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Chemical screening, biological activity and antioxidant activity screening of some algae from Libyan coast

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ABSTRACT

The research of chemicals, biological and antioxidant activity of marine algae from Libyan coast is new trend in the natural product researchers in the Libyan university as this is the first marine natural product research under the name "marine algae are source of food and future medicine". In the Libyan coast there are several kinds of algae. Three of them were studied for their chemical and biological activity, Asparagopsis, Sargassum and Dictyotales were under study using classical color chemical tests and showed high Saponins concentration in Asparagopsis and low concentration in Sargassum and Dictyotales. Alkaloids, Coumarin and Anthraquinones are absent in all samples. Flavonoids are found in Asparagopsis and Sargassum while Tannines and Steroid are found only in Dictyotales. Antioxidant activity was examined by DPPH method and showed good activity in all samples with 41.7% in Asparagopsis. Antimicrobial activity was monitored for Four bacteria type (pseudomonas, Escherichia coli, Staphylococcus and Klebsiella), all type were affected by algae extracts and Asparagopsis showed the highest a effect on all microbes.

Keywords: marine algae, Asparagopsis, Sargassum , Dictyotales, DPPH, phytochemical screening.

INTRODUCTION

Natural products obtained from marine resources play an important role in the development of new drugs and modern medicines, especially in the areas of cancer and infection. The last 30 years has seen a focused and purposeful exploration of the marine environment for drug leads from natural products. Among marine organisms, marine algae are rich sources of structurally diverse bioactive compounds with various biological activities. In order to survive in a highly competitive environment, freshwater or marine algae have to develop defense strategies that result in a tremendous diversity of compounds from different metabolic pathways. he simplest plants found in the plant kingdom belong to the group known as "algae". Algae differ from higher plants in the way that they do not possess true roots, stems or leaves. They are distributed worldwide in the sea, freshwater, and wastewater.

Algae have different shapes and colors of variety as a result of the presence of additional pigments with chlorophyll and classified by these colors, Algae reproduce either Vegetative, Asexually and Sexually. Seaweed or benthic marine algae are the group of plants that live either in marine or brackish water environment. Like the land plants algae contains photosynthetic pigments and with the help of sunlight and nutrient present in the seawater, they photosynthesize and produce food. Algae are found in the coastal region between high tide to low tide and in the

sub-tidal region up to a depth where 0.01 % photosynthetic light is available. Brown algae include about 250 races and 1500 type, the most important races of the brown algae (Sargassum, Dictyotales, focus and Ectocarpus). Red algae include about 400 races and 4000 type, The most important races of the red algae (Asparagopsis, Gelidium, Batrachospermum and Nitella). Sargassum is a brown to olive green colored macro algae of the brown algae family. And can reach impressive lengths of 3-4 or even 16 m, numerous species are distributed throughout the temperate and tropical oceans of the world, especially in the coast of the Mediterranean, and are therefore found in the coast of Libya, including the coast of Benghazi, where they generally inhabit shallow water and coral reefs. However, the genus may be best known for its planktonic (free-floating) species. Dictyotales is a large order in the brown algae (class Phaeophyceae). Members of this order generally prefer warmer waters than other brown algae. They light to medium brown and/or green to blue-green, occasionally with bright blue tints. The successful spread of this alga is due in part to its ability to asexually reproduce from fragments created by "biotic and a biotic disturbances". Red marine alga, Thallus (gametophyte) mid to dark brown-red, fluffy and fine, fading to grey-red, branching irregular to alternate, grows 3-15 cm high, Can be found In shallow subtidal habitats with heavy water motion, across a large part of the tropical reef regions of the Indo – Pacific, Mediterranean Sea. Can be extracted more than 100 organic compounds from this alga.

MATERIALS AND METHODS

Sample Collection

The search for samples of algae in several areas of the coast of the eastern region of Benghazi , after selecting the desired species of algae, and the determination of the general shape of the algae and distinguished each type, and in particular between the brown seaweed Dictyotales and Sargassum. the samples collected along the coast of the city of Benghazi as well as the cities of Sousse and Qmins, and the collection of samples was during the winter and summer.

The collection of sample were preformed in winter and summer for the algae types Sargassum and Asparagopsis which were found in summer time in good distribution amount while these types were completely absent in winter time. The other algae type Dictyotales were collected in both summer and winter with higher distribution amount in winter then in summer time.

Sample Preparation

After collecting algae, they were washed with plain water and then washed again with distilled water, these procedure for the purpose of cleaning samples from impurities. The drying of algae naturally at room temperature for the period of two weeks in good ventilation conditions. Samples were distributed over large filter papers, without being exposed directly to the sun, and after the complete drying, the samples were grinded by an electric mixer to a fine powder. The purpose of this process is to enable the solvent to access the inner parts of the tissue of algae.

The powdered samples were extracted with 95% methanol. For three times, some sample was kept for the purpose of other examinations using the powdered samples. The extraction procedure was performed by keeping the extraction container in a checking water bath for 24 hours at the room temperature. Filtration of extracted samples were done after the completion of checking period the mother liquor was kept in volumetric flasks with 100 ml size, at this point the extracts are ready for testing the secondary metabolites and carbohydrates and the effectiveness of biological extracts on some types of pathogenic bacteria, and test antioxidants.

RESULTS AND DISCUSSION

The research of chemicals, biological and antioxidant activity of marine algae from Libyan coast is new trend in the Natural Product researchers in the Libyan University as this is the first marine Natural Product project. The chemical screening showed that carbohydrate and Saponins are present in all samples with highly different concentration. The Asparagopsis sample showed high concentration of Saponins then Dictyotales while Sargassum showed the lowest concentration. The Asparagopsis and Sargassum samples were collected during summer and showed similar result in the other chemicals. This finding concludes that algae can have different chemical in a different season. Tannines and steroids were found only in Dictyotales sample which was collected in winter. This result as in agreement with the season effect on chemical of algae. The distribution of Flavonoids in Asparagopsis and Sargassum while Tannines in Dictyotales gave good Antioxidant activity for all samples. The Antimicrobial activity

was the best in Asparagopsis which may be a result of high Saponins in this sample.

		Dictyotales	**Sargassum**	**Asparagopsis**
Phytochemical screening	Flavonoids	-	+	+
	phenolic compounds	-	+	+
	Alkaloids	-	-	-
	Tannins	+	-	-
	Anthraquinones	-	-	-
	Coumarin	-	-	-
	Carbohydrates	+	+	+
	Steroidal	+	-	-
	Saponins	++	+	++++
Antioxidant activity Concentration (C) ppm	250 ppm	34.7%	32.7%	32.7%
	500 ppm	36.5%	38.5%	39.50%
	750 ppm	39.6%	40.44%	39.7%
	1000 ppm	41.4%	41.05%	41.74%
Biological activity	*Pseudomonas*	14.12 mm	14.01 mm	17.76 mm
	Escherichia coli	14.27 mm	14.34 mm	15.84 mm
	Klebsiella	15.07 mm	14.95 mm	16.68 mm
	Staphylococcus	13.49 mm	14.63 mm	20.83 mm

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