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ORIGINAL RESEARCH ARTICLE

Evaluation of Antibacterial Activity of Ethanolic Fruit Extract of *Cucumis trigonus* Roxb.

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ABSTRACT

The present study investigates the antibacterial potential of ethanolic extract of the fruits of *Cucumis trigonus*. *Cucumis trigonus* Roxburghii of family Curcurbitaceae is a perennial scabrid monoecious tendrillar herb commonly used in Indian folklore medicine. The antibacterial activity was conducted on 4 bacterial species (*Escherichia coli, Staphylococcus aureus, Bacillus cereus, Pseudomonas aeuriginosa*) which normally seen in the urine of a urolithiatic infected person. The Paper disc diffusion method was used for the study. The ethanolic extract exhibited moderate activity against the bacterial strains as assessed by disc diffusion assays.

Key words: *Cucumis trigonus*, bacteria, *Escherichia coli, Staphylococcus aureus, Bacillus cereus, Pseudomonas aeuriginosa*

INTRODUCTION

Cucumis trigonus Roxburghii of family Curcurbitaceae is a perennial scabrid monoecious tendrillar herb with slender angled stem, leaves deep palmately five lobed, hispid on the nerves beneath and rounded at the apex. Male flowers are small and are found in clusters where as female flowers are solitary. Fruits are ellipsoid or sub-global, yellow or yellow with green stripes, seeds are white and ellipsoid [1].

Cucumis trigonus is distributed throughout India and found in areas of Ceylon, Afghanistan, Persia and Northern Australia [2]. Roots, fruits and seeds are the medicinal parts of the plant. Roots are purgative and liver tonic. Fruits are used for stomachic, ascites, anemia and constipation and acts as a diuretic. Seeds have a unsaturated lipids as major constituents and acts as a coolant and astringent.

Over the past few decades there has been much interest in natural materials as sources of new antibacterial agents. Different extracts from traditional medicinal plants have been tested, many reports show the effectiveness of traditional herbs against microorganisms and as a result plants have become one of the bases of modern medicine [3]. Plants have given the western pharmacopoeia about 7,000 different pharmaceutically important compounds and a number of top-selling drugs of modern times such as quinine, artemisinin, shikonin and camptothecin [4]. The acceptance of traditional medicine as an alternative form of health care and the development of microbial resistance to the available antibiotics has led researchers to investigate the antimicrobial activity of medicinal plants [5].

There is a continuous and urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action due to an alarming increase in the incidence of new and reemerging infectious diseases and development of resistance to the antibiotics in current clinical use [6]. The screening of plant extracts has been of great interest to scientists in the search for new drugs for greater effective treatment of several diseases. Therefore, plant extracts and phytochemicals with known antimicrobial properties can be of great significance in therapeutic treatments [7].

MATERIALS AND METHODS

Collection of the plant material:

Cucumis trigonus Roxb. fruits were collected from Kovanur area of Coimbatore district, Tamil Nadu, India during the month of September to November,2009. The plant was identified and

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authenticated by taxonomist Dr.K. Arumugasamy, Assistant Professor, Department of Botany, Kongunadu Arts and Science College, Coimbatore, Tamilnadu, India. Voucher specimen was deposited herbarium centre, Department of Botany, Kongunadu Arts and Science College, Coimbatore.

Preparation of ethanolic plant extract

50g of dried plant powder of *Cucumis trigonus* Roxb. was extracted with 250 ml of ethanol with occasional shaking for 48hr. The extract was filtered and the dried extract was used for the study.

Micro organisms tested

The bacterial strains *Escherichia coli*, *Bacillus cereus*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus* were used for testing.

ANTIMICROBIAL ASSAY

Antimicrobial activity test was carried out by the method of Bauer *et al*., 1996).

Preparation of culture media and inoculation

The petriplates and the media (Nutrient agar and dextrose agar medium were sterilized for 20 min. at 120 ^{o}C. The rest of the procedure was carried out in the laminar air flow chamber. Approximately 20 ml of the media was poured into the sterile petriplates and allowed to get solidify for 15-20 min. After the media gets solidified the microorganisms (bacterial strains) were spreaded in the media using a sterilized L - rod.

