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AN EVALUATION OF THE ANTIBACTERIAL ACTIVITY OF ROOT EXTRACTS OF *MANILKARA ZAPOTA* AGAINST *STAPHYLOCOCCUS AUREUS* AND *ESCHERICHIA COLI*

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ABSTRACT

Manilkara zapota powdered root material was extracted using water. Phytochemical screening of the crude extracts revealed the presence of alkaloids, glycosides, saponins, tannins, carboxylic acids. This presence of the bioactive constituents have been linked to the antimicrobial activity of the plant material against *Staphylococcus aureus* (gm+ve) and *Escherichia coli* (gm–ve) using agar cup plate method. Minimum inhibitory concentration values ranged from 25-100 mg/ml. The plant can be used as a source of oral drugs to fight infections against susceptible bacteria.

Key words: *Manilkara zapota* root, Antibacterial activity, *Staphylococcus aureus*, *Escherichia coli*, Aqueous extract.

INTRODUCTION

This paper discusses about the antimicrobial properties of *Manilkara zapota* against *Staphylococcus aureus* (gm+ve) and *Escherichia coli* (gm-ve) by using agar cup plate method. *Manilkara zapota* belongs to the family of sapotaceae. *Manilkara zapota* is a glabrous plant which is 8-15 mt in height, cultivated widely throughout South India. Sapodilla can grow to more than 30 m (98 ft) tall with an average trunk diameter of 1.5 m (4.9 ft). The average height of cultivated specimens, however, is usually between 9 and 15 m (30 and 49 ft) with a trunk diameter not exceeding 50 cm (20 in). It is wind-resistant and the bark is rich in white, gummy latex called chicle. The ornamental leaves are medium green and glossy. They are alternate, elliptic to ovate, 7–15 cm long, with an entire margin. The white flowers are inconspicuous and bell-like; with a six-lobed corolla. Tap root system is observed in the *Manilkara zapota* plant.

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The fruit is a large ellipsoid berry, 4–8 cm in diameter, containing two to five seeds. Inside, its flesh ranges from a pale yellow to an earthy brown color with a grainy texture akin to that of a well-ripened pear. The seeds are black and resemble beans, with a hook at one end that can catch in the throat if swallowed. The fruit has a high latex content and does not ripen until picked. The fruit has an exceptionally sweet, malty flavor. The unripe fruit is hard to the touch and contains high amounts of saponin, which has astringent properties similar to tannin, drying out the mouth. *Staphylococcus aureus* can cause furuncles (boils), carbuncles (a collection of furuncles). In infants, *Staphylococcus aureus* can cause a severe disease Staphylococcal scalded skin syndrome (SSSS). *Escherichia coli* can cause several intestinal and extra intestinal infections such as urinary tract infections, meningitis, peritonitis, mastitis and septicemia.

Very few works have been carried out on leaves (Yogesh S *et al*., 2011; Chanda SV and Nagani KV, 2010; Nair R and Sumitra C, 2008; Mital K and Sumitra Chanda, 2012) stem (Chanda S et al., 2009), bark, fruit (Vijay K and Sriram S, 2010), fruit juice (Kothari V and Seshadri S, 2010) for antibacterial activity, antioxidant activity and Seed germination studies. Hence

we are taking roots of *Manilkara zapota* for determining antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*.

Procedure

Collection of plant material

The roots which were used for the extraction process were primarily collected from local areas of Guntur. Further these roots were subjected to air drying for about two weeks and were used for the extraction.

Preparation of the plant material

The fresh plant was harvested, rinsed with tap water and air dried under shade for about 14 days and reduced to fine powder using blender. The powder was stored in an air tight bottle until needed for use.

Preparation of the extract

20 gm of the powdered sample was soaked in 100 ml of the solvent contained in a 500 ml of sterile conical flask and covered with a cotton wool. It was then plugged and wrapped with aluminum foil and shaken vigorously. The mixture was left to stand overnight (24 hours) .The mixture was then filtered using a clean muslin cloth and then whatmann no: 1 filter paper. The filterate was then evaporated to dryness at 40°C. The percentage yield was calculated. For the preparation of dilutions of crude extracts for antibacterial activity assay, the extracts were reconstituted by dissolving in the distilled water and further diluted to obtain 100-25 mg/ml.

Microorganisms

Staphylococcus aureus, *Escherichia coli* were obtained from the microbiology laboratory and were stored in a refrigerator.

Reference and Control

The references were antibiotic in nature and tetracyline was used as the reference for all bacterial species. The Control experiment consists of a plate of solidifying agar onto which was inoculated pure solvent with microorganism mixed in a 1:1 portion.

Phytochemical screening of the plant material

Phytochemical screening was carried out on the powdered plant material for the presence of different bioactive components such as tannins, carboxylic acids, glycosides, alkaloids, saponins.

