



The Medicinal and Nutritional Importance of Plant Extracts and the Consumption of Healthy Foods - A Review

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Abstract

In recent years, there has been an increasing demand for natural products and foods with a balanced nutritional profile and healthy ingredients. Therefore, researchers have focused on redesigning and elaborating traditionally known products, replacing some preservative and flavor components with ingredients and additives with positive physiological effects, including natural plant extracts rich in bioactive compounds. Currently, diseases treated with industrial drugs are very effective, however, the adverse effects of long-term treatment and the emergence of resistance of the micro-organisms that cause these diseases, led to the search for alternative treatments. The natural products used in traditional medicine provide a source of molecules for the identification of new drugs, and Brazil, due to its botanical and territorial diversity, has abundant biodiversity that includes several species of plants and animals, providing a rich source of new products and compounds. Although the literature describes numerous promising compounds and extracts to combat various microorganisms and diseases, the results of these researches have not been adopted by the pharmaceutical and food industries for the development of new products. Therefore, this review focused on the importance of plant extracts, their bioactive compounds and essential oils commonly used by the population to treat various diseases and their use as natural additives instead of synthetic ones in foods.

Keywords: Bioactive Compounds; Food Additives; Healthy Food; Industrialized Foods; Medicinal Plants; Plant Extracts

Introduction

The high consumption of industrialized foods associated with sedentary lifestyle and overweight caused an increase in the number of chronic diseases related to inadequate diet [1]. With the focus on reducing these incidences the population has sought a healthier diet associated with the practicality and the presence of functional characteristics, being an important point to be approached by studies and mainly of greater interest for the food industries [2,3].

The World Health Organization (WHO) in 2004 launched the Global Strategy on Healthy Eating, which establishes certain guidelines with the main objective of reducing risk factors related to such diseases based on a healthy diet, physical activity and health. Among the recommendations is the increase in the

intake of vegetables, fruits and vegetables, as well as vitamins and minerals, since these foods contain bioactive compounds such as carotenoids, phytoestrogens, glycosinolates, sulfur compounds, fructooligosaccharides and flavonoids [4].

According to current Brazilian legislation, food (or ingredient) with functional or health property is all food that, in addition to its basic nutritional functions, is also capable of producing beneficial health effects, has safe consumption without the need for medical supervision [5].

The compounds of antioxidant action used by the food industry can be synthetic or natural, and those of greater use are those of a synthetic nature. However, the salubrity of some synthetic antioxidants has been questioned, since there are studies demonstrating that they may favor mutagenic and carcinogenic effects [6,7].

Numerous phytochemicals present in edible flowers are related to health-promoting benefits such as antioxidants, anti-inflammatory, anticancer, anti-obesity, hypoglycemic, and substances with protective properties of the neurological, hepatic and gastro system [8-10].

Natural antioxidants are an alternative to prevent the oxidative deterioration of food, thus minimizing the damage that these oxidative compounds would cause in humans [11].

The plant extracts represented by the medicinal, spice and aromatic plants, participate in the daily health and food actions, through its numerous active principles and biocomplexes extracted from different methods and processes, involving different solvents, allowing the study of the extracts in the condition of raw or purified drug, starting from in nature or green plants or from dehydrated plants [12-14].

The plants and their flowers, besides beautifying places, have fragrances and essences that are used in the pharmaceutical and cosmetic industry, due to their medicinal and aromatic properties, and some species are used in cooking [14,15].

The word "extract" derives from the Latin *extractus*, which means "thing extracted from another" [14,16-18]. The general purpose of the extraction is to release the compounds of the plant matrix structure in order to obtain extracts with high concentrations of these compounds present in small amounts in the natural solid matrix of the plants and are used to improve the stability of food products against oxidation [14,18,19].

Methods

This review of the article was based on studies on plant extracts, characterization of its bioactive compounds and its uses in food processing to improve the quality of life of consumers.

Discussion

Rop., *et al.* [20] wrote that global demand for more attractive and tasty foods could be enhanced by edible plants and conducted a study focusing on the nutritional value of 12 species and concluded that vegetable colors as well as fruit colors indicate the presence of phytochemicals as examples polyphenols or phenolic compounds, flavonoids, carotenoids and anthocyanins.

Xiong., *et al.* [21] found in a study with edible plant species in China that these plants have a large amount of polyphenols, which are substances known to have high antioxidant capacity and biological activity.

To the extent that research defines the health benefits of physiologically active components in vegetables, they may still have the potential to be used as an additive in foods to help prevent chronic diseases and prevent food oxidation [22].

One of the major concerns related to the consumption of plants and their extracts is their possible toxicity. Plants and their extracts can add a distinctive flavor and provide a unique touch of color to foods. However, not all plants are edible, it is important to correctly identify each species and to know which parts of these plants should be consumed [23].

Considering the high consumption of plants as food, additional research is needed to evaluate the nutritional and non-nutritive value of these plants as well as other potentially beneficial compounds that may contain [24].

Changes in consumers eating and behavioral habits have fueled the need to develop clean technologies capable of ensuring the productive viability of foods made with functional ingredients. The search for raw materials that are beneficial to health and do not cause undesirable sensorial changes to the final product has gained emphasis and intensified interest in bioactive compounds of plant origin. These compounds have great commercial appeal due to their biological action and their use in the development of functional foods and also to become an alternative as food additives (dyes, flavorings, antioxidants and preservatives) [18,25].

