

STUDIES ON ANTIBACTERIAL EFFECT OF GARLIC (*Allium sativum*), GINGER (*Zingiber officinale*), ONION (*Allium cepa*) and MANGO (*Mangifera indica*) AGAINST FEW BACTERIAL PATHOGENS

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Abstract:

Plants produce an assorted scope of bioactive particles, making them rich wellspring of various kinds of drugs. The plants utilized for the trial were *Allium sativum* (garlic), *Zingiber officinale* (Ginger), *Allium cepa* (Onion) and *Mangifera indica* (Mango). Five pathogenic microscopic organisms tried every one of the two gram positive strains and three gram negative strains were chosen. In the current investigation gram positive microscopic organisms the most elevated zone of restraint was seen against *B.cereus* with *M.indica* and the base zone of hindrance was recorded in against *S.aureus* with *Z.officinale* and *A.cepa*. Anyway four plants can fill in as expected interruption of chose microorganisms and can build the lead season of food sources if appropriately consolidated.

Keywords: Plants, antibacterial activity, Pathogen, Bacteria, Sap

1.INTRODUCTION

The science managing the investigation of the counteraction and treatment of illness brought about by miniature life form is known as restorative microbiology. Plants produce an assorted scope of bioactive atoms, making them rich wellspring of various kinds of prescriptions. A large portion of the medications today are gotten from normal wellsprings of semi manufactured subordinates of characteristic items utilized in the conventional frameworks of medication. Along these lines it is an intelligent methodology in drug disclosure to screen customary items. As indicated by World Health Organization (WHO) therapeutic plants would be the best source to get an assortment of medications. Plant based antimicrobials address a tremendous undiscovered wellspring of medications and further investigation of plant antimicrobials is the need of great importance. Antimicrobials of plant birthplace have huge restorative potential. Plant inferred antimicrobials have a long history of giving more required novel therapeutics. Plant produce synthetic mixtures got from plant optional metabolite compounds, which can have an impact as antimicrobial (Chrubasik *et al.*, 2005). Various investigations have been completed in different pieces of the world by separating plants to looking for antimicrobial movement (Masibo and He, 2008). The home grown medication might be as powders, fluid or combinations rich might be crude or bubbled, treatments linings and cut (Godstime *et al.*, 2014).

Historically, medicinal plants have been a source of novel drug compounds. Plants derived products have made large contributions to human health and wellbeing. Green pharmacy may become the base for the development of medicines by providing a pharmacophore which could be used for the development of new drug with novel mechanisms of action. Many scientists across the globe have reported antimicrobial properties of several medicinal plants but still a very meager portion of this tremendous potential drug-repertoire has been scientifically screened (Menghani *et al.*, 2011). A number of medicinal plants have been screened for antimicrobial activity in recent years (Premanath *et al.*, 2011) and efforts have been done to identify their active constituents (Tijjani *et al.*, 2009). The plants extracts possessing bioactivity are essentially evaluated for toxicity and the extracts are usually tested for short or long term toxicity in animal models (Chavda *et al.*, 2010 and Diallo *et al.*, 2010). Nontoxic extracts possessing good bioactive principles may provide potential antimicrobial leads. The current investigation was to evaluate the action of four plants including *M.indica*, *A.cepa*, *A.sativum*, and *Z.officinale* against human pathogenic microscopic organisms.

II.MATERIALS AND METHODS

2.1.Collection of plant materials:

The plants utilized for the examination were *Allium sativum* (garlic), *zingiber officinale* (Ginger), *Allium cepa* (Onion) and *Mangifera indica* (Mango). Those plant materials were gathered locally really.

2.2.Extraction of plant materials:

Rhizomes of ginger, Bulb of garlic and onion, sap of mango were completely washed with refined water and air dried for 1hrs. After dried, the plant materials were physically stripped off and they are again washed with refined water to eliminate residue and mud. Washed materials were obscure dried for multi week. Following multi week the material were mixed into fine powder and gauged.

The powdered plant materials were treated with dissolvable. 10 grams powdered materials were broken down in 70% ethanol. The extraction was left in a perfect, sterile, glass holder and shaken over whelming to take into consideration appropriate extraction. The holder was wrapped with Aluminum foil to forestall the vanishing and permit to agree to multi week with shaking at ordinary spans. After that extraction was filtrate utilizing whatman no.1 filter paper. The extraction was held sterile jug under cooler condition until use.

