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Determination of Bioactive Compounds and Antibacterial of The Brown algae *Sargassum sp.*

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ABSTRACT

Objective of this study was to determine of bioactive compounds and antibacterial activity of *Sargassum Sp* extract. Pathogenic bacteria, *including Pseudomonas aerogenosa*, *Escherichia coli*, *Salmonella SP.*, *Bacillus Cereus*, *Staphyloylococcus aureus*, and *Streptococcus mutans* , as the active and methanol chemical compounds were extracted from this algae using solvents (cold water Ethanol alcohol) with qualitative detection of secondary metabolites of the aqueous extract of this algae, which indicated the presence of phytochemicals analysis such as Amino acid, Alkaloids, Steroids, Phenols, chemical compounds The Flavonoids, Glycosides, Terpenoids, Tan inns, Saponins and Carotenoids . were determined using the gas chromatography mass spectroscopy (Gc-mass) technique of the methanolic extract of *sargassum* These compounds were represented Muramic acid, Isopropyl Alcohol, Glycerin, Loliolide, Tetradecanoic acid, Pentadecanoic acid, n-Hexadecenoic acid, , Phytol, Oleic acid, Octadecanoic acid, Erucic acid, Ergosta-5,24(28)-dien-3-ol,(3.beta.)- and Stigmasta-5-24(28)-dien-3-ol,(3.beta)- The aqueous extract of this algae did not show any bioactivity against all bacterial species under study. It was noticed that the methanolic extract was more efficient in its effect on the bacterial species, as the rates of inhibition zones for this extract were (16, 18.66, 16.66, 19, 19.33 and 22.66) mm for each of *P. aerogenosa*, *E. coli*, *Salmonella Sp.*, *B. cereus.*, *Staph. aureus* and *S. mutans*, respectively.

Key words: *sargassum*, Antibacterial activity, GC mass, Bioactive compounds

1. INTRODUCTION

Infectious diseases are considered one of the main causes of high rates of disease and eath among humans all over the world, especially developing countries, as the risk of disease has increased dramatically

in recent years due to severe infection and disease-causing bacteria have become resistant to common drugs due to the wrong use of antibiotics and bacteria resistance. decreased and the resistance of pathogens to antibiotics has necessitated the development of new alternatives, thus algae is a rich source of bioactive compounds (Chowdhury *et al*., 2015). The last century witnessed a scientific development to study many of the medicinal properties of secondary ovaries present in all organisms, especially algae, and to benefit from natural products in the treatment of many diseases, as the last focus was on algae because they are available and diverse in many places (Amr, 2009).

Primary or secondary algae produce potential biologically active compounds of therapeutic, industrial and agricultural importance (Mugilan and Sivakami, 2016). The main reasons for using algae extracts as antibacterial agents are their natural origin and a low chance of developing resistance to pathogens, as they have minimal adverse side effects on humans and animals and lower environmental risks compared to their synthetic alternatives (Kolanjinathan *et al*., 2014).

1. MATERIALS AND METHODS SAMPLE COLLECTION AND PREPARATION OF EXTRACTION

The algae samples (*Sargassum Sp)* were obtained from the American company Amazon in the form of Powder. The different types of solvent used were absolute methanol 80% and water 100%. All tests were performed at room temperature.

Gas Chromatography mass device.

Some chemical compounds were identified in the methanolic extract of *Sargassum* algae using the Gas Chromatography mass device in the Basra Oil Company / Research and Quality Control Department / Nahran Omar Laboratories.

Antibacterial Assay

Pseudomonas aerogenosa, Escherichia coli, Salmonella Sp., Bacillus ceres, Staphlloccus aureas and Streptococcus mietus were used in experiment. Mueller Hinton agar was used in antibacterial assay. *Sargassum* algae extracts were dissolved in methanol to obtain a concentration of 50, 100 and 150 mg/mL. Antibacterial assays were conducted using the disc diffusion method as previously described by (Kumar2014). Zones of inhibition around the discs were measured in mm. The experiment was repeated in triplicate and the mean of diameter of the inhibition zones was calculated.