Disc application and incubation

By following the disc diffusion method (Bauer *et al*., 1996) the sterile discs (5mm in diameters; whatmann No.1filter paper) dipped in the different plant extracts of concentration 1mg/ml was placed over the spreaded agar media, after 3-5min. of drying using flamed forceps. The discs were gently pressed down to ensure complete contact of the disc with the agar surface. Ampicillin is used as positive control for antibacterial tests. The disc was spaced far enough to avoid both reflection waves from the edges of the petriplates and overlapping rings of inhibition. The nutrient agar plates used for testing bacterial susceptibility were incubated in inverted position at 37^{o}C for 24 hr.. The diameter of the zone of inhibition was measured.

RESULTS

The antimicrobial activity of ethanolic fruit extract of *Cucumis trigonus* was done and the growth inhibition pattern was tested with the microorganisms and compared with the standard drug erythromycin. The results of the antimicrobial activity were given in the (**Table 1 & Fig 1,2,3,4**). These data revealed that the ethanolic extract showed good antimicrobial activity against bacteria. It is noteworthy that in particular the effect against *Escherichia coli*, *Staphylococcus aureus*, *Bacillus cereus* and *Pseudomonas aeuriginosa* were comparable with erythromycin.

The result of this study showed that the antibacterial activity of ethanolic fruit extract of *C. trigonus* was effective against *Escherichia coli*, *Staphylococcus aureus*, *Bacillus cereus* and *Pseudomonas aeuriginosa* compared with the standard drug erythromycin. Maximum antibacterial activity was shown against *Escherichia coli*, *Pseudomonas aeuriginosa and Bacillus cereus*. Whereas the *Staphylococcus aureus* exhibited no zone of inhibition.

Table 1: Screening of antibacterial activity of *Cucumis trigonus* against bacteria compared with standard drug Erythromycin

Microorganisms	Mean mm inhibition zone (mm)	
	Erythromycin	*Cucumis trigonus* (1mg/ml)
Escherichia coli	12	8.4mm
Staphylococcus aureus	No zone of inhibition	No Zone of inhibition
Bacillus cereus	13.5	4.0mm
Pseudomonas aeuriginosa	12	6.2mm

Fig 1: Antibacterial activity of *Cucumis trigonus* R. fruit extract towards *E.coli*

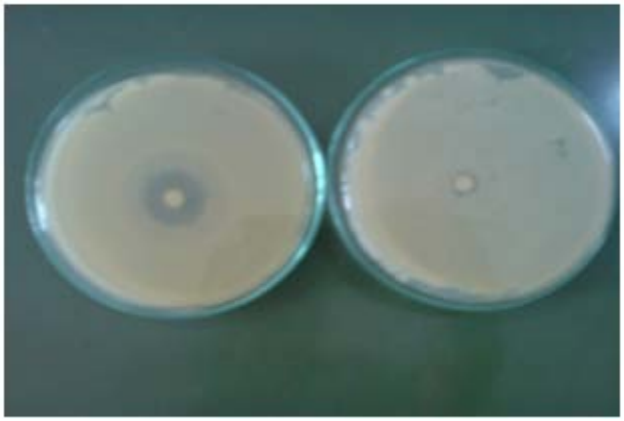


Fig 2: Antibacterial activity of *Cucumis trigonus* R. fruit extract towards *S.aureus*

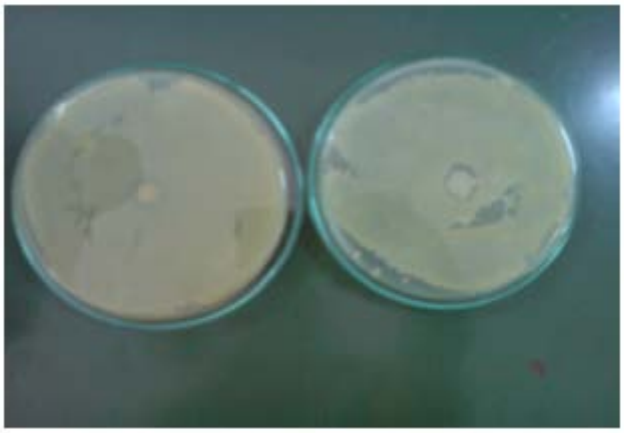


Fig 3: Antibacterial activity of *Cucumis trigonus* R. fruit extract towards *B. cereus*