Determination of antimicrobial activity

The antibacterial activity of the aqueous extract of *Manilkara zapota* was determined using agar cup plate method. Cups or wells of 8 mm diameter were punched in the agar medium. Aqueous solutions of different concentrations of the plant extract were dispensed in different wells and incubated at 37º C for 24 hours. The control wells were loaded with saline (negative control) and tetracycline (100 µg/ml) for *Staphylococcus aureus* as positive control. The antibacterial activity was assessed by measuring the zone of inhibition. The relative antibacterial activity of the extract was calculated by comparing its zone of inhibition with the standard drugs.

RESULTS AND DISCUSSION

Percentage yield of the powdered plant *Manilkara zapota* extract obtained by using water is shown in Table 1.

Table 1. Percentage yield of the crude extracts of *Manilkara zapota*

Extraction solvent	Raw material powder (gm)	Extracted plant powder (gm)	Percentage yield
Distilled water (aqueous)	20	0.5	2.5%

Table 2. Phytochemical constituents of *Manilkara zapota* root

Plant constituents	Water extract
Alkaloids	+
Glycosides	+
Tannins	+
Saponins	+
Carboxylic acids	+

Key: + = positive, - = negative

Table 3. Antibacterial activity of *Manilkara zapota* root

Organism	Zone of inhibition	Antibiotic	Zone of inhibition
E.Coli	18 mm	Tetracycline	25 mm
Staphylococcus aureus	11 mm		

Out of the 20 g of the powdered plant material, the percentage yield obtained was 2.5%.Phytochemical screening of the crude extracts of *Manilkara zapota* revealed the presence of some bioactive components as shown in table 2. It contains tannins, glycosides, alkaloids, saponins, carboxylic acids. These compounds have potentially significant application against human pathogens, including those that cause enteric infections. The presence of alkaloids is interesting, as significant quantities are used as antimalarials, analgesics and stimulants. The presence of glycosides moieties like saponins, are known to inhibit tumor growth and serve also to protect against gastrointestinal infections. Herbs that have tannins as their components are astringent in nature and are used for treating intestinal disorders such as diarrhea and dysentery thus exhibiting antibacterial activity. Tannins are widely used in traditional medicine in treating wounds and to arrest bleeding. Antibacterial activity of the crude extracts of *Manilkara zapota* were evaluated by measuring the diameters of zone of growth inhibition on some members of enterobacteriaceae and the results are presented as shown in table 3. It indicates that the root extract of *Manilkara zapota* showed antimicrobial activity against both gram positive and gram negative bacteria. The MIC values obtained for the test bacteria are high ranging from 25-100 mg/ml when compared to the MIC values of 0.01-10 ug/ml obtained for the test bacteria frequently recorded for conventional antibiotics. It was explained that the observed differences to be due to the fact that while synthetic antibiotics are in a pure form, crude plant extracts contain some impure substances that may be inert and don't have antibacterial activities.

Although *Manilkara zapota* was found to contain some bioactive compounds with pronounced antibacterial activities, further phytochemical and pharmacological studies will be needed to isolate the active constituents and evaluate the antimicrobial activities against a wide range of microbial pathogens.

REFERENCES

Chanda SV and Nagani KV. Antioxidant Capacity of *Manilkara zapota* L. Leaves Extracts Evaluated by Four *in vitro* Methods. *Nature and science*, 8(10), 2010, 260-266.

Kaneria M, Baravalia Y, Vaghasiya Y and Chanda S. Determination of Antibacterial and Antioxidant Potential of Some Medicinal Plants from Saurashtra Region. India. *Indian J Pharm Sci*, 71(4), 2009, 406–412.

Kothari V, Seshadri S. In vitro antibacterial activity in seed extracts of *Manilkara zapota*, Anona squamosa, and Tamarindus indica. *Biol Res*, 43(2), 2010, 165-168.

Mital K and Sumitra C. Evaluation of antioxidant and antimicrobial properties of *Manilkara zapota* L. (chiku) leaves by sequential soxhlet extraction method. *Asian Pacific Journal of Tropical Biomedicine*, 1, 2012, 1526-1533.

Nair R and Sumitra C. Antimicrobial activity of Terminalia catappa, *Manilkara zapota* and Piper betel leaf extract. *Indian journal of pharmaceutical sciences*, 70(3), 2008, 390-393.

Pankaj KJ, Prashant S, Neeraj U and Yogesh S. Evaluation of Analgesic Activity of *Manilkara zapota* (Leaves). *European Journal of Experimental Biology*, 1 (1), 2011, 14-17.

Vijay K and Sriram S. *In vitro* antibacterial activity in seed extracts of *Manilkara zapota*, Anona squamosa, and Tamarindus indica. *Biological Research*, 43, 2010, 165-168.