Chemical Compounds And the Vital Importance of Organic Extract of Bacillus Polymyxa Marine Bacteria

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ABSTRACT
The study included the identification of local marine microbial isolates Bacillus polymyxa from the coastal waters of Lattakia governorate. The filtrate was separated from sediment for Bacillus polymyxa extract and organic extract was obtained for both filtrate and sediment. Then, The chemical composition was studied by gas chromatography GC Mass. The most important chemical compounds of bacterial extract were determined for both Bacillus polymyxa filtrate and sediment. The results of chemical analysis of each bacterial extract showed that the chemical compounds included fatty acids, esters, aldehydes and their derivatives. The most important of these compounds have antibacterial effect were (Tetracosane, 3-Eicosene (E)) and they are found in high percentages in the bacterial cells extract. In addition, it was observed that some compounds have anti-inflammatory and antioxidant and anti-cancer properties. Some of these compounds (18-Nonadecenoic acid, 22-Tricosenoic acid, Nonacosane) are used as an antiseptic and in cosmetics and pharmaceuticals.

Keywords: *Bacillus, GC Mas, Chemical compound.*

I. INTRODUCTION

The seas and oceans cover about 70% of the Earth's surface and occupy 96% of the biosphere; Marine biodiversity has provided an important source of chemical compounds with important metabolic activity of living organisms[1]. However, the researches about these compounds did not begin in earnest until the last half century. They included all life forms in the marine environment[4]. The researchers isolated about 25,000 natural compounds from marine organisms (microorganisms, phytoplankton, green algae, red sponges, corals, mollusks, echinoderms, etc.) until 2014. 20,000 compounds of them have biochemical properties and had used as source of pharmaceutical drugs [3-4-13].

The predominant physical and chemical conditions in the marine environment (pressure, temperature, salinity and dissolved oxygen concentration) induce marine organisms to produce secondary metabolites. Which belong of them to different chemical groups, these metabolites have an enzymatic and physiological effect in the organism and its metabolic activity[1-5-7]. Because of the importance of these marine chemical, the researches has led to look for alternative antibiotics are more efficient than the commercial antibiotics. Although natural compounds are more effective and less hazardous to the environment[6].

II. MATERIALS AND METHODS:

Preparation of *Bacillus polymyxa* extract: The *Bacillus polymyxa* used in this research was isolated from Lattakia beach water from Afamia site (35° 54´ 53" N; 35° 76´ 17" E) as a site exposed to sewage pollution during the winter season at 2019. The liquid *Bacillus polymyxa* culture carried out and incubated at 37 ° C for 24 hours. After that, the supernatant was separated from the cells for obtain organic extract by Kataz and Demain method [8]. Using a centrifuge (5000 rpm / min for 10 min).

Then the both of supernatant and cells parts were soaked with methanol (90%), by 50% (V / V) and incubated at 4 °C for 24 hours, Following each part was allowed to dry in fume hood to remove any remaining. Two of organic extracts were rota-vapored under vacuum.The temperature of the water bath was set at 32ºC and the rotation rate was medium solvent. In the end, two of crud organic extracts were placed in small vials and were stored at – 20ºC for chemical analysis, and determine the biological important chemical compounds. The chemical composition was studied using gas chromatography / mass spectrometry (GC / MS), with a capillary column of 5-DB silicon oils, dimensions of inner diameter and length (0.25 mm x 30m), the liquid phase thickness is 0.25 µm. The purity of used helium gas was 99.99, and a flow rate of 2 ml / min, and the separation process was carried out according to the following thermal program: 70 C° 4 °C/min 280 °C Iso thermal (20 min).

III. RESULTS AND DISCUSSION:

The results showed that the chemical compounds of organic extract of *B. polymyxa*, the percentage of

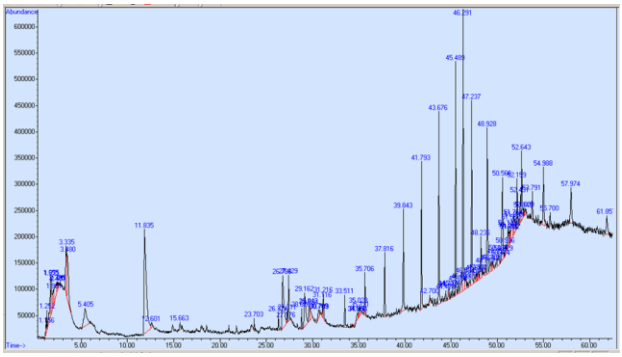
chemical compounds in cells extract was higher than the supernatant extract.

