

Anti bacterial activity of *Cinnamomum zeylanicum* and *Capsicum annunm* extracts against *Escherichia coli* and *Salmonella typhi*

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Maysoon M. Alhamando Alyaa Rzoki Faiza Kadhim
Department of biology, College of science, University of Baghdad
Mysoon_hamando@yahoo.com , alyatiba@yahoo.com
fkoomran@yahoo.com

Abstract :

Two Gram negative bacterial isolates were selected : *Escherichia coli* and *Salmonella typhi* . Antibacterial activity of the aqueous and alcoholic extracts of *Cinnamomum zeylanicum* and *Capsicum annunm* were determined against the two bacterial isolates . obtained results showed that the inhibitory concentration of the cinnamon aqueous extract was 150 mg/ml for *E. coli* and was 175 mg/ml for *S.typhi* . whereas The cinnamon ethanolic extract was 20 mg/ml for *E. coli* and was 10 mg/ml for *S.typhi* .The results indicated that , both extracts had a suppressing effects. The results proved also that the alcoholic extract for cinnamon has better effect than the aqueous extract against these two bacterial isolates . The results also showed that there is no effect for *capsicum annunm*(black pepper) neither aqueous extracts nor alcoholic extract against the bacterial isolates that used in this study .

Keywords:cinnamon,capsicum,plant extract

Microbiology classification : QR75-99.5

Introduction :

The use of plants and plant products as medicines could be traced as far back as the beginning of human civilization [1]

Some *E. coli* strains produce toxins (ETEC) that affect the small intestine and cause diarrhea and dysentery [2]. Resistance to antimicrobial agents is emerging in a wide variety of pathogens and multiple drug resistance is becoming common in diverse organisms such as *Salmonella typhi* and *S. paratyphi* A that caused typhoid fever or gastroenteritis [3] This has necessitated a search for new antimicrobial substances from other sources including plants [4] . *Cinnamomum zeylanicum* used as a spice . leaves contain eugenol and are sometimes used as a substitutes for cloves (Eugenol is the major aromatic chemical component of colves)[5] . *Capsicum annunm* stimulates the secretion of saliva and gastric juice and increase peristaltic movement and motility of stomach , It is an excellent remedy inatonic and flatulent dyspepsia and dispsomania[6] . The main objective of the research is to screen and evaluate the antibacterial activity of the crude ethanolic and aqueous extract to compare between the ethanolic and aqueous extracts against two representative Gram negative bacteria *E.coli* and *S.typhi* .

Materials and Methods :

1- Preparation of plants extracts :

* Preparation of Hot aqueous extraction for each *Cinnamomum Zeylanicum* and *Capsicum annuum* :

fifty gm of dry powdered material was soaked in 500 ml of boiled distilled water with continuous shaking for 24 hour at 35 C⁰ by shaking incubator and then filtered with many layers of cheese clothes and filtered with whatman filter paper No. 1 .

The filtrates solution were dried with Rotary evaporator at 40 C⁰ until obtained thick liquid and the liquid dried in incubator at 35-40 C⁰ for 2-3 days , The dried powder collected in sterile clean bottles and stored in a refrigerator (4 C⁰) until further use[8] .

* Preparation of cold ethanol (alcohol) extraction for each *Cinnamomum Zeylanicum* and *Capsicum annuum* :

Two hundred fifty ml of ethyl alcohol(75%) were used and the same steps of extraction were followed as in aqueous extracts preparation[9] .

2- Preparation of stock solutions from aqueous and ethanol extracts for each of *Cinnamomum zeylanicum* and *Capsicum annum* and sterilized by Membrane filters

3- Agar well diffusion method was used to determine Antibacterial activity for studied plant extracts[10] .

4- Prepare the diluents for aqueous and alcoholic extracts from stock solution in a proportion volume / volume .

5- In this study two Gram of (*Escherichia coli*) and (*Salmonella typhi*) were tested , the bacterial cultures Identified according to Berge's manual[11] .

6- The bacterial cultures were grown in nutrient broth and Incubated at 37C⁰ for 24 hour and maintained on nutrient agar slants .

7- An inoculum size of 10⁵ cfu/ml of bactericum compared with No. 0.5 mcfarland turbidity standard was used[12] .

