Antibacterial Activity OF fruit extract of *Terminalia chebula* Retz. against some Gram Positive and Gram Negative Bacteria.

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Abstract

Aqueous extracts of the fruits of *Terminalia chebula* Retz. (Combretaceae) were screened for their antibacterial activity using the Pour plate method. It was tested against six medically important bacterial strains, namely Gram-positive Bacteria (*Bacillus subtilis*, *Bacillus aureus* and *Staphylococcus aureus*) and Gram-negative bacteria (*Escherichia coli*, *K pneumoniae*, and *Pseudomonas aeruginosa*). The susceptibility of the microorganisms to the aqueous extracts of *Terminalia chebula* was compared with standards drug i.e. Gentamycin, Tetracycline. The aqueous extract was more significant against Gram-positive bacteria than against Gram-negative bacteria. The 100 µg/ml showed the best antibacterial activity as compared to the standard; hence this plant can be further subjected to isolation of the therapeutic antimicrobials and further pharmacological evaluation.

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Key words: Antimicrobial activity, Gram positive & Gram negative Bacteria, *Terminalia chebula* Aqueous extract.

1. Introduction

Herbal medicine is still the mainstay of about 75-80% of the whole population, mainly in developing countries, for primary health care because of better cultural acceptability, better compatibility with the human body and fewer side effects. However, the last few years have seen a major increase in their use in the developed world. Nowadays multiple drug resistance has developed due to the indiscriminate use of commercial antimicrobial drugs commonly used in the treatment of infectious disease. In addition to this problem, antibiotics are sometimes associated with adverse effects on the host including hypersensitivity, immune-suppression and allergic reactions. This situation forced scientists to search for new antimicrobial substances. Given the alarming incidence of antibiotic resistance in bacteria of medical importance, there is a constant need for new and effective therapeutic agents. Therefore, there is a need to develop alternative antimicrobial drugs for the treatment of infectious diseases from medicinal plants. Several screening studies have been carried out in different parts of the world. There are several reports on the antimicrobial activity of different herbal extracts in different regions of the world [1].

*Terminalia chebula* Retz.(Combretaceae) It is native to Indian subcontinent and the adjacent areas such as Pakistan, Nepal and the South-West of China stretching as far south as Kerala or even Sri Lanka [2]. *Terminalia chebula* Retz. is a medium to large deciduous tree, attaining a height of up to 30 m, with widely spreading branches and a broad roundish crown. Its wood is hard and bulky. It occurs scattered in teak forest, mixed deciduous forest, extending into forests of comparatively dry types [3-7]. According to Unani system of medicine, unripe fruit is an astringent and aperient. The ripe fruit is purgative, tonic, good in piles, strengthens the brain, the eyes and gums. In Ayurveda, fruits are used as antimicrobial [8], Antioxidant [9] anti-inflammatory, wound healing, stomachic, laxative, tonic, carminative, expectorant,
anthelminitic, antidyseptic, useful in asthma, sore throat, eye and heart diseases, tumors, epilepsy, cures spongy gums, ulcers. Snake bite and scorpion sting [10], burns, scalds, skin disorders [11], tridosha [12].

2. Material and Methods

2.1. Plant Collection and authentication

In the present study, the fruits of *Terminalia chebula* Retz. were collected from the local areas of Savarde, Tal-Chiplun Dist- Ratnagiri (Maharashtra). The fruits were authenticated by Dr. Harsha Hegde, Scientist, RMRC, Indian Council of Medical Research (ICMR) Belgaum, Karnataka, India.

2.2. Preparation of the crude extracts

The fruits of *Terminalia chebula* Retz. was dried at room temperature (25-35 °C) and powdered with the help of an electric grinder. The course material was macerated with distilled water. The extracts were dried at 50°C in a water bath. The percentage yields obtained of the extracts was 21.20%.

2.3. Preparation of test Samples

Aqueous extracts of *Terminalia chebula* Retz was prepared in sterile distilled water (1mg/ml). Further test dilutions were made ranging from 10 µg/ml to 100µg/ml in sterile distilled water [13].

2.4. Preparation of Bacterial Suspension

The bacterial suspension was prepared by transferring a loopful of inoculum into 1ml sterile saline solution from the stock culture maintained at 4°C in 10ml nutrient broth [14].

![Fig-1: Preliminary screening for antibacterial activity of fruit extract of *Terminalia chebula*](image-url)
Table 1: Preliminary screening for antibacterial activity of fruit extract of *Terminalia chebula*

<table>
<thead>
<tr>
<th>Test Samples</th>
<th>Conc. (µg/ml)</th>
<th>Zone of Inhibition (mm)</th>
<th>Gram positive</th>
<th>Gram negative</th>
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<td>B. Subtilis</td>
<td>B. aureus</td>
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<td>Aqueous Extract</td>
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2.5. Preparations of Plates

Nutrient agar medium was sterilized at 15lb/cm² pressure for 20 min in an autoclave about 15 ml of medium was poured in each Petri plates under sterile conditions [15].

2.6. Test Bacteria

The Bacterial culture employed in this study are *Bacillus subtilis, Bacillus aureus, Staphylococcus aureus, Escherichia coli, K pneumoniae* and *Pseudomonas aeruginosa* obtained from the department of Microbiology, Gulbarga University, Gulbarga. (Karnataka) INDIA.

2.7. Culture Media

The media used in Pour Plate Method was sterile nutrient agar.

2.8. Antibacterial Assay

Each extracts was tested against three Gram-positive bacteria (*Bacillus subtilis, Bacillus aureus* and *Staphylococcus aureus*) and three Gram-negative bacteria (*Escherichia coli, K pneumoniae, Pseudomonas aeruginosa*) Antibacterial activity was determined by Pour plate method in Sterile nutrient agar medium plate. The 6.0 mm wells were made each Petri plate. Plate were allowed to stand for 1hr and inoculated with 1ml extract. Respective dilutions ranging from 10 µg/ml to 100 µg/ml was prepared. The applied sample extracts were allowed to diffuse properly by keeping the Petri plates in refrigerators at 4°C for 4hr. Then the Petri plates were transferred to incubation chamber for 24hr at 37°C. The diameter zone of inhibition in mm was measured [10]. Greater the diameter more active is plants extracts tasted on the colony of the organisms [16,17].

3. Results and Discussion

Aqueous extracts of the fruits of *Terminalia chebula* Retz was subjected to a preliminary screening for antimicrobial activity against Gram positive & Gram negative bacteria i.e. *Bacillus subtilis, Bacillus aureus, Staphylococcus aureus, Escherichia coli, K pneumoniae* and *Pseudomonas aeruginosa*. It was clear from Table – I & Fig. – I. The aqueous fruit extract of *Terminalia chebula* Retz shown significant activity against five organisms tested but the aqueous extract of *Terminalia chebula* less activity against *B. Subtilis* organism as compared to the standards drugs. The aqueous fruit extract of *Terminalia chebula* shown most significant against *S.aureus* as compared to both standards drug and it has been shown in Fig 1. The aqueous extract at 100 µg/ml concentration was most significant as compared to the standard drugs 25 µg/ml Gentamycin and 25µg/ml Tetracycline against all organisms. The antibacterial activity responsible due to the presence of chemical constituents as alkaloids, glycosides, saponins, cardiac glycosides, tannins, Tannic acid and simple phenol compounds.

References


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