70 - MICROALGAE IN A NUTRITIONAL PERSPECTIVE FOR CONTEXTUALIZED APPROACHES

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Abstract

The purpose of this article is to present a reserach based on the scientific content of microalgae in a nutritional perspective, integrating multidisciplinary knowledge for academia and for community at large. Special mention to the possibility of incorporating them in activities and strategies for reading and interpretation of scientific texts based on contextualized approaches. The methodology consisted in analytical, interpretive and qualitative description of the content of scientific communications. The reserach allowed to present content and image of microalgae in a nutritional perspective, potential for leading discussions, with possibility to produce effective contributions by integrating pedagogical practices planned by professors and researchers from different fields and levels of education in a contextualized approaches.

Palavras chave: Microalgae, nutritional value, contextualization.

Introduction

The national education curriculum guidelines provide the constancy of contextualization in the whole curriculum of basic education in order to promote the dialogue between different fields of knowledge and the transversality of knowledge from different disciplines, as well as the study and the development of projects relating to specific topics of the students reality (BRAZIL, 2013). This recommendation extends to higher education in different areas, established by the National Council of Education curriculum guidelines for undergraduate courses.

To establish contextualized relationships it is necessary the teacher's domain in different pedagogical practices, as well as on specific conceptual dimension and other scopes, which allow students to build structures that assign meaning to knowledge, with emphasis not only on the cognitive domain, but on its social and technological relations.

In this regard, it follows with the justification of the importance of reading and discussion texts as activities distributed throughout didactic sequences designed by the professor. And, when it comes to nutritional aspects, many discussions can be performed, starting by the individual, that can make decisions about their nutrition, which will have implications on their quality of life, and as a result in different aspects and dimensions.

A balanced diet includes an appropriate proportion of the quantity and quality of protein, essential amino acids, minerals, polyunsaturated fatty acids and vitamins, as established in the technical regulation on the dietary recommended intake (DRI) of protein, vitamins and minerals (BRAZIL, 2004). These nutritional properties can be found in the composition of microalgae, already used for centuries in human consumption of native peoples and ancient civilizations.

This study carried out a bibliographical research, whose objective was to build foundations of scientific content about microalgae in a nutritional perspective of multidisciplinary scope of knowledge, not only to academia but for the community in general.

2. Theoretical Review

2.1 Microalgae and its application potential

Microalgae represent a very heterogeneous group of predominantly aquatic organisms, but can live in terrestrial environments and that grow quickly in different environmental conditions, besides being equipped with pigments, responsible for the varied coloring and metabolism phototroph (RAVEN et al., 2007).

Species of the genus Spirulina and Chlorella used as dietary supplements and species of the genus Dunaliella as source of β-carotene, have been marketed from 1960, and other species have been applied in feed supplementation (BENEMAN, 1990). However, microalgae have been used as food for centuries, by native peoples, including some species of the genus Nostoc, consumed mainly in Asia and Spirulina consumed in Africa and in Mexico (BERTOLDI et al., 2008).

The cultivation of microalgae in large scale offers advantages when compared to other foods, due to its specific characteristics, such as short cycle of life, rapid growth and cultivation in different environments like freshwater, saltwater and brackish water, in addition to the reduction of demand for large areas of production (CHISTI, 2007). In addition to these factors, microalgae present efficiency as contributors to environmental remediation, can be grown in wastewater and used for sequestration of carbon dioxide (CO2) from the atmosphere, minimizing problems associated with air pollution (WANG et al., 2008).

2.2 Microalgae in human consumption and its nutritional value

Many microalgae species are used for food production by producing various substances essential to human nutrition as vitamins, minerals, pigments, essential fatty acids and lipids (MORAIS; COSTA, 2008).

A comparison of biochemical composition of nutritional sources between conventional foods and some species of microalgae with values expressed as percentage of the dry weight, is presented in Table 1. These values indicate that the species of microalgae Chlorella vulgaris, Spirulina maxima, Dunaliella salina and Hematococcus pluvialis, prsesent na average of protein composition more than some conventional foods such as milk, soy and beef. However, as to the content of lipids is below, as well as the carbs is lower than the milk and soy, except the meat that is only 1%.

This nutritional feature of food leads to reflection on the meaning of the feasibility of its use, as different factors in a country like Brazil, as well as in others, where the biological manifestations of hunger and malnutrition or obesity by poor nutrition, are implications of a social development model that manifests itself in food and nutritional context, with reflexes in the way of eating, living, falling sick and dying of the populations (PINHEIRO; CARVALHO, 2010).