8- The freshly prepared inoculum was swabbed all over the surface of nutrient agar plate using sterile cotton swab Four wells of 6 mm diameter were prepared in the medium with the help of sterile cork – borer having 6mm diameter and were labeled properly and 50µl of different medicinal plant extracts dilutions was filled in the wells Plates were left for some time till the extract diffuses in the medium with the lid closed & incubated at 37 C⁰ for 24 hours . plates were observed for zone of inhibition[11]

Results and Discussion :

The results revealed that the concentration of 150 mg/ml was for aqueous Cinnamon extract against *E. Coli* while the concentration 175 mg/ml was inhibitory concentration for the same extracts against *Salmonella typhi*(table 1)

This study showed that the concentration 20 mg/ml for alcoholic cinnamon extract against *E. coli* had less effect in comparasion to high concentration of the extracts , while the concentration was 10 mg/ml against *Salmonella typhi* had less effect of inhibition in comparasion to high concentration of the extracts(table 2)

The details of antibacterial activity of Cinnamon extracts used in this study are shown in table 1 and 2 .

Table (1) : effect of aqueous extract of Cinnamon against tested bacteria

Bacterial isolate	Concentration mg/ml	Zone of Inhibition (mm)
<i>E. coli</i>	100	(-)
	125	(-)
	150	20
	175	24
<i>Salmonella typhi</i>	100	(-)
	125	(-)
	150	(-)
	175	21

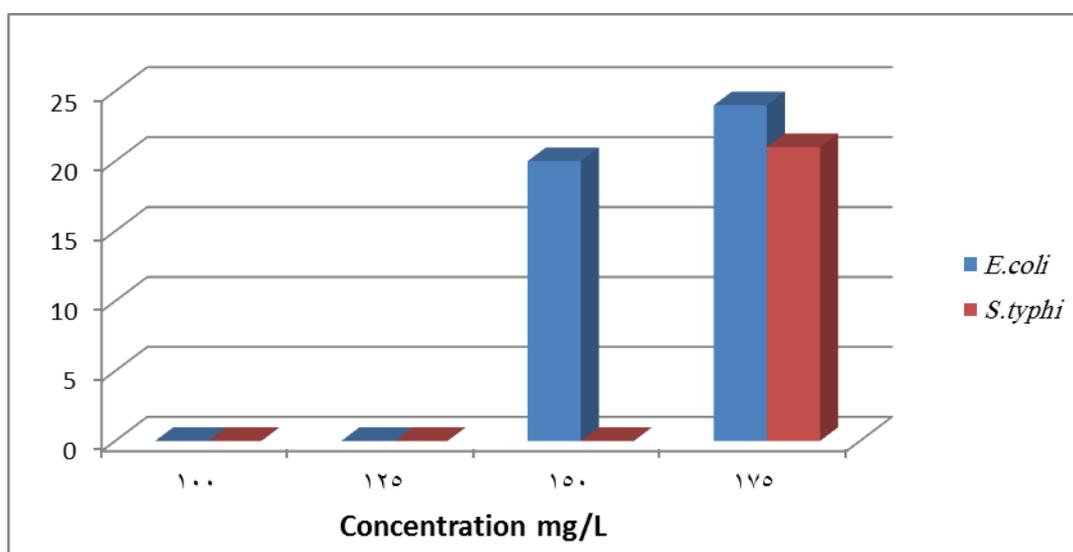


Figure 1: effect of aqueous extract of Cinnamon against tested bacteria

Table (2) : Effect of alcoholic extract of Cinnamon against tested bacteria

Bacterial isolate	Conc. mg/ml	Zone of Inhibition (mm)
<i>E. coli</i>	10	-
	20	15
	30	20
	40	23
<i>S. typhi</i>	10	15
	20	20
	30	24
	40	26

Note : the negative sign indicates negative result = No inhibition

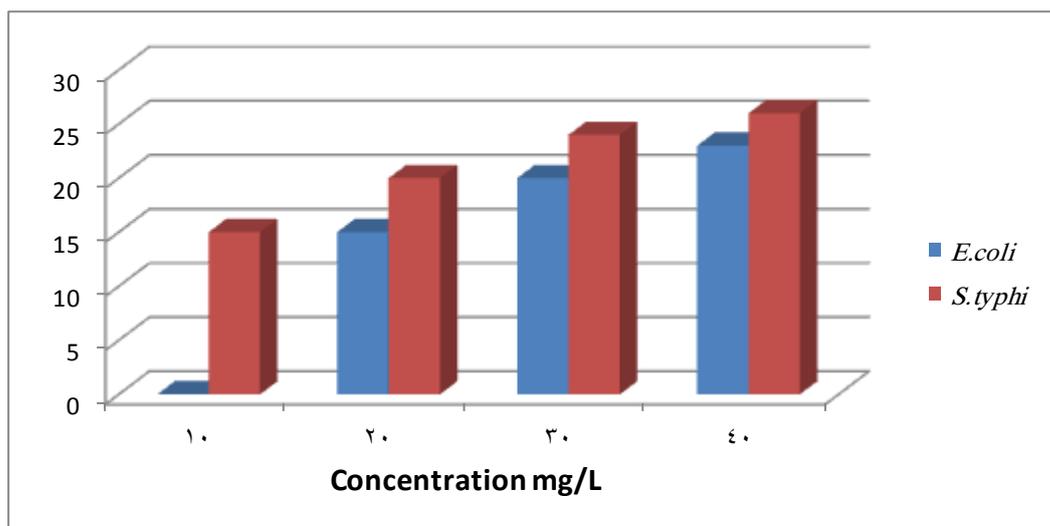


Figure 2: : Effect of alcoholic extract of Cinnamon against tested bacteria

- 1- Determination of antimicrobial susceptibility for aqueous and alcoholic extracts for *Cinnamomum zeylanicum* against two Gram negative bacterial isolates *E. coli* and *Salmonella typhi* by agar well diffusion .

