

EVALUATION OF ANTIMICROBIAL ACTIVITY OF FRESH RHIZOMES EXTRACTION FROM *ZINGIBER OFFICINAL*

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(Received 25 March 2010 ,Accepted 5 October 2010)

Key words: ethanolic, *zingibeeaceae*, bacteria

ABSTRACT

Investigation of antibacterial activity of ethanolic , methanolic and ginger oil were carried out in this study on Gram positive and Gram negative pathogenic bacteria . The study exhibited these bacteria have variable susceptibilities against these extracts and depend on type of bacteria . The notes was shown the highest effect and wide diameter of growth inhibition zone against *Escherichia coli* .

INTRODUCTION

Zingiber is genus of plants be longing to the *zingibeeaceae*, one of the largest and most important families. It is widely distributed throughout tropical and sub tropical regions, particularly in southeast Asia (1). Ninety species have been identified world wide and at least 35 of these are found in Thailand (2). Plants in this genus are ricg in volatile oils and used as sources of foodstuffs , spices and antioxidant and antimicrobial activities (3,4)

Fresh ginger contains 80% moisture, 2-3% protein, 0.9% fat, 1.2%minerals,2-4% fibre and carbohydrates. The minerals present in ginger are iron, calcium and phosphorous. It also contains vitamins such as thiamine, riboflavin, niacin and vitamin C. The composition varies with the type , variety, agronomic condition, curing methods , drying and storage condition (5)

Ginger is an essential in many traditional Chinese medicines and has been used since the 4th century BC. Chinese take ginger for a wide variety of medical problems such as stomachache , diarrhea , nausea , cholera, asthma, heart condition , respiratory disorders, toothache and rheumatic complaints (6).

Ginger has strong antibacterial and to some extent antifungal properties. In vitro studies have shown that active constituents of ginger inhibit multiplication of colon

bacteria (7),. This can be counteracted with ginger. It inhibits the growth of *Escherichia coli*, *Proteus sp*, *Staphylococci*, *Sterptococci* and *Salmonella* (8)

PLANT MATERIAL AND EXTRACTION

Fresh rhizomes of *zingiber officinal* (ginger) were purchase from local market of Basrah. The rhizomes were washed under tap water to remove the dirty and soil and sliced in to smaller pieces. They were dried under shadow at room temperature and then grounded from into powder by using electrical mill (fisher) for 3minuts the powder of the rilizomes.

The powder were divided into 2 parts. One part was used for extraction of the ginger oil (50gms) of powder were extract separately with N-hexane by soxhlet extraction technique successively (9). The extract were concentrated using rotary vacuum evaporator and kept indessicatar until further studies. The other powder (50gm) was extract by mixing with (250ml) concentration 70% ethanol in other with methanol extract (70%) for 24hrs. using reflex extraction. The extract was filtered through wattmann No.31 for removal particles then left to dry to evaporation in the solvent and then obtained black solid residue (10).

MICROORGANISMS TEST

Six species of pathogenic bacteria were previously isolated and identified by other works were used. The study the antimicrobial activity evaluation was determined by using the disk diffusion method (Kirby Bauer) as described by (11) circular paper disc measuring 7.0mm was cut from wattmann No.0.1 filter paper. Bacteria were inoculated with each of the test organism which was fully spread on the Muller-Hinton agar medium. Finally to disc impregnated with the concentration of extract were carefully placed in to the culture plates and allowed to stand for a few minutes before being incubated for 24hrs. at 37C° they were the examination for growth and using of inhibition . The zones of inhibition were determined by measuring diameter of clearance across the disc with a ruler.

RESULTS

The inhibitory effects of three extract (70%Ethanol, 70%Methanol and N-hexane) of fresh rhizomes of *Zingiber officinal* (ginger) against three Gram positive and three Gram negative species were studied.

The data in the table (1) show the inhibition zone of various bacterial isolated , all these extracts showed promising antibacterial activity against both Gram positive and Gram negative microorganism except the 70% methanol extract against *staphylococcus aureus* , 70% ethanol extract against *Bacillus subtilis* and ginger oil extract against *Klebsiella pneumonia*. *E.coli* and *Streptococcus* spp. were strongly inhibit the growth in different concentration of these extract.

The inhibition zone induced by extract also illustrated by photographs which are listed in figures (1,2,3,4,5 and 6).

Table (1): Diameter of clear zones (mm) of the Methanol, Ethanol and ginger Oil extract from *Z.officinal*.

Microorganism	Concentration of inhibition for extract(mm)		
Gram-positive bacteria	I	II	III
<i>Bacillus subtilis</i>	10	0	7
<i>Staphylococcus aureus</i>	0	10	13
<i>Streptococcus sp.</i>	10	9	11
Gram-negative bacteria	I	II	III
<i>Escherichia coli</i>	10	15	20
<i>Klebsiella pneumonia</i>	7	10	0
<i>Pseudomonas aeruginosa</i>	5	8	10

