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Research Article

Antimicrobial Activity of Some Medicinal Plant Extracts in eastern Africa

Hr. Sibel Lukuslui

Independent Researcher at Biology Department,

Agaro, Ethiopia, 09(eastern Africa)

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ABSTRACT:

Objectives: To evaluate the antimicrobial activity of extracts from folkloric medicinal plants in addition to their commercial oils against pathogenic microorganisms. Bacteria and fungi continue to develop drug resistance by employing various mechanisms to survive in the lethal environment created by antimicrobials.

Methods: leaf extract of each of the two plants were prepared. The antimicrobial effect of each concentration was measured. It involves extraction of plant material followed by testing for biological activity. Once the extract tested is found to be biologically active, the next step is to proceed with fractionation. Subsequently, various fractions obtained are tested for biological activity.

Results: Aqueous extracts of plants had action against most of the tested microorganisms.

Conclusion: The data obtained revealed that, among the tested microorganisms,

Keywords: Antimicrobial, Medicinal Plants, pathogenic microorganisms, biologically active, fractionation

INTRODUCTION

Recently, plant as a source of medicine is gaining international popularity because of its natural origin, availability in local communities, cheaper to purchase, ease of administration, and perhaps less troublesome. Also, herbal medicine may be useful alternative treatment in case of numerous side effects and drug resistance.[1,2,3,4,5]

Primary plant constituents. These are mainly nutritional components of plants such as common sugars, amino acid, proteins, and chlorophyll. These have little or no medicinal properties.[6,7] *Secondary plant constituents*. These are also known as secondary metabolites such as alkaloids, terpenoids, saponins, phenolic compounds, flavonoids, and tannins. These are responsible for many biological or pharmacological activities.[6,7]

Bioassay-guided fractionation. It involves extraction of plant material followed by testing for biological activity. Once the extract tested is found to be biologically active, the next step is to proceed with fractionation. Subsequently,

various fractions obtained are tested for biological activity.

In the past two decades, the frequency of antimicrobial-resistant infections has increased in both the hospital and community. Pharmacological industries are producing many new antibiotics, and resistance to these drugs by microorganisms has increased (8).

Hence, there is a need for the development of drugs to prevent the infections caused by these organisms. Medicinal plants are used in the world and more so in India and this contributes significantly to primary health-care system (9).

Medicinal plants have been used as sources of medicine in virtually all cultures. During the last decade, the use of traditional medicine (TM) has expanded globally and is gaining popularity.

People use herbal remedies due to their efficacy, tradition and their low cost. Medicinal plants areimportant elements of indigenous medical systems in Palestine as well as in other developing countries. Complementary and alternative medicine utilization in Palestine are common elsewhere, whereas other types were unique to this area(8).

Many studies indicate that in some plants there are many substances such as peptides, unsaturated long chain aldehydes, alkaloidal constituents, some essential oils, phenols and water, ethanol, chloroform, methanol and butanol soluble compounds. These plants then emerged as compounds with potentially significant therapeutic application against human pathogens, including bacteria, fungi or Virus(9-13).

However, the antimicrobial activity of several extracts of different plants was reported. For example the crude methanolic extracts of neem plant have been shown to have strong antibacterial activity(14).

Water extract of garlic and clove possesses antimicrobial activity. Some bacteria showing resistance to certain antibiotics were sensitive to extracts of both garlic and clove(8). On the other hand, water extract of Miswak (*Salvadora persica*) roots and stem contains potential antimicrobial anionic components such as chloride, sulfate, thiocyanate and nitrate.

MATERIALS:

Plant materials: medicinal plants investigated in this study were collected from local hill station.

Determination of antibacterial activity

Blood agar and MHA measuring 20 ml each were poured into Petri dishes. The bacterial culture was spread over the surface of the MHA plate and blood agar. Wells of 6 mm diameter were punched into the agar and filled with 100 µl solution of test compound. The inoculated plates were incubated in an incubator for 18 h at 37°C. Tests were done in triplicates, and the average of the three was considered for the study.

Determination of antifungal activity

Nearly 20 ml of SDA was poured into each Petri dish. Culture of the *C. albicans* was spread over the surface of the SDA plate. Wells were punched into the agar plate measuring 6 mm in diameter and filled with 100 µl solution of test compound. The plates were then kept in the incubator for 18 h at 37°C. Tests were done in triplicates, and the average of the three was considered for the study.

RESULTS:

Antibacterial activity:

In this study, Agar well diffusion method was employed to study the antibacterial and antifungal susceptibility [15-16]. Diameter of the zone of inhibition was measured for the antimicrobial activity. Ethanol extract exhibited antibacterial activity against all the strains, and MDR *K. pneumoniae* and MDR *E. coli* strain had zone of inhibition measuring 13 mm and 14 mm, respectively, whereas they were resistant to ampicillin.

Different extracts of A. sativum, P. rupestre showed significant antibacterial activity against (MDR) gram negative (E. coli, K. pneumoniae & P. aeruginosa) bacteria isolates as assessed by the diameter of zone of inhibition of the extracts. Although, the low values recorded for some plant extracts may be attributed to the fact

that the extracts being in crude form, contain very small amounts of bioactive compounds.

At the same time, several workers have reported bioactivity of crude extracts of medicinal plants within such range of diameter zone of inhibition (17). The aqueous extract of *A. sativum* possesses antibacterial activity against *E. coli, K. pneumonia* & *P. aeruginosa*.(18)

Extracts were tested against the isolates for their inhibitory activity, using a common broth microdilution method in two-fold dilution series of these extracts was prepared: and the average of the obtained minimum inhibitory concentrations (MICs) & minimum bactericidal concentrations (MBCs) are listed in Table1 (4).

Scientific name of the plant used	E. coli		K. pneumoniae		P. aeruginosa	
	MIC	MBC	MIC	MBC	MIC	MBC
A. sativum	23	100	12.5	100	12.0	100
P. rupestre	22.5	100	25	100	25	50

Table1: obtained minimum inhibitory concentrations (MICs) & minimum bactericidal concentrations (MBCs)

Our results showed that *P. Rupestre* aquatic extract had high antibacterial activities against the tested bacteria in agreementwith(19) who stated that the *P. Rupestre* aquatic extract showed antibacterial

activities towards the Gram- negative bacteria.

This has clearly indicated that antibiotic resistance may does not interfere with the antimicrobial action of plant extracts, and these extracts might have different modes of action against the tested microorganisms.

CONCLUSION

The result of the present study suggests for further investigation, as In the present scenario, antimicrobial resistance is very common. Bacteria and fungi continue to develop drug resistance by employing various mechanisms to survive in the lethal environment created by antimicrobials (20).

The usage of medicinal plants for primary health care needs by millions of people in developing world is still occupying a prominent position. The folk remedies are considered readily available, cheap and time tested (21-23).

Study has clearly indicated that antibiotic resistance may does not interfere with the antimicrobial action of plant extracts, and these extracts might have different modes of action against the tested microorganisms.

CONFLICTS OF INTEREST

Authors have no conflicts of interest to declare.

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