

Effect of Water and Alcohol Extracts of *Myrtus communis* and *Camellia sinensis* in the Growth and Efficacy of *Pseudomonas aeruginosa* Bacteria and *Escherichia coli* Bacteria

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Article Info	Abstract
Received 14/Jun./2017 Accepted 8/No./2017	<p>The aim of this study was to determinate the effect of water and alcohol extracts of two medicinal plants, Myrtle and Green Tea, growth inhibiting of two types of bacteria: <i>Pseudomonas aeruginosa</i> and <i>Escherichia coli</i>. And the resistance of bacterial isolates to Tetracyclin antibiotic. The pH of leaves of alias and green tea was measured. Gradient concentrations of each plant extract were used to determine the concentrations in which the bacteria showed their growth, which gave vitality almost equal to the control group. The study concluded that: The water extract of Myrtle leaf and green tea was found to be effective in reducing the growth of bacteria at concentrations (10, 20, 30) and (10, 15, 20%) compared with the alcoholic extract of both plants which was less effective. The antibiotic showed a clear inhibitory effect on <i>E.coli</i> at concentration (0.1) ml while <i>P. aeruginosa</i> showed clear antibody resistance.</p> <p>Keywords: <i>Myrtus communis</i>, <i>Camellia sinensis</i>, <i>Pseudomonas aeruginosa</i> and <i>Escherichia coli</i>.</p> <p>الخلاصة</p> <p>كان الهدف من هذه الدراسة هو تحديد تأثير المستخلص المائي والكحولي لنوعين من النباتات الطبية وهما الياس والشاي الأخضر في تثبيط نمو نوعين من البكتريا وهما <i>Pseudomonas aeruginosa</i> و <i>Escherichia coli</i>. ومقاومة العزلات البكتيرية للمضاد الحيوي Tetracyclin. وقد تم قياس الرقم الهيدروجيني لأوراق نبات الياس والشاي الأخضر، كما استخدمت تراكيز متدرجة لكل مستخلص نباتي ومن ثم تحديد التراكيز التي أظهرت فيها البكتريا نموها والتي أعطت حيوية مقارنة لمجموعة السيطرة، ثم توصلت الدراسة إلى ما يلي: وجد أن مستخلص أوراق الياس والشاي الأخضر (المائي) ذو كفاءة في الحد من نمو البكتريا عند التراكيز (10، 20، 30) و (10، 15، 20) % على التوالي مقارنة مع المستخلص الكحولي لكلا النباتين والذي كان أقل تأثيراً. إن المضاد الحيوي قد أظهر تثبيطاً واضحاً على بكتريا <i>E.coli</i> عند التركيز (0.1) مل في حين أظهرت بكتريا <i>P. aeruginosa</i> مقاومة واضحة للمضاد.</p>

Introduction

There has been a large increase interest in researches to use of medicinal plants, the folk medicine used by the ancient Babylonians, Assyrians and Arab doctors that played a big role in the progress of the world's preventive medical civilization, including therapeutic, where they relied on plants and herbs in nature [1], because of their wide observations in their fully of knowledge and science life for the service of human not only at the Arab and Islamic level, but at the global level, on

account of the existence of an unlimited number of plants and medicinal herbs in Iraq and in order to keep pace with scientific progress in this area in terms of the selection of the best extraction method and the diversification of the use of these extracts in different medical and industrial fields [2]. In this study, two types of plants were selected for detection of their antimicrobial efficacy: *Murtus communis* and *Camellia sinensis* (Green tea).

Material and Methods

Bacterial Isolation

Pseudomonas aeruginosa and *Escherichia coli* isolates were obtained from the Bacteriology Laboratory at Al-Karama Teaching Hospital.

Plant samples:

1. *Camellia sinensis* (Green Tea) :

It was obtained from the local markets in the form of powdered dried leaves in sealed bags which is equipped with the approval of the Ministry of Health - Herbal Medicine Center that subject to examination and diagnosis in terms of health.

2. *Myrtus communis* (Myrtle Plant) :

Its leaves were used which obtained as dried and milled in small bags from Herbal medicine centers.

Preparation of water and alcohol plant extracts for both plants:

The water extract of the two plants is prepared using method of [3]. where a (20g) of dry plant powder is weighed and placed in a thimble of the Soxhlet apparatus, then added 150 ml of distilled water in the extraction flask and the extraction process continued for two hours at a temperature of (60 °C) after that the extracts is filtered with a paper filter (Whatman No.2). The method of [4] is used for alcohol extract, where the process is done in the same steps of water extracts except using Ethyl alcohol (95%) and continued for 3 hours at a temperature of (60 °C). The extract was then filtered using the filter paper. Then the extract was dried, and a given weight is taken for the purpose of dilution.

Effect of plant extracts in bacterial isolates :

To demonstrate the effect of plant extracts on growth of bacterial isolates, gradient concentrations of green tea extract and Myrtle plant were used : (5, 10, 20, 30, 40) mg / ml and (10, 15, 20, 25, 30) mg/ml, while for alcohol extracts for both plants: (10, 20, 30, 40, 50) mg/ml .

Effect of antibiotic in bacterial isolates :

A pure colony of bacterial isolates was transferred to a test tube containing 10 mL of the irrigated medium for 24 hours at 37 °C, then a (0.1)ml of bacterial treatment with

(0.1)ml of Tetracycline were poured in a glass dish where the sterile medium was poured.

Results and Discussions

pH measurement of Myrtle leaves and green tea: The results of the pH measurement of the plant extracts showed that its value in the extract of Myrtle leaves was (5.6) , and its value in the green tea extract was(5.5). The pH value affects the nature of the amino acids that forming proteins interfering with the peptidoglycan layer in the bacterial wall, as well as affect the locations of bacterial cell wall enzymes and other microorganisms [5].

