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BIOLOGICALLY ACTIVE SUBSTANCES OBTAINED FROM MICRO-AQUATIC WEEDS AND THEIR IMPORTANCE IN MEDICINE.

Ostonova Gulnoza Rashidovna

Teacher of Asia International University

Email: ostonovagulnozarashidovna@oxu.uz

Abstract: Microalgae are a rich source of biologically active substances, which are widely used in pharmaceuticals and medicine. This article analyzed the characteristics of biologically active compounds obtained from microalgae - proteins, vitamins, polysaccharides, omega fatty acids, pigments and antioxidants, as well as their importance in medicine. During the research, the immune-enhancing, antioxidant, anti-inflammatory and anti-cancer properties of microalgae were studied based on scientific sources. The results showed that microalgae have high prospects in modern biotechnology and pharmaceuticals.

Key words: microalgae, biologically active substances, spirulina, chlorella, antioxidant, pharmaceutical, medicine, omega-3.

INTRODUCTION

In recent years, the interest in sources of natural biologically active substances has increased significantly. Microalgae are especially important with their rich chemical composition and biological activity. Microalgae are photosynthetic microscopic organisms that are widely distributed in marine and freshwater bodies. They are ecologically safe, fast-reproducing organisms with high biological productivity.

Microalgae contain proteins, amino acids, vitamins, minerals, carotenoids, chlorophyll, polysaccharides and polyunsaturated fatty acids. These substances have a positive effect on the human body. Therefore, they are widely used in pharmaceuticals, food industry, cosmetology and biotechnology.

Especially microalgae such as Spirulina and Chlorella are widely studied around the world due to their high biological value. Based on them, various biological supplements and medicines are produced.

Microalgal biomasses are excellent sources of various bioactive compounds such as lipids, polysaccharides, carotenoids, vitamins, phenolics and phycobiliproteins. Large-scale production of these bioactive substances requires cultivation of microalgae in open or closed culture systems. Some of these bioactive compounds (eg, polysaccharides, phycobiliproteins, and lipids) are produced during the active growth phase. They appear to have antibacterial, antifungal, antiviral, antioxidant, anticancer, neuroprotective, and chemopreventive effects. These properties make microalgae potentially useful in the treatment and management of several neurological and cellular dysfunction-related diseases, including Alzheimer's disease (AD), AIDS, and COVID-19, as discussed in this review. Although several health benefits have been highlighted, there seems to be agreement that the field of microalgae is still emerging in the literature and that more research is needed to identify the mechanisms of action that support the efficacy of microalgae compounds. In this review, two biosynthetic pathways are modeled to help elucidate the mode of action of bioactive compounds derived from microalgae and their

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products. These are the biosynthetic pathways of carotenoid and phycobilin proteins. Public awareness of the importance of microalgae, supported by empirical scientific evidence, will greatly contribute to the rapid implementation of benefits derived from research studies. It has been suggested that these microalgae can be applied to certain human disease states.

Microalgae is a health food due to its balanced nutritional and bioactive components. The diversity of microalgae species also produces different nutritional and bioactive molecules, making microalgae the richest natural resource for nutritional and bioactive components. In addition, the absence of a cellulose cell wall allows the biomass to be easily digested after consumption. Interestingly, studies have shown that nutritional supplements such as vitamin C, vitamin E and omega-3 fatty acids found in healthy foods and found in microalgae can reduce the risk of certain health problems. This has fueled interest in the search for nutraceuticals to replace synthetic drugs with many side effects for the treatment or prevention of many diseases.

MATERIALS AND METHODS

During the research, local and foreign scientific literature on microalgae and biologically active substances obtained from them was analyzed. The following microorganisms were selected as the research object: Spirulina, Chlorella, Dunaliella salina

Haematococcus pluvialis

Research methods were as follows:

1. Analysis of scientific literature;

2. Comparison of biochemical composition;

3. To study the mechanisms of action of biologically active substances;

4. Evaluation of directions of use in medicine.

Statistical data on the composition and pharmacological properties of biologically active substances were also analyzed.

RESULTS

Chemical composition of microalgae

According to the results of the research, it was found that microalgae are very rich in biologically active substances. In particular, it was observed that they contain: 50-70% protein, vitamins, antioxidant pigments, omega-3 fatty acids, and polysaccharides.

Whitening pigments and antioxidants. It was found that microalgae contain strong antioxidants. Including:

Beta-carotene: Dunaliella salina is one of the main natural sources of beta-carotene. Beta-carotene is converted into vitamin A in the body and strengthens the immune system.

Astaxanthin: Haematococcus pluvialis contains high amounts of astaxanthin. This substance has the property of neutralizing free radicals.

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Phycocyanin: Phycocyanin in Spirulina has anti-inflammatory and antioxidant effects.

Proteins and amino acids. Proteins contained in microalgae have a high biological value. They contain all the amino acids necessary for the human body.

The amount of protein in Spirulina is about 60-70%. This makes it an important source of protein deficiency.

Fatty acids. The presence of omega-3 and omega-6 fatty acids in microalgae was found.

Main fatty acids: DHA, EPA, linoleic acid.

These substances: improve heart function; regulates blood pressure;

supports brain activity.

Biological activity of polysaccharides. Polysaccharides have immunomodulatory properties and activate the body's defense system.

Antiviral, antibacterial, antitumor properties of some polysaccharides have been identified in research.

Vitamins and minerals. Microalgae contain: group B vitamins, vitamin E, iron, magnesium, iodine.

These substances play an important role in improving metabolism in the body.

DISCUSSION

The results of the research showed that microalgae are a promising biological resource for medicine. Especially the antioxidants and omega fatty acids obtained from them are important for human health.

Preparations based on spirulina are used as an effective tool to increase immunity and cleanse the body of toxins. Also, Chlorella is useful in removing heavy metal ions from the body.

Antioxidants such as astaxanthin and beta-carotene from microalgae protect cells from oxidative stress. This is important in slowing down the aging process and reducing the risk of cardiovascular diseases.

Anti-cancer effects of microalgae have also been noted in some studies. It was found that their biologically active components can slow down the growth of tumor cells.

Microalgae-based pharmaceuticals: biologically active additives;

capsules, tablets, cosmetics are produced.

In the future, microalgae biotechnology may further develop and serve to create new drugs.

CONCLUSION

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Microalgae are an important natural source of biologically active substances. The proteins, vitamins, antioxidants, polysaccharides and omega fatty acids contained in them have a positive effect on the human body.

The results of the study showed the following:

1. Microalgae have high biological value;

2. They have antioxidant and immunomodulatory properties;

3. Has a broad perspective in medicine and pharmaceuticals;

4. It can be used effectively in cardiovascular, viral and inflammatory diseases.

Therefore, in-depth study of microalgae and their use in the creation of new pharmaceutical preparations is one of the current scientific directions.

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