In addition, microalgae have been widely cultivated for their capacity to synthesize functional or nutraceutical compounds, such as polyunsaturated fatty acids (arachidonic acid, eicosapentaenoic acid and docosahexaenoic acid) and carotenoid pigments (astaxanthin, beta-carotene and lutein). Currently, are marketed as health food or food supplement and can be found in dust formulations, tablets, capsules or extracts. Microalgae are also incorporated into pasta, snacks, candy and

drinks, both as a nutritional supplement and natural colours (BECKER, 2004; COLLA et al., 2007, 2008).

Table 1 – Comparison of biochemical composition of conventional nutritional sources and some species of microalgae.

Conventional food/Species of microalgae	Values in dry weight percentage of Biochemical Composition (%)		
	Protein	Lipids	Carbohydrates
Milk	26	28	38
Soybeans	37	20	30
Cattle meat	43	34	1
Chlorella vulgaris	51 – 58	14 – 22	12 – 17
Spirulina maxima	60 – 71	4 – 9	8 – 14
Dunaliella salina	39 – 61	14 – 20	14 – 18
Hematococcus pluvialis	48	15	27

Source: Adapted from García (2013).

Functional foods have the specific goal of improving health and reducing the risk of contracting diseases. Therefore, it is common the enrichment of biologically active components, such as minerals, vitamins, fatty acids, fiber and antioxidants, which can improve gastrointestinal functions, supply of antioxidants, and the metabolism of micronutrients and macronutrients.

Many nutraceutical foods of new generation have been proposed, with the objective of assisting in the reduction of heart disease (such as omega 3 enriched eggs and margarine with phytosterols), reduction of disease in the development of the central nervous system (folic acid), and facilitate digestion (milk and yogurt fermented with prebiotic micro-organisms).

Microalgae are a rich source in many bioactive molecules and are of interest in food and human health. Due to its metabolism phototroph, are exposed to oxygen stress and free radicals, and as a result develop numerous antioxidant systems against the free radicals and the reactivity of oxygen, that promote an accumulation of highly effective antioxidant complex. Some of these molecules are beta-carotene, astaxanthin, zeaxanthin (xanthophylls) and vitamin E (GOMEZ-ARIZA et al., 2010). Spirulina maxima is quoted by its protective effect of oxidation in vitro and in vivo (MIRANDA, et. al. 1998).

It has been increasing the possibilities of using microalgae as a source of functional substances and as a basis for dietary supplements. The most commonly used species are Chlorella spp., Duanliella spp. e Scenedesmus spp., and the cianobacteria Spirulina spp., as foods rich in nutrients and substances of interest, since they accumulate important quantities of lipids, proteins, pigments (chlorophyll, carotenoids), vitamins and minerals and pigments, joining the possibility of its mass production and manipulation with biotechnological techniques (RA, 1991).

There are evidences that ingesting small amounts of microalgal biomass can produce positive effects on the physiology of animals, showing non-specific immune response and helping the immune system (BELAY, 1993, 2002). Spirulina is used as a dietary supplement for the modulation of immune functions, as well as for improvement of a variety of foods. Mao, Van de Water e Gershwin (2005) demonstrated that food with Spirulina showed protective effects for allergic rhinitis, reduction of cholesterol and hypertension (TORRES-DURAN; FERREIRA-HERMOSILLO; JUAREZ-OROPEZA, 2007). And, was highlighted by Ambrosi et al. (2008), as a food supplement allowed by FDA (Food and Drug Admistration), without toxicity and therefore considered a micro-organism GRAS (Generally accepted as safe).

2.3 Representation of microalgae for contextualized approaches

The reflections undertaken throughout this research allowed to develop an image, shown in Figure 1, as driving to instigate possible relations of microalgae studying in a nutritional perspective, with the objective of contributing to discussions in pedagogical practices with contextualized approaches.

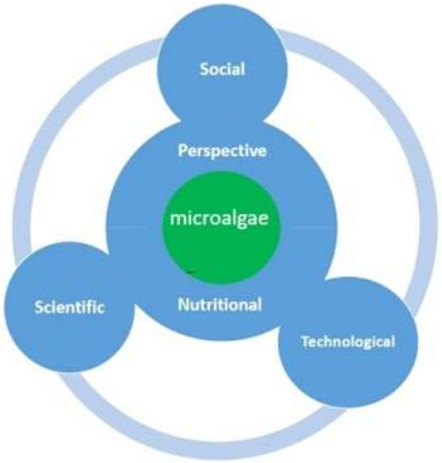


Figure 1 – Possible relations of microalgae in a nutritional perspective.

Source: own authorship.

In conducting the analysis and interpretation of Figure 1, there is a possibility of the teacher as mediator of the teaching and learning process, instigating students to seek initially in this article, conceptual contribution about microalgae, following in nutritional perspective, in reflections of the possible technological, scientific and social relations. And, from this document, extrapolate to investigation of other scenarios, especially those related to their context.