1. RESULTS AND DISCUSSION

The results shown in Table (1) showed that the aqueous extract of *Sargassum sp.* on Alkaloids, Phenols, Flavonoids, Glycosides, Terpenoids, Tannins, Saponins and Carotenoids.

Table (1) Phytochemicals analysis of *Sargassum sp.* extract

Phytochemicals	***Sargassum sp.* extract**
Alkaloids	-
Phenols	+
Flavonoids	+
Glycosides	+
Terpenoids	+
Tannins	-
Saponins	+
Carotenoids	+
Amino acid	+
Glycoeides	+

+ = Presence of constituent; - = Absence of constituent

This is in agreement with Al-Okayli (2019) study on the brown alga *Sargassum platensis*. The results shown in Table (2) showed the chemical compounds diagnosed by the technique of gas chromatography (GC - mass) for methanolian extract of *sargassum*, as a number of active chemical compounds were found in the methanolate extract of this algae, and among these compounds that occupied the largest area of the total area of the diagnosed compounds represented by n-Hexadecanoic acid The It is a carboxylic acid and has anti-bacterial activities, as one that occupied an area of (159361083) indicated by a study. alcohol and has an anti-bacterial activity and may be attributed to it because it occupied the largest part of the total area (Wu *et al*., 2017),secondly the compound was Oleic acid, which occupied an area of (64018283), which is an unsaturated fatty acid and has antioxidant and anti-bacterial activity, according to the study of(10) . (Saravanakumar *et al*., 2018). As for the compound Tetradecanoic acid which is called myristic acid, which is one of the basic fatty acids that the body cannot manufacture and which occupies an area of (33637145) as studies indicated that it has anti-bacterial activity (AbdElnaby *et al*., 2016).

Table (2): Chemical compounds diagnosed with GC - mass for methanolic extract of *Sargassum.*

The name of the chemical compound	Molecular formula	Molecular weight Gram / mol	Retention time	Area
Glycerin	C3H8O3	92.08	10.794	5986244
Loliolide	C11H16O3	196.24	20.794	3609817
Tetradecanoic acid	C14H28O2	223.37	20.943	33637145
Pentadecanoic acid	C15H30O2	242.3975	21.948	3556504
n-Hexadecanoic acid	C16H32O2	256.434	23.109	18132086
Phytol	C20H40O	296.531	23.186	2191516
Oleic acid	C18H34O2	282.468	24.711	64018283
Octadecanoic acid	H18H36O2	282.46	24.881	5652462
Erucic acid	C22H42O2	338.57	28.031	2107971
Ergosta-5,24(28)-dien-3-ol, (3. beta)-	C28H48O	400.7	33.591	2839634
Stigmasta-5,24(28)-dien-3-ol, (3-beta)-	C29H48O	412.691	34.704	30625022

The results showed that the aqueous extract of this algae at all concentrations did not show any biological activity against all the bacterial species under study, and that result is consistent with the findings of Al-Ghanayem, (2017). On the brown algae *Sargassum platensis*, this finding can be traced back to the fact that most of the antibacterial active ingredients identified are not soluble in water (Stirk *et al*., 2007).

The results shown in Table (3) showed the effect of the different concentrations of methanolic extract of *Sargassum* algae against the bacterial species under study, as three concentrations (50, 100 and 150) mg / ml were used, and it is clear from the table that there is a clear inhibition against the bacterial species under study in general. There is a direct relationship between the concentrations of algal extract and the average area of inhibition of the bacterial species under study, as when the concentration of algae extract is high, the area of inhibition of the bacterial species is larger, and the results of the study also showed that the higher inhibitory effect is more pronounced against the bacteria positive for the stain of Kram compared to the bacteria negative for the stain of Kram stain.

Table (3) The effect of different concentrations of methanolic extract of *sargassum* algae against the bacterial species under study.