The difficulties in motivating people to change the pattern of food consumption have been studied in depth, including the complex range of environmental, nutritional, psychological, social and cultural factors involved in eating behavior, factors that are intrinsic to human eating behavior [26].

Toral., *et al.* [27] say that one of the biggest barriers to changing the diet is the belief that there is no need to change eating habits, which is often the result of a misinterpretation of one's own eating habits.

Ramos e Stein [28] define habit as act, use, custom or pattern of reaction acquired by frequent repetition of an activity, that is, that is learned after having been performed several times. Lemos e Dallacosta [29] defined habit as the lasting disposition acquired by frequent repetition of an act, use, or custom.

Therefore, eating habits are what we often eat. Thus, it can be affirmed that the food or the type of food that people consume in the daily life characterizes the alimentary habit. Habit is not a

preference, since, in general, people do not routinely consume what they prefer or like most [26].

So what's the difference between habit and eating behavior? According Basdevant, *et al.* [30] the food behavior represents a combination of actions that go beyond the quantitative and qualitative aspects of the food ingested, the demand and acquisition of foods that precede the habit of eating, the rhythmic and environmental conditions that accompany the meals, and the phenomena pre- and post-ingestion.

Food behavior is complex in its functions, since in man it seems to be subject to three types of demand - energetic, hedonistic and symbolic, factors that do not act in isolation, but always in combination or interaction [26].

According Toral, *et al.* [27] food behavior can be defined as attitudes related to eating practices and sociocultural attributes, and includes both individual and collective aspects related to the food itself or even to the act of feeding.

Therefore, it is not simply the repetition of the consumption of food that produces the food behavior; a series of interrelated factors, internal and external to the organism, that influences the acquisition of this behavior must be considered [28,31].

The introduction of new foods and the formation of food behavior should be associated with sensory characteristics of food to reduce hunger or rapid satiation, as well as the pleasant physical and social environment that involves the context of food intake, the important conditions for a preference for this food to form [26].

If the subject is exposed to this conjunction of variables with great frequency, the probability of maintaining such preference is quite significant. Then, in order to know other flavors and odors, the same principles of exposition to the alimentary stimuli are contiguous, that is to say, evaluation of the consequences of the ingestion of the food and repetition of the experiment [26].

This is why the introduction of novel foods is one of the most important practices for learning new tastes and consistencies, for the formation of adequate and healthy eating habits, as well as for food preferences and aversions [32].

The introduction of plants and their extracts in the manufacture of food products can be explained by the globalization process and can add diversity and innovation to the countries' trade, besides the nutritional benefits and good health for the consumers [33-35].

The issues mentioned above motivate researchers to seek alternative strategies for disease control that are potentially environmentally friendly, with fewer negative consequences for humans and the consumer. Among these alternatives, the main ones are the treatment protocols based on plants, since the healing effect of the plants has been explored for thousands of years [36,37].

Brazil is a country with rich biodiversity, including a large number of tropical plant species that are widely used in traditional medicine. Medicinal plants are currently used for treating several diseases and symptoms, such as headache, fever and stomach problems, as well as neglected diseases, such as leishmaniasis and malaria [38-40].

The immense biodiversity of plants in the Brazilian Amazonian region has contributed to the discovery of numerous biologically active molecules and has stimulated great research interest worldwide [39,41]. Previous studies have demonstrated the therapeutic potential of such plants, their numerous biological actions and their therapeutic applicability against diseases [42,43].

The biological activities of these natural products are due to biologically active compounds, such as triterpenoids, quinolones, flavonoids, alkaloids, quinones, glycosides, chalcones, sesquiterpenes, lactones and other substances [44,45]. The use of medicinal plants to treat disease is very common in the Amazon region. These natural products are used as tinctures, syrups, teas, infusions, fluid extracts or powders [46].

Extracts, which are rich in active metabolites obtained from various parts of the plant, are widely used in scientific research [43]. For use in *in vitro* and *in vivo* studies, the various components of the plant (stems, roots, leaves and seeds) are submitted to maceration, separation, purification and fractionation processes, and incubated in the presence of a volatile solvent (hexane, dichloromethane, chloroform, acetone, methanol or ethanol) that aids in isolating of the bioactive compounds [47].

It is interesting to note that extracts contain high concentrations of bioactive compounds that are similar to those of the infusions and teas, making them attractive for use in scientific research. A growing number of studies are being conducted using plant extracts with selective *in vitro* and *in vivo* activity against bacteria, fungi, protozoans and viruses [48].

Conclusion

Through the plant extracts we can consider that the plants are a good natural source for the identification and quantification of new bioactive compounds. Vegetable extracts can be added in processed foods, contributing to the biological activity through its bioactive compounds and thus allowing consumption by people who need special diets. Vegetable extracts prove to be a viable alternative as a natural antioxidant in place of synthetic antioxidants, with potential for industrial application in food products and when applied in food can reduce or inhibit various health problems and even some diseases.

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Conflict of Interest

The authors declare that they have no conflict of interests.

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