2.3.Antibacterial Activity using Agar well diffusion method:

Antibacterial activity of *Allium sativum* (garlic), *zingiber officinale* (Ginger), *Allium cepa* (Onion) and *Mangifera indica* (Mango) were determined against two gram positive and three gram negative pathogens using standard agar well diffusion assay method. The strains of microorganisms were inoculated in a conical flask containing 100 ml of nutrient broth. Nutrient agar poured on petridishes and inoculated with test organisms from the seeded broth using cotton swabs. Sterile discs of six millimeter width had been impregnated with different plant extracts and introduced onto the upper layer of the seeded agar plate. The plates were incubated overnight at 37°C. The susceptibility of the test organisms were determined by radius of the zone of inhibition around each disc. The antibacterial activity of the extracts at different sample was screened by agar well diffusion technique (Chanda *et al.*, 2010). The zone of inhibition was measured in mm diameter and the results are giving in table 1.

2.4.Statistical analysis:

The data represent mean of three replicates \pm standard deviation (SD). Results were subjected to multidrug analysis of variance, and the mean comparisons were performed by Tukey's multiple range tests using SPSS version 20.0. Difference between means were considered significant at p.value <0.05.

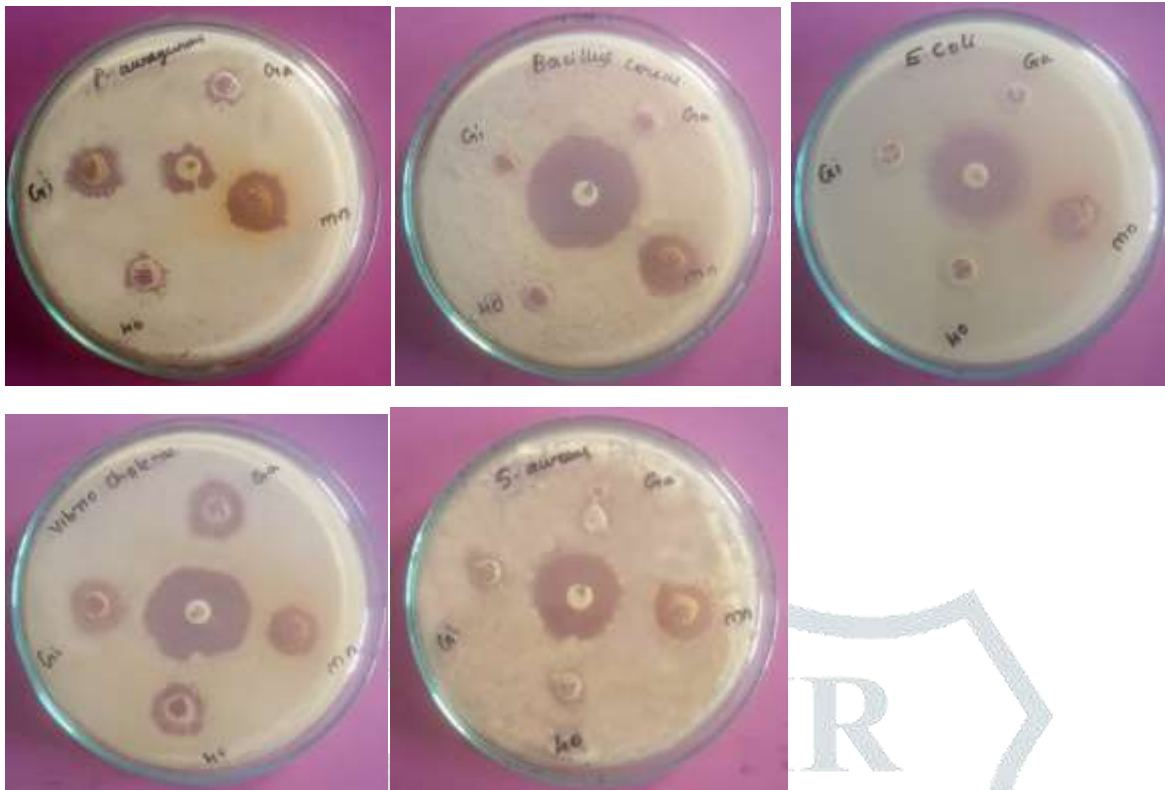
III.RESULTS AND DISSCUSSION

Characteristic plant item based antimicrobials drug disclosure accomplished foremost significance as newfound medications are probably going to be compelling against multidrug safe microorganisms. Antibacterial action of *Allium sativum* (Garlic), *Zingiber officinale* (Ginger), *Allium cepa* (Onion) and *Mangifera indica* (Mango) was tried against the chose clinical bacterial microbes like *S.aureus*, *B.cereus*, *P.auriginosa*, *E.coli* and *V.chlorae* (Table 1 and Plate 1).