Bacterial species	Concentration mg/ml			Mean
	50	100	150	
Pseudomonas aeruginosa	12.00±0.57	15.00±0.57	21.00±1.00	23.67
Escherichia coli	12.00±0.50	20.00±0.57	24.00±1.00	21.33
Salmonella cholerasuis	12.00±0.57	18.00±0.57	20.00±1.00	20.67
Bacillus cereus	13.00±1.00	21.00±1.00	23.00±1.00	18.00
Staphylococcus aureus	13.00±0.57	22.00±100	23. 00±1.00	19.56
Streptococcus mutans	15.00±1.00	23.00±1.00	30.00±1.00	17.00
Mean	12.83	19.83	23.5	

L.S.D=5.18(P≤0.05)

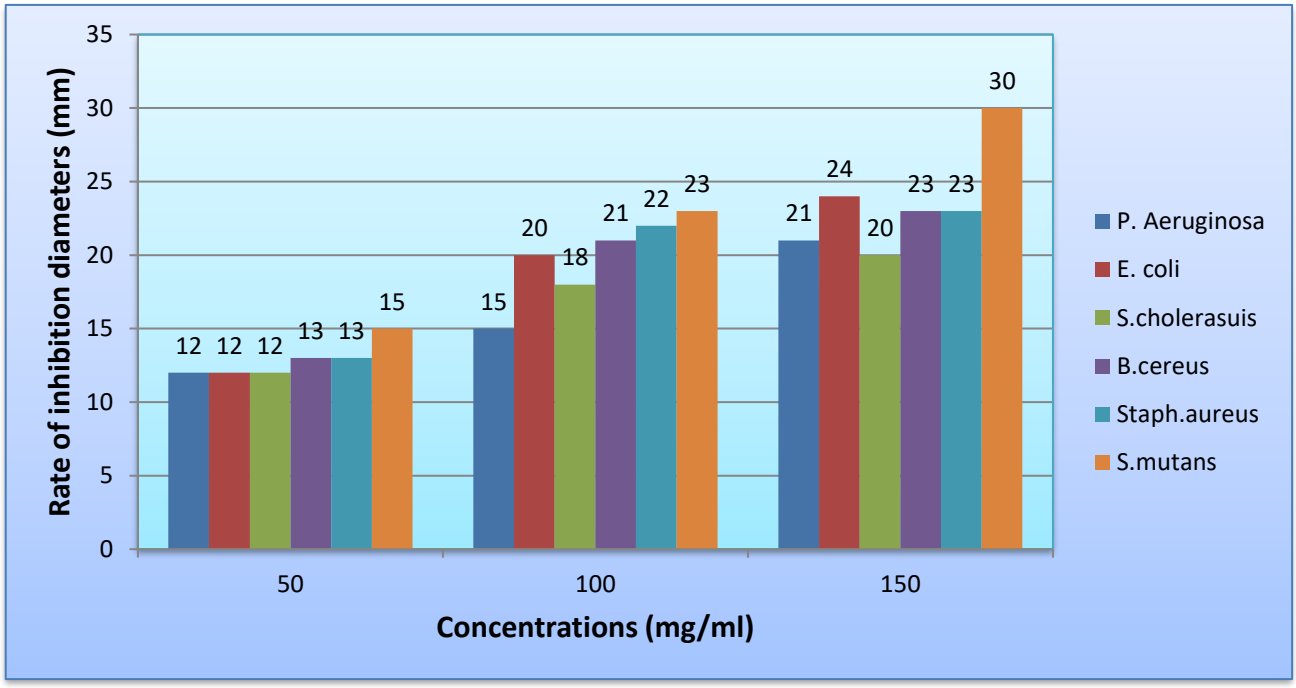

Figure (1) The effect of different concentrations of methanolic extract of *Sargassum* algae against the bacterial species under study.

This is in agreement with what many researchers have stated. The high sensitivity of Gram-positive bacteria to algae extracts may be due to differences in the bacterial wall structure. The Gram-

negative bacteria wall contains more lipids than the Gram-positive bacteria, and these fats prevent the penetration of the active compounds into the bacteria and thus affect their inhibition (Salem *et al*., 2011). There are many factors that affect the nature of the results obtained by the researcher in the tests related to the effectiveness of algae extracts against the activity of bacterial growth, there may be differences in the results reached by researchers for the same type of algae, and this difference may be attributed to the regions, time of collection and methods Preserving the samples used in the test before extraction, the environmental factors and the stage of algae growth about the farm harvest, the type of solvent in the extraction and the extraction method.

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