

THE EFFECT OF ETHANOLIC EXTRACTION OF FRESH *ZINGIBER OFFICINALE*
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ABSTRACT

All cultures and societies in many countries has a strong knowledge about folkloric medicine, one example of using of *Zingiber officinale* (*Ginger*) to treat many diseases such as nausea, stomach ache, diarrhea and bleeding, inflammation and also used in sexual dysfunction. In this is study the extraction of fresh *Ginger* was done by using ethanol 70%. Moreover, the effect of *Ginger* extraction was examined on many types of bacteria; *E. coli*, *Staphylococcus aureus*, *Bacillous* and *Pseudomonas*, beside two types of fungal; *Candida albican* and *Aspergillus niger*. Moreover, antimicrobial susceptibility test was done by using cup plate assay method. The results showed that the inhibition zone of isolated bacteria as following: in *Bacillus subtilus* was found (14.5 mm), *Pseudomonas aerigonosa* was found (13 mm). Moreover, the study found the effect of *Ginger* on antifungal activity as following: in *Candida albicans* was found (13.5 mm) and *Asperogillus niger* was found (16.5 mm). Our data revealed that, the ethanolic extract of fresh *Ginger* has highly effectiveness against many types of bacterial activities and also against fungal activities.

KEYWORDS: Medicinal plant, bacteria, fungal and drug resistance.

INTRODUCTION

Microbial pathogenicity and other infectious diseases have been controlled by using drugs since last many years. Therefore, the massive used of antibiotics has developed multiple drug resistance (MDR) in many bacterial pathogens and fungals. Moreover, the increasing drug resistance is the main barrier in complete the treatment of microbial diseases.^[1] Similarly, the substance used to preserve foodstuffs, such as sulfites, nitrates, nitrites and antibiotics, are harmful for human health and have many side effects including headache, nausea, weakness, mental retardation, seizures, cancer and anorexia.^[2] Moreover, development of drug resistance in pathogens and increasing interest of consumers for safe food forces to explore new antimicrobial agents.^[3,2] In the meantime, natural products are considered a major source of new drugs and their use as an alternative medicine for treatment of various disease has been increased rapidly recently.^[4] On the other hand, the pharmaceutical drugs can causes many side effects on human. On the other hand, the herbals medicine are inexpensive, show better patient tolerance and are readily available for all people especially those with low income.^[5] Consequently, in recent years, beside of their beneficial effects, the using

of herbs are gradually increase not only in under developing countries but also in developed countries.^[6]

The *Ginger* (*Zingiber officinale*), is an erect, herbaceous perennial plant in the family *Zingiberaceae* grown for its edible rhizome. Moreover, the *Ginger* or ginger root are used in the treatment of many diseases.^[7] Moreover, in folkloric medicine, it was used to treat nausea, stomach ache, diarrhea and bleeding.^[2] However, the previous studies explained the useful of this plant in the prevention of abnormal blood clotting by inhibiting platelet aggregation,^[8] also *Ginger* has been used as herbal medicine to treatment of diabetes mellitus.^[9,10] Moreover, *Ginger* also was found as good fighter for cancer cells stimulates the death of leukemia cells.^[11] Also, it was found as a wonderful treatment for anti-inflammatory, migraines and headaches.^[9]

MATERIALS AND METHODS

Fresh *Ginger* were obtained from local market. Prior to extraction, the *Ginger* were first rinsed with distilled water. After that, the *Ginger* powder was completely extracted with ethanol (70 %) by Soxhlet apparatus. Then the 70% ethanol extract was dried in Rotary Evaporator apparatus. Moreover, the dried extract samples were dis-solved in distilled water to the give

final concentration of 100 mg/ml and centrifuged again at 10,000 rpm for 10 minutes to remove the undissolved residues.

All different bacterial strains including *Escherichia coli* (E. coli), *Pseudomonas* (P. S), *Bacillus subtilis* (B. S), *Staphylococcus aureus* (S. A), *Candida albicans* (C.A) and *Aspergillus niger* (A. N) were obtained from Khartoum hospital. The strains were maintained on Nutrient agar. However, the bacterial strains were

inoculated in 1 ml LB broth and grown overnight at 37°C separately before performing antimicrobial assay. In the meantime, the 50 µl of overnight culture of each bacterial strain was transferred separately into 5 ml of LB broth (pH 7.2) under sterile conditions and placed in shaking water bath at 37°C for 16 hours. The bacterial cells were harvested at 3000 rpm for 15 minutes at 4°C, washed twice with phosphate buffer saline (pH 7.4) and resuspended in LB broth. The inoculum concentration was adjusted to 10⁷ CFU/ml.^[2]

RESULT

Table 1: Anti-microbial activity of fresh ginger extracts against microorganisms.

