed in running tap water to remove soil particles and followed remains and finally washed with tap water. The plant was dried under shade for 15 days, segregated, crushed by a mechanical mixer grinder to fine powder, stored in an airtight container for further use or analysis.

**2.3 Soxhlet Extractor Using Ethanol, Petroleum Ether Extract**

The Phytochemical constituents were extracted in continuous hot extraction in Soxhlet apparatus using Ethanol and Petroleum Ether. Plant powder material (200 g) filtered through net size 80 to get the powder of even size. Around 25 g of the powder was packed in soxhlet extractor prepared physically. The cover was then inserted into the Soxhlet apparatus and was extracted in continuous hot extraction was done by using 150 ml ethanol as a solvent. The temperature was maintained using regulators of heating mantle and the extraction was continued for 24 hours. Then the ethanol extract was collected conical flask and powder from the cover was rejected. Ethanol extract was repeatedly washed and impurities if any were removed. The crude extract was stored and used for the further study.

Similar extraction was carried out for Petroleum ether as solvent. Both extracts were labeled and preserved in refrigerator for further analysis, characterization, phytochemical screening, GC MS study and antimicrobial studies [8].

**3. Results and Discussion**

This section presents the results of phytochemical screening, UV, FT-IR analysis,
GC-MS study and antimicrobial activity of Ethanol and Petroleum ether extracts of *Corchorus tridens* L plant.

**3.1 Phytochemical Analysis**

The ethanol and petroleum ether extracts of *Corchorus tridens* L was subjected to phytochemical screening for various phytoconstituents, which revealed the presence of alkaloids, amino acids, carbohydrates, flavonoids, glycosides, phenol, protein, quinines, resins, saponins, starch, steroids, tannins, terpenoids and vitamin C[9-11] (Table 1).

**Table 1: Phytochemical Screening Test for *Corchorus tridens* L**

| S. No | Chemical Constituent | Ethanol | Petroleum Ether |
|---|---|---|---|
| 1 | Alkaloids | + | + |
| 2 | Amino acids | - | - |
| 3 | Carbohydrates | - | + |
| 4 | Flavonoids | + | + |
| 5 | Glycosides | - | - |
| 6 | Phenol | + | - |
| 7 | Protein | - | - |
| 8 | Quinines | + | + |
| 9 | Resins | - | - |
| 10 | Saponins | - | - |
| 11 | Starch | - | - |
| 12 | Steroids | + | + |
| 13 | Tannins | + | + |
| 14 | Terpenoids | - | + |
| 15 | Vitamin C | - | + |

+ indicates the presence of phytoconstituents
- indicates the absence of phytoconstituents

**3.2 UV-Visible Spectroscopic Analysis**

The UV-VIS profile (Fig 1) of the plant extract was studied at a range of 200 to 800 nm. Four major bands were recorded at 229, 287, 408 and 666 nm respectively [12].

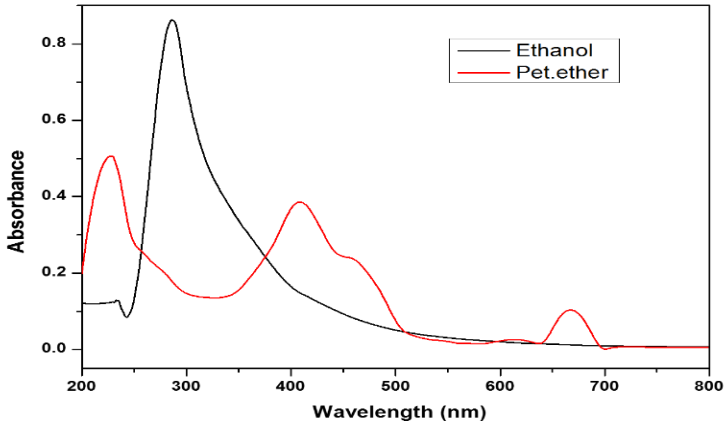


**Fig: 1 UV Spectra of Ethanol Extract of *Corchorus Tridens***

### 3.3 FT-IR Spectroscopic analysis

The FT-IR spectrum was used to identify the functional group of the active components based on the peak value in the region of infrared radiation. The results of FTIR analysis showed different peaks at 3364.14, 2343.36, 1669.6, 750.05, and 670.5 $cm^{-1}$ respectively (Fig 2). It confirmed the presence of functional groups such as amide, alcohol, phenols and halogen compounds etc [13].

