

# Estimation of Antibacterial Activity of Green Mango (*mangifera indica L.*) Extract on the Growth of Bacteria

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Article Info	Abstract
Received 30/May/2017  Accepted 8/Nov./2017	<p>Alternative herbal medicines have been used since hundreds of years in globe in treatment of various kinds of infections that may infect human as well as animals. Medicinal plants, in general, contain phytoconstituents some of which having chemical properties resemble to that of synthetic antibiotics. Due to this, the aim of this study is to investigate the antibacterial activity of the green mango (<i>mangifera indica L.</i>) extract against both Gram-negative bacteria and Gram-positive bacteria. The extraction process of the active phytoconstituents of green mango was done by using infusion method. The estimation of antimicrobial activity of green mango extract was carried out by using agar well diffusion method against two species of gram-positive bacteria and five species gram-negative bacteria using three concentrations that are 5%, 10% and 50% of the extract. The 5% concentration of the extract has showed 2 mm diameter inhibition zone against both <i>Proteus</i> and <i>Salmonella</i>, 5mm diameter inhibition zone against <i>Pseudomonas</i>, 7mm diameter against both <i>Klebsiella</i> and <i>Staphylococcus</i>, and 11, 12 mm diameter inhibition zone against <i>E.coli</i> and <i>Streptococcus</i> respectively. The 50% concentration of extract has showed 14 mm diameter against <i>Proteus</i>, 19, 20, 20mm diameter against <i>Salomella</i>, <i>Klebsiella</i> and <i>Staphylococcus</i> respectively, 22, 23 mm diameter against <i>E.coli</i> and <i>Pseudomonas</i> respectively and 26 mm diameter against <i>Streptococcus</i>. Lastly, the 10 % concentration of extract has showed a result ranged between the 5% concentration and 50% concentration.</p> <p><b>Keywords:</b> Green mango extract, infusion method, <i>mangifera indica</i>, bacteria.</p> <p><b>الخلاصة</b></p> <p>الاعشاب الطبية البديله للادويه الكيماويه قد تم استخدامها لمعالجة مختلف الاصابات في الانسان وفي الحيوان على حد سواء، النباتات الطبيعه تحتوي على مكونات نباتيه ذات خواص كيميائيه مشابهه للمضادات الحيويه ولهذا السبب فان الغرض من هذه الدراسه كان لمعرفة الخواص البايولوجيه لفاكهة المانجا الخضراء. تم استخلاص المكونات النباتيه للمانجا بواسطة النقع البارد لمسحوق المانجا المجففه. اختبرت الفعاليه التضاديه لمستخلص المانجا المجففه بواسطة طريقه النقع بتركيز مختلفه شملت 5%، 10%، 50% ضد نوعين من البكتريا الموجبه لصبغة غرام وخمس أنواع من البكتريا السالبه لصبغة غرام اظهر المستخلص بتركيز 5% تأثيرا مثبتاً على نمو البكتريا حيث كان قطر منطقة التثبيط 2 ملم ويمكن اعتباره اقل تركيز مثبتاً <i>proteus</i> and <i>Salmonella</i>. في بكتريا <i>Klebsiella</i> and <i>Staphylococcus</i> ، 7ملم ضد كل من <i>Pseudomonas</i> و 5ملم قطر منطقة التثبيط ضد بكتريا بينما اظهر التركيز 50% للمستخلص مناطق تثبيط قطرها 14 ملم ضد <i>Streptococcus</i>، <i>E. coli</i> و 11 ملم ، 12 ملم لـ <i>Klebsiella</i> and <i>Staphylococcus</i>، <i>Salmonella</i> و 19، 20، 20ملم ضد <i>Proteus</i> و 22، 23ملم لـ <i>Streptococcus</i> و 26ملم ضد <i>Pseudomonas</i> and <i>E. coli</i> و 22، 23ملم ضد. اما المستخلص ذو التركيز 10% اظهر نتائج تثبيط تراوحت بين نتائج تركيز 5% و 50%.</p>

## Introduction

Mango (*mangifera indica L.*) is a tropical fruit that cultivated in Southeast Asia [1] recognized for its delicious test, flavor and attractive color, it is a rich source of carotenoids, ascorbic acid and phenolic compounds. Plant parts have been used extensively to treat various ailment and

has been proved to possess antidiabetic [2], antioxidant [3], antimicrobial [4], radical scavenging [5], anti-inflammatory [6]. The plant crude extracts are of particular interest because of their wide acceptance by consumers for their potential multi purposes uses [7].

For the last decade, efforts have been made to investigate several ways for utilization of fruits and vegetables wastes to minimize their pollution effects on the environment. One of these methods is the utilization of this agro waste therapeutically due to legislation and environmental reasons [8].

Pharmaceutical companies are in search of alternative preservative from natural sources to eliminate synthetic preservative in food due to their undesirable effects on human [9]. Therefore the objective of this study was to investigate the antimicrobial activity for ripe peel of *Mangifera indica* L. against Gram-positive bacteria and Gram-negative bacteria species.

## Materials & methods

### Collection of the fruits

Green mango (*Mangifera indica* L.) fruits were purchased from local market of the chickballa pure, Bangalore, India in the duration of June 2015 to sept. 2015, then the fruits including peel were sliced to remove the seed and dried under shade.