*** Aqueous cinnamon extract :**

The results revealed that the concentration of 150 mg/ml was for aqueous Cinnamon extract against *E. Coli* while the concentration 175 mg/ml was inhibitory concentration for the same extracts against *Salmonella typhi* and measured size of inhibition zone in mm for all concentration mention above in table 1. (Fig 3and 4)



Fig 3: inhibition zone of Aqueous extract



Fig 4: inhibition zone extract of cinnamon against *S.typhi* cinnamon against *E.coli*

*** Alcoholic Cinnamon extract :**

This study showed that the concentration 20 mg/ml for alcoholic cinnamon extract against *E. coli* had less effect in comparison to high concentration of the extracts , while the concentration was 10 mg/ml against *Salmonella typhi* had less effect of inhibition in comparison to high concentration of the extracts and measured the size of inhibition zone in all concentration for both isolate was mention above in details in table 2. (Fig. 5&6) .



Fig. (5) Inhibition zone of extract alcoholic of cinnamon against *E.coli*



Fig. (6) Inhibition zone of alcoholic extract of cinnamon against *S.typhi*

These results showed that antimicrobial activity for the aqueous and alcoholic extracts of Cinnamon against the two bacterial isolates and these results disagreed with [13] , which obtained no antimicrobial property of alcoholic extracts of Cinnamon against each of *E. coli* and *S. typhi* which may be due to different extraction methods used for preparation of the extract

These results showed that the alcoholic extract of cinnamon was better than the aqueous extract of cinnamon in antimicrobial activity and this agreed with [12] who mentioned that the crude aqueous extract had greater MIC_s , indicating lower antibacterial activity , compared to the crude ethanolic extracts .

2- Determination of MIC for aqueous and alcoholic extracts for *Capsicum annum* (Black pepper)

The results illustrates that no effect of aqueous & alcoholic extracts of black pepper against the bacterial isolates *E. coli* and *S. typhi* with the conc. could used: in this experiments 100 , 125 , 150 , 175 mg/ml and 10,20,30,40 mg/ml respectively . These results may be due to produce of the G-ve bacteria outer membrane which act as a barrier to many environmental substances including antibiotics including antibiotics[14] .

15 showed that none of the crude aqueous and alcoholic extracts *Alstonia macrophylla* wall.,*Bixa orellana* L.,*Blumea balsamifera*(L.)D.C.,*Azadirachta indica* A.Juss.,*Arcangelisia flava*(L.)Merr.,and *Leea rubra* Blume showed antibacterial effect against *E. coli*.

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الفعالية ضد بكتيرية لمستخلصات نباتي الفلفل الأسود والدارسين ضد بكتيريا
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ميسون منذر حمندو علياء رزوقي فائزة كاظم عمران

قسم علوم الحياة، كلية العلوم ، جامعة بغداد

Mysoon_hamando@yahoo.com , alyatiba@yahoo.com

fkoomran@yahoo.com

الخلاصة :

تم اختيار عزلتين بكتيريتين سالبة لصبغة غرام وهي *Escherichia coli* و *Salmonella typhi* . حددت الفعالية ضد بكتيرية للمستخلص المائي والكحولي لنباتي الدارسين *Cinnamomum zeylanicum* والفلفل الأسود *Capsicum annunm* تجاه العزلتين ، وكان التركيز المثبط لمستخلص الدارسين المائي 150 ملغم/مليتر لبكتيريا الـ *E.coli* و 175 ملغم/مليتر لبكتيريا *Salmonella typhi* والتركيز المثبط لمستخلص الدارسين الكحولي 20ملغم/مليتر و 10 ملغم/مليتر للعزلات *E. coli* و *S.typhi* على التوالي . أثبتت النتائج أن المستخلص الكحولي للدارسين أفضل بتأثيره من المائي على العزلات البكتيرية المحلية ولم يظهر اي تأثير يذكر لمستخلص الفلفل الاسود المائي أو الكحولي ضد اي من عزلات البكتيريا المستخدمة .

كلمات مفتاحية: الفلفل الاسود، الدارسين، مستخلصات نباتية

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