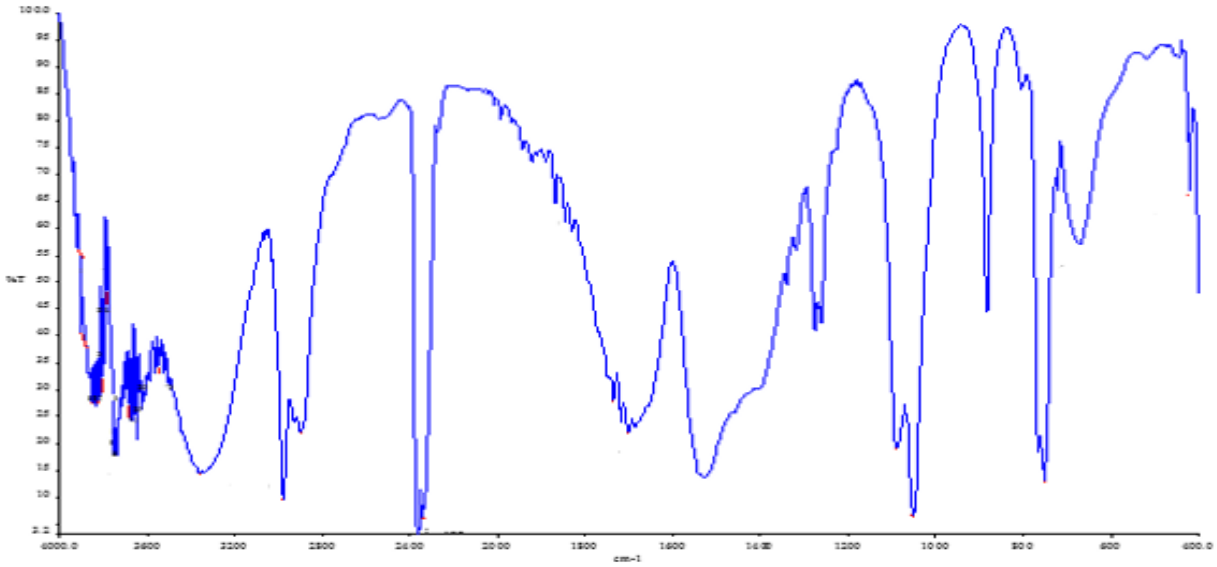

**Fig: 2 IR Spectra of Ethanol Extract of *Corchorus Tridens***

### 3.4 Chemical Characteristics of *Corchorus tridens* L Using GC-MS Analysis

The components present in the Petroleum Ether extracts of *Corchorus tridens* were identified by GC-MS analysis (Fig 3). There were in all 21 active phyto constituents present and are listed in Table2 along with their molecular weight, nature of compounds and their activity.