Chemical compounds of supernatant organic extract of B. polymyxa isolated from Afamia site:

The figure (1) show percentage of fatty acids were 4.19% in supernatant. The principle of theses acids were 9-octadecenoic acid and 22-Tricosenoic acid, which consider as anti-oxidant, inflammatory and anti-cancer. Also, they were used for treatment of diseases of the digestive system and the hepatitis [12,13]. The percentage of aliphatic hydrocarbons was 8.38%, and the most important aliphatic hydrocarbons was Pentacosane, which has an important antimicrobial role [9]. The percentages of esters, alcohols, ketones and other compounds in supernatant organic extract were 0.63%, 1.18%, 1.07% and 2.14% respectively (Table 1).

Table (1). Percentages of chemical compounds in the supernatant organic extract of *B. polymyxa* isolated from Afamia site.

Compounds	Percentage of Compounds %
Hydrocarbons	3.12
Fatty acids	28.2
Esters	0.61
Amides	1.84
Alcohols	4.52
Other Compounds	7.66



Fig(1). Chromatogram of the active compounds of the supernatant organic extract of *B. polymyxa* isolated from Afamia site, with GC-Mass technology.

Chemical compounds of cells organic extract of B. polymyxa isolated from Afamia site:

The figure (2) show percentage of fatty acids were 28.2% in cells extract. The principle of theses acids was 18-Nonadecenoic acid, which has an anti-cancer and anti-toxin role [11]. The percentage of aliphatic hydrocarbons was 3.12%, and the most important aliphatic hydrocarbons was Tetracosane, which has a cytotoxic role against cancer cells, anti-diarrhea, antibacterial, cardiomyopathy, anti-inflammatory[10]. The percentages of esters, alcohols, ketones and other compounds in supernatant organic extract were 28.2%, and the most important compound was β-Sitosterol, which has analgesic effect and role in protection of infected nerve endings [2]. The percentages of alcohols, ketones and other compounds in cells organic extract were Alcohols, ketones and other compounds were 1.18%, 1.07% and 2.14% respectively (Table 2).

Table (2). Percentages of Chemical Compounds in the cells organic extract of *B. polymyxa* isolated from Afamia site.

Compounds	Percentage of Compounds %
Hydrocarbons	4.19
Fatty Acids	8.38
Esters	0.63
Amides	1.07
Alcohols	1.18

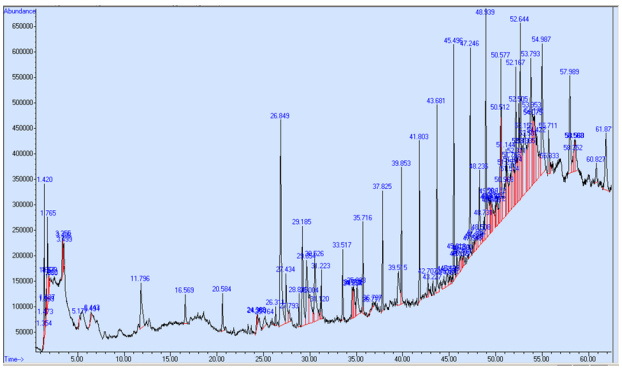


Fig (2). Chromatogram of the active compounds of the cells organic extract of *B. polymyxa* isolated from Afamia site, with GC-Mass technology.

IV. CONCLUSIONS AND RECOMMENDATIONS:

The most important chemical compounds in cells organic of marine *Bacillus polymyxa* were different from that of the supernatant organic extract. The percentage of chemical compounds determined in the cells extract was higher than the supernatant extract. The most important of these compounds were detected with high percentage in organic extracts were Pentadecanoic acid, Pentacosan- Oleic Acid, 9,12-Octadecadien and Nonacosane. This research is considered from the current applied researches in the marine biotechnology domain. Because of the importance of the marine natural compounds extracted from marine organisms and their application in medical and pharmaceutical domains, The research about natural sources for obtain the biochemical compounds with a wide spectrum of antibiotics non-conventional against common human pathogenic bacteria.

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