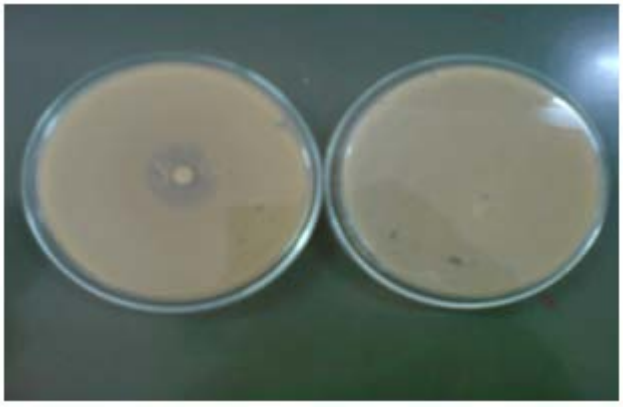
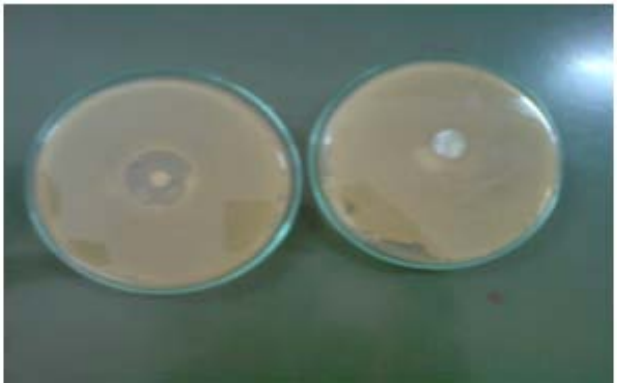


Fig 4: Antibacterial activity of *Cucumis trigonus* R. fruit extract towards *P. aureginosa*



DISCUSSION

The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive compounds of plants are alkaloids, flavanoids, tannins and phenolic compounds [9]. Many plant leaves have antimicrobial principles such as tannins, essential oils and other aromatic compounds. In addition, many biological activities and antibacterial effects have been reported for plant tannins and flavanoids [10]. Plants have an almost limitless ability to synthesize aromatic substances, most of which are phenols or their oxygen-substituted derivatives and these compounds protect the plant from microbial infection and deterioration [11]. Some of these phytochemicals can significantly reduce the risk of cancer due to polyphenol antioxidant and anti-inflammatory effects. Some preclinical studies suggest that phytochemicals can prevent colorectal cancer and other cancers [12].

The antimicrobial activities of various plants have been reported by many researchers [13]. As the plant produce secondary metabolites in order to protect themselves from microorganism, herbivores and insects, thus antimicrobial effect is somehow expected from plants. Flavanoids, alkaloids and triterpenoids are producing a better opportunity for testing wide range of microorganisms.

Medicinal plants have become the focus of intense study in terms of validation of their traditional uses through the determination of their actual pharmacological effects [14]. Efforts have been made to discover new antimicrobial compounds from various kinds of sources such as microorganisms, animals and plants. One of such resources is folk medicines. Systematic screening of them may result in the discovery of novel effective compounds [15].

Bacterial strains are developed with antibiotic resistance to some orthodox modern antibiotics [16]. Because of the side effects and the resistance that pathogenic microorganisms build against the common antibiotics, much recent attention has been paid to extracts and biologically active compounds isolated from plants used in herbal medicine [17].

From the findings, it is found that the ethanolic extract of *Cucumis trigonus* showed significant results because it is found to be active against *E.coli*, *P. aeuriginosa* and *B. cereus*. These findings support the traditional knowledge of local users and it is a preliminary scientific validation for the use of the plant for antibacterial activity. To promote proper conservation and sustainable use of such plant resources, awareness of local communities should be enhanced incorporating the traditional knowledge of scientific findings.

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