Plant name	Antimicrobial Activity					
	Antimicrobial Activity				Antifungal activity	
Microorganism Types	E. coli	P.S	B.S	S.A	C. A	A. N
Inhibition zone	-	13	14.5	-	13.5	16.5

Escherichia coli (E. coli), *Pseudomonas* (P.S), *Bacillus subtilis* (B.S), *Staphylococcus aureus* (S.A), *Candida albicans* (C. A) and *Aspergillus niger* (A. N).



Figure 1: The antibacterial activity of Ginger of extracts against *Escherichia coli*. The inhibition zone was not found (0mm).



Figure 3: The antibacterial activity of Ginger against *Bacillus subtilis* (B.S). The inhibition zone was found to be (14.5).



Figure 2: The antibacterial activity of Ginger of extracts against *pseudomonas* (p.s). The inhibition zone was found to be (13mm).



Figure 4: The antibacterial activity of Ginger of extract against *staphylococcus aureus*. The inhibition zone was not found (0mm).



Figure 5: The antifungal activity of extract against *Candida albicans*. The inhibition zone was found to be (13.5).



Figure 6: The antifungal activity of extract against *Aspergillus niger*. The inhibition zone was found to be (16.5mm).

DISCUSSION

The growing population concern about health problems has recently led to the development of natural antimicrobials to control microbial diseases. Medicinal plants and spices are one of the most commonly used natural antimicrobial agents in foods and have been used traditionally for thousands of years by many cultures for controlling common health complications. Natural plant product based antimicrobials drug discovery attained paramount importance as newly discovered drugs are likely to be effective against multi drug resistant microbes.

Previous study confirmed that *Ginger* has active constituents, and was showed potent antioxidant, antiinflammatory, antimutagenic, antimicrobial and anticancer activities.^[7,11]

The results found the positive effects to *Ginger* as antibacterial activity in *pseudomonas*, *bacillus subtilis*, Moreover, the extract of this is plat also showed antifungal activity aginst *candida albicana* and

Aspergillus niger. On the other hand, our data revealed that the *Ginger* extraction has no effects on *E. coli* and *staphylococcus*. Moreover, the results evaluated the effect of an ethanolic extract of *Ginger* on candida albicans, and found a pronounced activities against *Candida albicans*.

CONCLUSION

The study conclude that the *Ginger* has great potential activity as antimicrobial and can be use in the treatment of many microbial diseases. The study reveals that the potential effects of this plant which have an extraordinary potential to produce the biologically active constituents that might be used in the treatment of many microbial diseases and this need further study.

REFERENCES

1. Nurit B, Yael H, Avi D, Wahid K, and Ronen H. Alternative Antimicrobial Approach: Nano-Antimicrobial Materials. Evidence-Based Complementary and Alternative. Medicine, 2015; 16.
2. Iram G, Mariam S, Halima S, Shahbaz MA, Zahoor QS and Amin MA. Inhibitory effect of allium sativum and *zingiber officinale* extracts on clinically important drug resistant pathogenic bacteria. Annals of clinical microbiology and antimicrobials, 2012; 11: 8.
3. Nurit B, Yael H, Avi D, Wahid K and Ronen H. Alternative antimicrobial approach: Nano-antimicrobial materials evidence-based complementary and alternative medicine. Front Vet Sci., 2017; 4: 237.
4. Ciddi V. Natural products derived from plants as a source of drugs. J Adv Pharm Technol Res., 2012; 3(4): 200–201.
5. Scott JB, Aneesh AA, Yvonne SL, Swati N, and Mary F P. Herb–drug interactions: challenges and opportunities for improved predictions. Drug Metab Dispos., 2014; 42(3): 301–317.
6. Jae-Mahn S. The influence of social context on the treatment outcomes of complementary and alternative medicine: the case of acupuncture and herbal medicine in Japan and the U.S. Global Health, 2015; 11: 17.
7. Yusong J, Qinhong L, Yong Z, Yiqing L and Jianbin L. Transcriptome analysis reveals the genetic basis underlying the biosynthesis of volatile oil, gingerols, and diarylheptanoids in ginger (*Zingiber officinale* Rosc.) Bot Stud, 2017; 58: 41.
8. Stanger MJ, Thompson LA, Young AJ, Lieberman HR. Anticoagulant activity of select dietary supplements. Nutr Rev., 2012; 70(2): 107-17.
9. Glickman-Simon R, Lepper LT. Panax ginseng for psychomotor performance and cognition, spinal manipulation for lumbar disk herniation, ginger for migraines, music therapy for mental illness, and acupuncture for diabetic peripheral neuropathy. Explore (NY), 2014; 10(6): 404-7.

10. Yiming L, Van HT, Colin C D, and Basil DR. Preventive and protective properties of *Zingiber officinale* (Ginger) in diabetes mellitus, diabetic complications, and associated lipid and other metabolic disorders. Evidence-Based Complementary and Alternative Medicine, 2012; 10.
11. Salafzoon S, Mahmoodzadeh Hosseini H, Halabian R. Evaluation of the antioxidant impact of ginger-based kombucha on the murine breast cancer model. J Complement Integr Med, 2017; 21.