* I=Methanol extract 70%, II=Ethanol extract 70%, III= ginger oil 100%

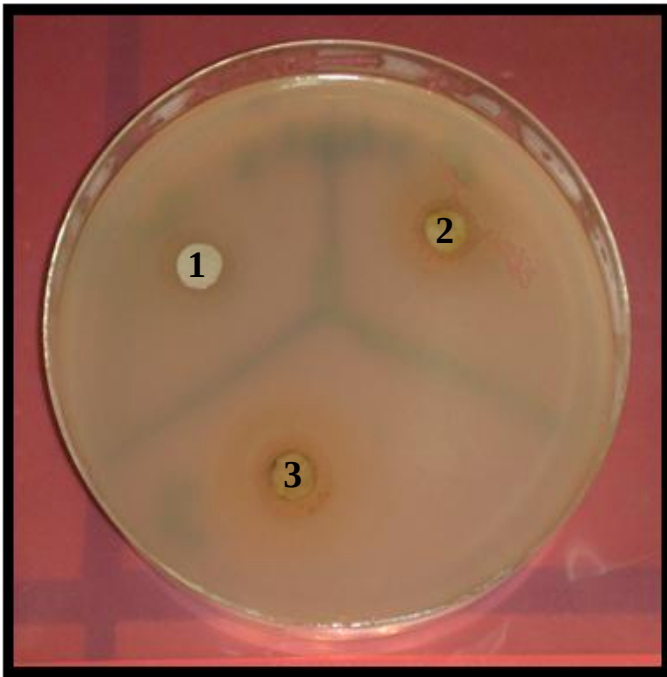


Fig. 1: show the inhibition zone of different *Z.officinal* extracts on *Streptococcus* spp.



Fig. 2: show the inhibition zone of different *Z.officinal* extracts on *Staphylococcus aureus*



Fig. 3: show the inhibition zone of different *Z.officinal* extracts on *Bacillus subtilis*



Fig. 4: show the inhibition zone of different *Z.officinal* extracts on *Pseudomonas aeruginosa*



Fig. 5: show the inhibition zone of different *Z.officinal* extracts on *Escherichia coli*

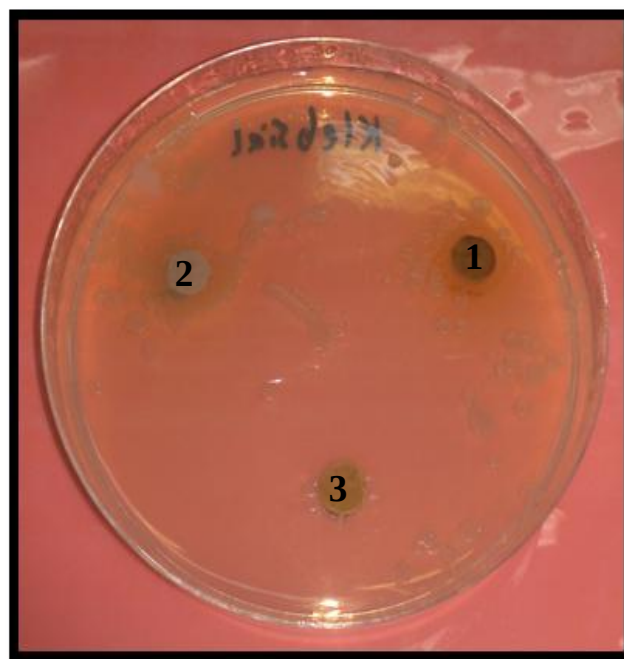


Fig. 6: show the inhibition zone of different *Z.officinal* extracts on *Klebsiella pneumonia*

* 1=Methanol extract 70%, 2=Ethanol extract 70%, 3= ginger oil 100%

DISCUSSION

Many medicinal plant extracts have been known to possess antimicrobial activity and are used for the purpose of food preservation (12, 13).

In this study, the methanolic, ethanolic and ginger oil extract of *Zingiber officinal* displayed effective antimicrobial activity, these appeared by the zone of inhibition against sensitive microorganisms was in the rang of 5-20. These results are agreement with the findings of previously reported studies that methanol is a better solvent for consistent extraction of antimicrobial components from medicinal plants compared to other solvents (14).

The methanolic extract of *Zingiber officinal* showed significant zone of inhibition against many microorganisms such as *Bacillus subtilis*, *streptococcus sp.* And *E.coli* and moderated inhibition against *Klebsiella pneumonia* and *Pseudomonas aeruginosa*. These results agreement with result of(15) which revealed the methanolic extract of *Z.officinale* signification ($p<0.001$) zone of inhibition against bacteria such as *E.coli* and *S.aureus* and other bacteria.

The *Z.officinal* is known to contain resins and volatile oils (16, 17) which may be responsible for its potent antimicrobial activity .Generally , the high concentration of phenolic compounds in *Z.officinal* accounts for their antioxidant property.

The oil ginger of *Z.officinal* was active against *B.subtilis*, *S.aurues*, *streptococcus* sp. *E.coli*, and *P.aeruginosa* and no inhibition against *k.pneumonia*.

These results agreement with results of (18) which reported the essential oil of *Z.Wrayi* was active against *B.subtilis*, *E.coli* and *Sarcina* sp.at all concentration studied.

The major compounds of ginger oil (*Z.officinal*) are ginger, galangal, turmeric, kaempferia, bastard and cardamom which display effects on membrane of bacteria (gram positive and gram negative bacteria) which may be due to the ethyl groups in these compounds.

تقدير الفعالية المضادة للميكروبات لمستخلص جذور الزنجبيل *Zingiber officinal*

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الخلاصة

لقد تم دراسة الفعالية المضادة للميكروبات لمستخلصات الايثانول والميثانول والمستخلص الزيتي لجذور الزنجبيل. وقد اختبرت بعض انواع من البكتريا الموجبة والسالبة. حيث بينت الدراسة ان هذه البكتريا لها حساسية مختلفة اتجاه هذه المستخلصات وحسب نوع البكتريا وقد لوحظ ان التأثير الاكبر للمستخلصات كان على جرثومة *Escherichia coli*.

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