### Preparation of the infusion extract

The dried sliced fruits were milled by using suitable grinding machine until obtaining fine powder, then the powder was weighed into 2.5gm, 5gm and 25gm amounts and transferred into labeled flasks, to each of which was added 100 ml of sterile deionized distilled water. The flasks were then shaken well by hand and allowed to soak for 48hrs at 4 c, then filtered and they were evaporated under vacuum to 50 percent of their original volume to get 5%, 10% and 50% concentrations extract of green mango extract [10].

### Antibacterial Activity Evaluation

Microorganisms used two Gram-positive bacteria (*Streptococcus species*, *Staphylococcus aureus*), five Gram-negative bacteria (*Klebsiella aeruginosa*, *Escherichia coli*, *Salmonella typhimurium*, *Pseudomonas aeruginosa* and *Proteus vulgaris*), were obtained from biotechnology division, applied science department, university of technology.

### Agar well diffusion method for antibacterial effect

Antibacterial effect of green mango extract was studied against pathogenic bacteria by the agar

well diffusion method [11]. Blood agar, nutrient agar and macconky agar were used as nutrition mediums. The different concentration of extract (100 µL) were instilled into three (8mm) wells, into three separated petri dishes for each species and one additional well was instilled (100 µL) deionized distal water (D.D water) as control. The plates were incubated at 37 C° for 24hrs. The inhibition of microbial growth was determined by measuring the diameter of the zone of inhibition and the mean value of different concentrations are evaluated.

## Results & Discussion

In this study the antibacterial effect of infusion extract of green mango (*Mangifera indica* L.) was evaluated against two Gram-positive and five Gram-negative bacteria species by measuring the mean value of inhibition zone diameter of three frequency of each bacteria. The infusion extract showed the same degree of antibacterial effect against all Grams positive and varying degree of effect against most of the Gram-negative bacteria tested as shown in Figures 1 and 2.

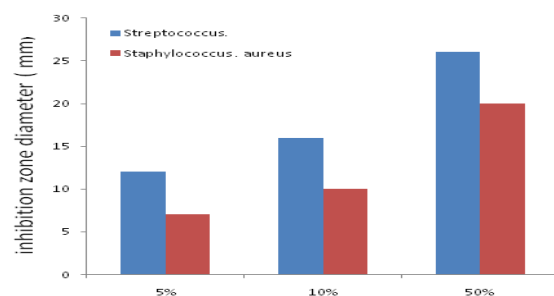


Figure 1: Antibacterial effect of green mango extract against Gram-positive bacteria.

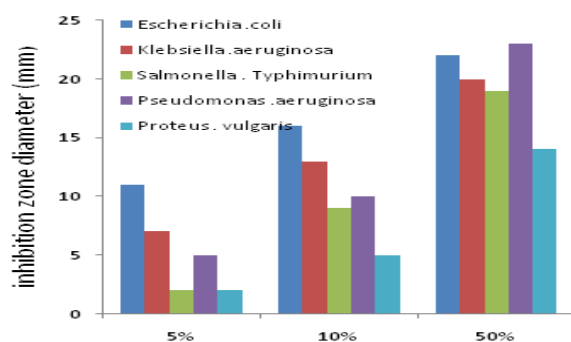


Figure 2: Antibacterial effect of green mango extract against Gram-negative bacteria.

The 5% concentration of the extract has showed 2 mm diameter inhibition zone against both *Proteus* and *Salmonella*, 5mm diameter inhibition zone against *Pseudomonas*, 7mm diameter against both *Klebsiella* and *staphylococcus*, and 11, 12 mm diameter inhibition zone against *E.coli* and *streptococcus* respectively. The 50% concentration of extract has showed 14 mm diameter against *proteus*, 19, 20, 20mm diameter against *Salmonella*, *Klebsiella* and *Staphylococcus* respectively, 22, 23mm diameter against *E.coli* and *Pseudomonas* respectively and 26 mm diameter against *Streptococcus*. Lastly, the 10% concentration of extract has showed a result ranged between the 5% concentration and 50% concentration.

Green mango extract showed highest effect of inhibition against *Streptococcus* spp., *P. aeruginosa*, *E.coli*. While the extract showed lowest effect of inhibition against *Proteus* and *S. typhimurium*.

Hence, it can be stated that the present study of infusion extract of green mango (*mangifera indica L.*) displayed considerable antibacterial effect against Gram-positive bacteria as well as Gram-negative bacteria.

Gram-positive bacteria were more susceptible than Gram-negative bacteria to infusion extract of green mango and these differences in the antibacterial effects between the two bacterial species are mainly due to their different cell wall structures. This agree with [12],[13],[14] who stated that, the antibacterial activity of Gram-positive bacteria showed higher rates compared to the antibacterial activity of Gram-negative bacteria due to their resistance to the most antibiotics.

Again, the result of this study showed disagreement with the result obtained by [15] who stated that, the Gram-negative bacteria were more susceptible to the decoction extract of mango than the Gram-positive bacteria. This is may be due to the difference in the way used to prepare the extract

## Conclusions

From this study, one can conclude that, the dry extract of the mango fruit (*mangifera indica L.*)

is capable to impart antibacterial effects against Gram-positive bacteria generally, and to some extent against Gram-negative bacteria. For this reason, the imparting of such fruit and usage it in many disciplines such as food industry and some pharmaceutical preparations as preservative is an interested point.

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