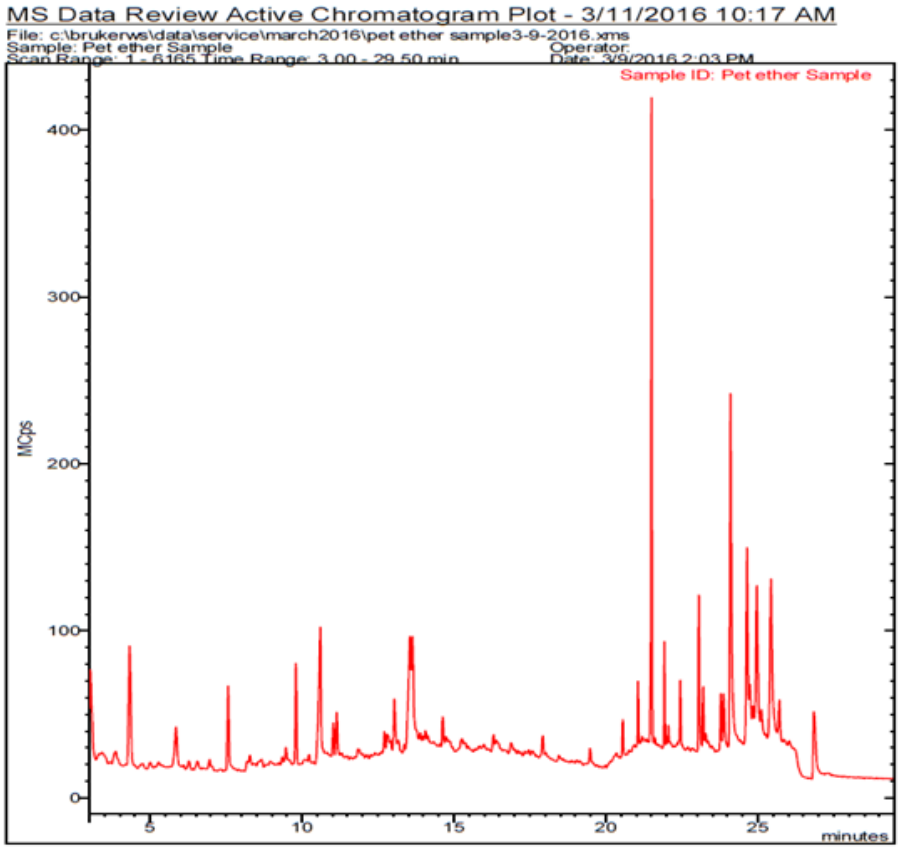


**Fig 3: GC-MS Chromatogram of the Petroleum Ether extract**

**Table 2: Activity of phytocomponents identified in *Corchorus tridens* L by GC-MS**

| Name of the compound | Molecular Formula | MW | Nature of Compounds | Activity |
|---|---|---|---|---|
| 1-Iodo-2-methylundecane | $C_{12}H_{25}I$ | 296 | Iodo compound | Antimicrobial |
| Heptadecane, 2,6,10,15-tetramethyl | $C_{21}H_{44}$ | 296 | 2,6,10,15-tetramethylheptadecane | Antibacterial,Anti-inflammatory activities. |
| Heptadecane, 2,6-dimethyl | $C_{19}H_{40}$ | 268 | Alkyl | Sex hormone in algae |
| Sulfurous acid, hexyl tetradecyl ester | $C_{20}H_{42}O_3S$ | 362 | | No Activity reported |
| Hexadecanoic acid, 15-methyl, methyl ester | $C_{18}H_{36}O_2$ | 284 | Ester | Antioxidant |
| n-Hexadecanoic acid | $C_{16}H_{32}O_2$ | 256 | Palmitric acid | Antioxidant, Nematicide, Pesticide. |
| Eicosanoic acid, ethyl ester | $C_{22}H_{44}O_2$ | 340 | Arachidic acid | Antioxidant, Hypo cholesterolemic Pesticide, Lubricant, Ant androgenic |
| Heptacosane, 1-chloro | $C_{27}H_{55}Cl$ | 414 | Heptacosane | Antibacterial, Antifungal Activity |
| 11,14-Eicosadienoic acid, methyl ester | $C_{21}H_{38}O_2$ | 322 | Ester compound | Antibacterial |
| Phytol | $C_{20}H_{40}O$ | 296 | Diterpene | Antimicrobial, Anti-inflammatory |
| 9-Octadecynoic acid | $C_{18}H_{32}O_2$ | 280 | Stearic Acid | No Activity reported |
| Tetracontane, 3,5,24-trimethyl | $C_{43}H_{88}$ | 604 | Tetracontane, 3,5,24-Trimethyl | anti-inflammatory |
| Tritetracontane | $C_{43}H_{88}$ | 604 | Alkyl | anti-inflammatory |
| Sulfurous acid, hexyl pentadecyl ester | $C_{21}H_{44}O_3S$ | 376 | | No Activity reported |
| 9,12,15-Octadecatrienoic acid, 2,3-bis(acetyloxy)propyl ester, (Z,Z,Z) | $C_{25}H_{40}O_6$ | 436 | Linolenic acid | Antioxidant, pesticide, antimicrobial, lubricant |
| Squalene | $C_{30}H_{50}$ | 410 | | Anti-Oxidant |
| Sulfurous acid, butyl tridecyl ester | $C_{17}H_{36}O_3S$ | 320 | | No Activity reported |
| dl-.alpha.-Tocopherol | $C_{29}H_{50}O_2$ | 430 | Tocopherol | Anti-Oxidant |
| Stigmastan-6,22-dien, 3,5-dedihydro | $C_{29}H_{46}$ | 394 | | Anesthetic |
| Cholesterol 3-O-[(2-acetoxy)ethyl] | $C_{31}H_{52}O_3$ | 472 | Simvastatin | prevent atherosclerosis |
| beta.-Amyrin | $C_{30}H_{50}O$ | 426 | Amyrin | Anti-Inflammatory |

### 3.5 Anti-Microbial Activity

Antibacterial activity of ethanol and petroleum ether extracts were evaluated *in vitro* against four bacterial species such as *Staphylococcus aureus*, *Basillus subtilis*, *Klebsiella aerogenes*, *Escherichia coli* at Periyar College of Pharmaceutical Sciences, Tiruchirappalli. Results are given in the following table 3, Fig 4.

The Anti-Microbial activity of the given sample against the above Microorganisms has been recorded as per the zone of inhibition formation. The results indicates that the sample of Petroleum Ether extract is more effective for *E.coli &Bacillus subtilis* when compare with other organisms such as *Staphylococcus aureus*, *klebsiella* aerogenes. Phytochemical constituents as per table 1could be responsible for the observed antimicrobial property.