Effect of plant extracts and antibiotics on bacterial isolates:

The results in Tables 1, 2, 3 and 4 showed the effect of Myrtle and green tea extracts on *P. aeruginosa* and *E.coli* bacteria.

Table 1: Effects of water extract of Green Tea and Myrtle plant leaves in growth the of *P. aeruginosa* .

Concentration					
C	5	10	20	30	40
92.00	91.05	65.13	58.13	60.20	89.40

Table 2: Effects of water extract of Green Tea and Myrtle plant leaves in growth of *E. coli*.

Concentration					
C	5	10	20	30	40
89.00	68.41	61.03	66.25	82.17	85.25

Table 3: Effects of alcohol extract of Green Tea and Myrtle plant leaves in growth the of *P. aeruginosa*

Concentration					
C	10	20	30	40	50
95.00	85.05	84.27	84.37	94.8	92.24

Table 4: Effects of alcohol extract of Green Tea and Myrtle plant leaves in growth the of *E. coli*

Concentration					
C	10	20	30	40	50
79.0	48.12	45.27	44.05	82.6	82.1

The highest percentage of the effect of green tea extract on *P. aeruginosa* was (40)mg/ml and for the alcoholic extract was (40) and (50) mg/ml, where for alcohol extract was at concentration (4.5) mg/ml with significant

differences compared with other treatments. This result is consistent with [6], which indicated the effectiveness of green tea against microorganisms.

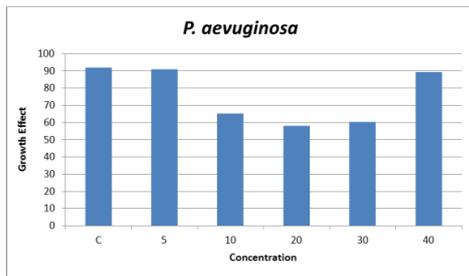


Figure 1: The effect of water extract of Green Tea and Myrtle plant leaves in growth the of *P. aeruginosa* .

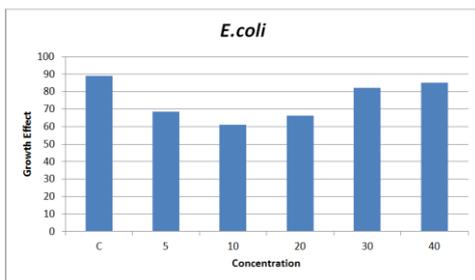


Figure 2: The effect of water extract of Green Tea and Myrtle plant leaves in growth the of *E. coli* .

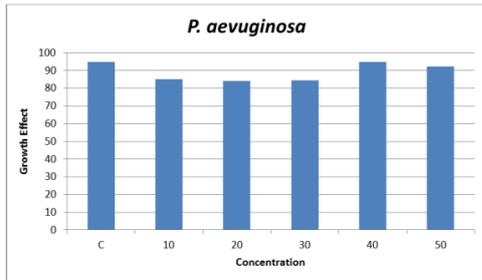


Figure 3: The effect of alcohol extract of Green Tea and Myrtle plant leaves in growth the of *P. aeruginosa* .

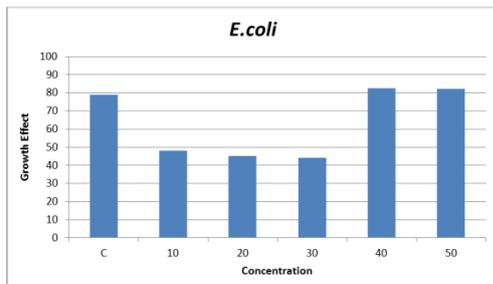


Figure 4: The effect of alcohol extract of Green Tea and Myrtle plant leaves in growth the of *E. coli* .

It has been noted that the green tea contains many active compounds such as Catechin which is inhibiting the growth of bacteria as referred by [7] , the extracts of Myrtle contains many compounds, including high toxicity such as alpha-pinene and 8-cineole , or less toxic than the first compound, in addition to oils, which is consistent with [8].

Tetracycline was used with a concentration of (0.1 mg), the antibiotic shows inhibiting to the growth of *E. coli* while *P. aeruginosa* was resistant to the antibiotic [9].

As shown in Table 5, this may be because *P. aeruginosa* has self-resistance due to low permeability of the outer membrane surrounding the peptidoglycan and that result is consistent with what [10] pointed out.

Table 5: Tetracycline Antibiotic effect on bacterial isolates .

Bacteria	The effect
<i>P. aeruginosa</i>	-
<i>E. coli</i>	+

+ Effective
- Ineffective

On the other hand, the tetracycline inhibited the effectiveness of *E. coli* at 0.1 mg. However, the antibiotic is not free of side effects such as the effect on liver cells and Gastric disorders and it is advised not to be used for children and pregnant women, because it paints the teeth with brown color and accumulate during the growth of teeth [11].

In this study, *P. aeruginosa* was found to be more resistant to water and alcohol extracts and showed an absolute resistance to antibiotic resistance, followed by *E. coli* with respect to the resistance to plant extracts and antibiotics.

Conclusions

The water extracts of *Myrtus communis* and *Camellia sinensis* have an active effect in the Growth and Efficacy of *Pseudomonas aeruginosa* and *Escherichia coli* which means that we can use the extracts of these plants in the medical field, against these kinds of bacteria, instead of antibiotics. Not all types of

antibiotics are active and inhibitive against bacterial isolates. *Pseudomonas aeruginosa* can be considered as one of the most resistant bacteria against antibiotics, such as Tetracycline, because it has many different techniques that help it to resist, and that's lead the failure of the antibiotic.

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