TABLE 1: ANTIBACTERIAL ACTIVITY OF DIFFERENT PLANT EXTRACTS

	Zone of inhibition				
	Gram Positive Bacteria			Gram Negative Bacteria	
	<i>P.aureus</i>	<i>E.coli</i>	<i>V.cholorae</i>	<i>S.aureus</i>	<i>B.cereus</i>
<i>A.sativum</i>	2.50 \pm 0.57	0.25 \pm 0.50	5 \pm 1	0	0
<i>Z.officinale</i>	4.25 \pm 0.95	0.25 \pm 0.50	3.66 \pm 0.57	2.33 \pm 0.57	3 \pm 1
<i>A.cepa</i>	3.50 \pm 0.57	0.50 \pm 1	4.66 \pm 0.57	2.33 \pm 0.57	0
<i>M.indica</i>	7.25 \pm 0.95	5.75 \pm 1.75	5.66 \pm 0.57	5.33 \pm 0.57	8.66 \pm 0.57
Control	3.50 \pm 1	7 \pm 0.81	9.33 \pm 0.57	6.66 \pm 0.57	11.3 \pm 0.57

PLATE 1: ANTIBACTERIAL ACTIVITY OF SELECTED SOME PLANT EXTRACTS



Of the five pathogenic microbes tried every one of the two gram positive strains and three gram negative strains were chosen. The gram negative microbes zone of restraint going from $0.25 \pm 0.50\text{mm}$ to $7.25 \pm 0.95\text{mm}$, where as the gram positive microorganisms zone of hindrance going from $2.33 \pm 0.57\text{mm}$ to $8.66 \pm 0.57\text{mm}$. Compare the gram positive and gram negative microbes the gram positive bacteria shows the highest activity. For the reason thicker peptidoglycan layer, gram-positive bacteria are more receptive to certain cellwall targeting antibiotics than gram-negative bacteria, due to the absence of the outer membrane.

From our investigation *M.indica* sap showed most extreme antibacterial movement against both gram positive and gram negative microbes ($5.33 \pm 0.57\text{ mm}$ to $8.66 \pm 0.57\text{ mm}$). *M.indica* are accounted for to be a rich wellspring of filaments, nutrient A, fundamental amino acids, and polyphenols (Ajila *et al.*,2007). Mango sap is a promising source of polyphenols including mangiferin, a unique bioactive compound in mango (Stohs *et al.*, 2018), quercetin derivatives, rhamnetin, kaempferol (Sayago-Ayerdi *et al.*,2013), gallotannins anthocyanins (cyanidin, peonidin, petunidin, delphinidin, and pelargonidin) (Abbasi *et al.*,2015), and proanthocyanidins (procyanidins A1, A2, A3, B2, B3) (Maldonado-Celis *et al.*,2019; Tan *et al.*,2020). During ripening, mango cultivars change color to yellow or red. The yellow types have observed the higher carotenoid content, and the red types possess the higher anthocyanin content in the peel. The major compounds of anthocyanins in mango peel are cyanidin 3-O-galactoside, and peonidin 3-O-galactoside and the levels of anthocyanins and proanthocyanidins in the peel tend to accumulate in higher concentrations in the later stages of maturation (Tan *et al.*,2020).