Methodology

The bibliographic search methodology allowed the revision of scientific basis in search of published references for

compilation and interpretation of conceptual scientific contribution on the topic of microalgae. The study allowed stratification of data through the analysis of the content in the selected references.

The data analysis, after stratification, consisted in the analytical and interpretative qualitative description of content, presented by authors in the surveyed publications. So, this technique allowed to gather informations, facts and reflections, issued by authors in their scientific reports in the media of formal disclosure.

Final considerations

The research made it possible to select and compile data about the concermentes issues about microalgae, as its nutritional characteristic, potential applications in food production and for other purposes. But, especially in the potential to instigate the analysis, discussion and reflection of relationships and implications of the study of microalgae in a nutritional perspective, that can be carried over to the scientific, social and technological.

The reserach for the development of the present article, allowed to present content and representation about the use of microalgae in a nutritional perspective, potential to lead discussions, aiming to produce effective contributions to compose sequences and pedagogical practices, planned by professors and researchers from different fields and levels of education in contextualized approaches.

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Abstract

The purpose of this article is to present a reserach based on the scientific content of microalgae in a nutritional perspective, integrating multidisciplinary knowledge for academia and for community at large. Special mention to the possibility of incorporating them in activities and strategies for reading and interpretation of scientific texts based on contextualized approaches. The methodology consisted in analytical, interpretive and qualitative description of the content of scientific communications. The reserach allowed to present content and image of microalgae in a nutritional perspective, potential for leading discussions, with possibility to produce effective contributions by integrating pedagogical practices planned by professors and researchers from different fields and levels of education in a contextualized approaches.

Palavras chave: Microalgae, nutritional value, contextualization.

MICROALGUES DANS UNE PERSPECTIVE NUTRITIONNEL POUR APPROCHES CONTEXTUALISEES

Résumé

L'objectif de cet article est de présenter une recherche basée sur le contenu scientifique des microalgues dans une

perspective nutritionnel, qui intègre les connaissances multidisciplinaires, non seulement pour les universitaires, mais pour l'ensemble de la communauté. Le faits saillant est mis pour la possibilité de les intégrer dans les activités et les stratégies de lecture et d'interprétation de textes scientifiques basées sur des approches contextualisées. La méthodologie a consisté en la description analytique, interprétatif et l'analyse qualitative du contenu de la communication scientifique. Et, cette methode a possibilité de présenter du contenu et de l'image à propos de microalgues dans un pespectiva nutritionnelle, potentiel pour centraliser et diriger les discussions, avec la possibilité de produire des contributions efficaces, en intégrant des pratiques pédagogiques, prévues par les enseignants et les chercheurs de différents domaines et niveaux d'éducation dans les approches contextualisées.

Mots-clés : Microalgues, valeur nutritive, contextualisation.

MICROALGAS EN UNA PERSPECTIVA NUTRICIONAL PARA ABORDAJES CONTEXTUALIZADOS

Resumen

El objetivo de este trabajo es presentar un estudio basado en el contenido científico de microalgas en una perspectiva nutricional, que integra conocimiento multidisciplinario, no solamente para el entorno académico, sino para la comunidad como un todo. Se destaca la posibilidad de su incorporación en actividades y estrategias de lectura e interpretación de textos científicos basados en abordajes/enfoques contextualizados. La metodología consistió en la descripción analítica, interpretativa y cualitativa del contenido de comunicaciones científicas. Esto ha permitido presentar el contenido y la imagen sobre microalgas en un punto de vista nutricional, potenciales para nuclear y orientar discusiones, con posibilidades de contribuir efectivamente mediante la integración de prácticas pedagógicas, planeadas por profesores e investigadores de diferentes áreas y niveles de enseñanza en abordajes contextualizados.

Palabras clave: Microalgas, valor nutricional, contextualización.

MICROALGAS NUMA PERSPECTIVA NUTRICIONAL PARA ABORDAGENS CONTEXTUALIZADAS

Resumo

O objetivo deste artigo é apresentar uma pesquisa fundamentada no conteúdo científico de microalgas numa perspectiva nutricional, que integra conhecimento multidisciplinar, não somente para o meio acadêmico mas para a comunidade em geral. Destaque especial se faz para a possibilidade sua incorporação em atividades e estratégias de leitura e interpretação de textos científicos fundamentadas em abordagens contextualizadas. A metodologia consistiu na descrição analítica, interpretativa e qualitativa do conteúdo de comunicações científicas. E, permitiu apresentar conteúdo e imagem sobre microalgas numa pespectiva nutricional, potênciais para nuclear e conduzir a discussões, com possibilidade de produzir contribuições efetivas, ao integrar práticas pedagógicas, planejadas por professores e pesquisadores de diferentes áreas e níveis de ensino em abordagens contextualizadas.

Palavras chave: Microalgas, valor nutricional, contextualização.