**Table 3: Antibacterial Study of *Corchorus tridens* L Plant extract**

| Name of the Micro Organisms | Zone of Inhibition (mm) | | Ciprofloxacin Std |
|---|---|---|---|
| | Ethanol | Pet Ether | |
| *Staphylococcus aureus* | 14 | 14 | 35 |
| *Bacillus subtilis* | 14 | 26 | 40 |
| *Klebsiella aerogenes* | 14 | 13 | 30 |
| *E.coli* | 12 | 23 | 38 |

**Fig 4: Zone of inhibition in mm against various microorganisms**

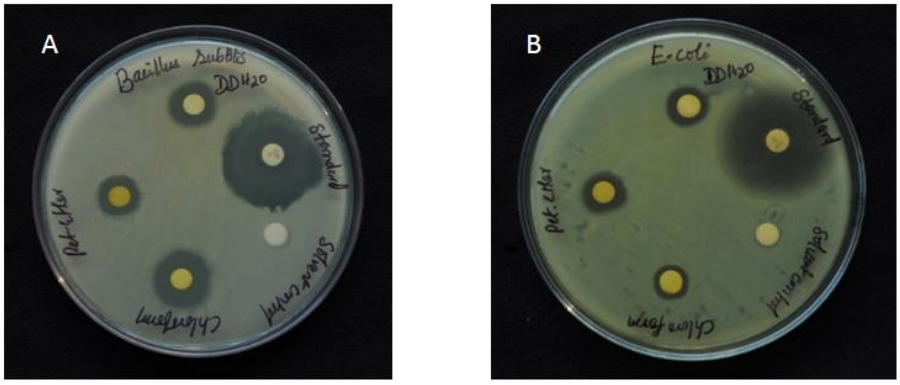


Fig A Zone of inhibition of given by pet. ether extract against *Bacillus subtilis*
Fig B Zone of inhibition of given by pet. ether extract against *E.coli*

## 4. Conclusion

Phytochemical screening, UV, FT-IR analysis, GC-MS analysis and Antibacterial activity of *Corchorus Tridens L* Plant was studied. The present study concludes that 9 phytoconstituents present through phyto screening tests, which was confirmed through screening test and FT-IR analysis. 21 active phyto constituents presence were confirmed through GC-MS analysis. Antibacterial activity has confirmed that the plant is more effective in inhibiting *E. coli and Bacillus subtilis*.

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## References

[1] Leaves V. Preliminary phytochemistry, antimicrobial properties and acute toxicity of *Stachytarpheta jamaicensis* (L.) Vahl. leaves. *Trends in Medical Research*. 2007; 2(4):193-8.

[2] Kumar, M., Dandapat, S., Kumar A., and Sinha, M.P., Anti-typhoid Activity of *Adhatoda Vasica* and *Vitex Negundo*, *Persian Gulf Crop Protection*. 2013; 2(3): 64-75.

[3] Hemashenpagam, Lali Growther, Sankar, T. Selvaraj and A. Panneerselvam., Phytochemical Analysis and Antimicrobial Activity of *Solanum xanthocarpum*. *Biomedicine*. 2009;29(4):353-356.

[4] Chandekar, C.J. and M.J. Madhugiri., Antimicrobial Potential of Leaves of *Psidiumguajava*.The Bio scan. 2011; 6(4): 557-561.

[5] Van Der Watt E, Pretorius JC. Purification and identification of active antibacterial components in *Carpobrotus edulis L*. Journal of ethnopharmacology. 2001; 76(1):87-91.

[6] Sharif MD, Banik GR. Status and utilization of medicinal plants in Rangamati of Bangladesh. *Res. J. Agric. Biol. Sci.* 2006; 2(6):268-73.

[7] Mamta Saxena, Jyoti Saxena, Rajeev Nema, Dharmendra Singh and Abhishek Gupta., Phytochemistry of Medicinal Plants. *Journal of Pharmacognosy and Phytochemistry*: 2013; 1(6): 1-3.

[8] Parekh J, Jadeja D, Chanda S. Efficacy of aqueous and methanol extracts of some medicinal plants for potential antibacterial activity. *Turkish Journal of Biology.* 2006 Jan 16; 29(4): 203-10.

[9] Njoku VO, Obi C. Phytochemical constituents of some selected medicinal plants. *African Journal of Pure and Applied Chemistry*. 2009 Nov 30; 3(11): 228-33.

[10] Yadav RN, Agarwala M. Phytochemical analysis of some medicinal plants. *Journal of Phytology*. 2011 Dec 14; 3(12).

[11] Edeoga HO, Okwu DE, Mbaebie BO. Phytochemical constituents of some Nigerian medicinal plants. *African Journal of Biotechnology*. 2005 Jul 7; 4(7):685-8.

[12] Marimuthu J, Essakimuthu P, Narayanan J, Anantham B, Tharmaraj RJ, Arumugam S. Phytochemical characterization of brown seaweed *Sargassum wightii*. *Asian Pacific Journal of Tropical Disease.* 2012 Dec 31; 2: S109-13.

[13] Blunt JW, Copp BR, Hu WP, Munro MH, Northcote PT, Prinsep MR. Marine natural products. *Natural product reports.* 2007 Feb; 24(1): 31-86.