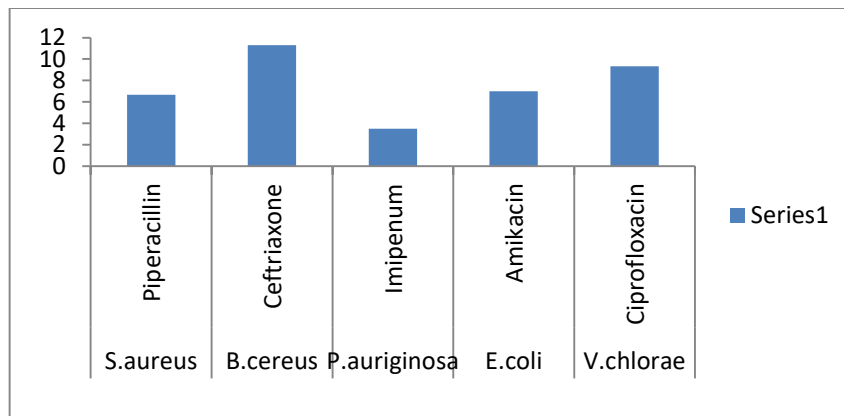
In this study *A. sativum* zone of inhibition against in only gram positive microbes ($0.25 \pm 0.50\text{mm}$ to $5 \pm 1\text{mm}$). In gram negative bacteria no antibacterial activity was recorded. For this reason gram positive organisms have highly variable growth and resistance patterns. *A. sativum* most elevated zone of restraint was estimated in *V.chlorae*. Organosulphur mixtures and phenolic compounds have been accounted for to be engaged with the garlic antimicrobial action (Griffiths *et al.*,2002; Nweze 2011). The garlic was likewise compelling against anti-infection safe microbes and their poisonous item. This impact is a result of garlic compounds. Particularly, the allicin influence the development of microbes by restraining these DNA and protein blend mostly and furthermore by repressing RNA amalgamation as essential objective. The inhibitory impact of garlic against the development of *S.aureus*, *E.coli* and *V.chlorae* yield capability of every one of solvents.

Finding from the current examination uncovered that *Z.officinale* most elevated antibacterial movement against *P.aeruginosa* ($4.25 \pm 0.95\text{mm}$). The opposition systems in *P.aeruginosa* are identified with upgrade of the death pace of patients contaminated with these microorganisms (Poole,2017). To address this test, there is developing interest in distinguishing and assessing antimicrobial accumulates in concentrates of restorative plants as another wellspring of medication and elective treatment approach. Consequently, it has been accounted for that ginger concentrate more prominent antibacterial movement against an assortment of bacterial animal groups including *Helicobacter pylori*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli* albeit blended outcome is ascribed to various ginger arrangements and differing strength (Chanda *et al.*,2010). β – Phellandrene and Zingiberene are the significant mixtures in Indian business ginger. Ginger additionally having antiulcer, energizer and mitigating properties (Sharma *et al.*,1997; Khushtar *et al.*,2009; Qiang *et al.*,2009).

From this investigation noticed that *Allium cepa* the greatest zone of hindrance was seen in *V.chlorae* ($4.66 \pm 0.57\text{mm}$). *V.chlorae* exercises of ethanolic extricates were more dynamic than different concentrates. Ethanolic removes from plants

reliably give more antibacterial movement than those separated in methanol or other non-polar substances (Cowan,1999). The antibacterial movement of onion can be ascribed to the presence of flavonoids and polyphenols which has been accounted for to have expansive range of antibacterial action. Polyphenols from plants have been accounted for to have antibacterial action (Ani *et al.*, 2006). *Allium cepa* didn't show antibacterial action against *B.cereus*.

FIGURE I: ANTIBACTERIAL ACTIVITY OF SELECTED BACTERIA AGAINST SOME ANTIBIOTICS



In the current investigation gram positive microbes the most noteworthy zone of hindrance was seen in (8.66 ± 0.57 mm) against *B.cereus* with *M.indica* and the base zone of restraint was recorded in (2.33 ± 0.57 mm) against *S.aureus* with *Z.officinale* and *A.cepa*. The standard anti-microbial plate Imipenem, Ceftriaxone, Amikacin and Piperacillin and Ciproflaxin showed the most extreme zone (9.33 ± 0.57 mm) against *V.chlorae* and *E.coli* (7 ± 0.81 mm). While the base movement (3.50 ± 1 mm) was recorded against *P.auriginosa* (Table 2 and Figure 1).

IV.CONCLUSION:

To close, there is wide scope of logical proof to show that *M.indica*, *Z.officinale*, *A.cepa* and *A.sativum* have potential in the treatment of numerous microbial infections. I prophesize that this plants has a remarkable potential to yield naturally dynamic materials which could be significant in the treatment of numerous microbial sicknesses and this ought to be completely investigated in appropriate methodology. I infer that the current investigation concentrates of *M.indica* can be utilized as incredible antibacterial movement in chose microorganisms. Further studies need to investigate dose levels, inter-individual variability, and pharmacometrics aspects of *M.indica* on a pathway to quantitative intake recommendations in the improvement or maintenance of intestinal health. It is, subsequently, suggested that more work be done particularly on *M.indica* to determine its bioavailability and biosafety on human cells.

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