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Evaluation of the Participation of Phenolic Compounds Naturally Present in Food in Stimulating the Health of the Organism

Portari-Mancini DA[1] and Mancini-Filho J[2]*

[1]Former Director of the Virology Laboratory of the Butantan, Institute São Paulo, Brazil

[2]Food Science and Experimental Nutrition Department, Faculty Pharmaceutical Science, University of São Paulo, Brazil

Editorial

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***Corresponding author:** Jorge Mancini-Filho, Senior Professor, Food Science and Experimental Nutrition Department Faculty Pharmaceutical Science, University of São Paulo, Brazil, Tel: 55 11 37267843; Email: jmancini@usp.br

Abbreviations: ROS: Reactive Species of Oxygen; CAT: Catalase; GTX: Glutathione Peroxidases; PGE2: Prostaglandin E2; LTB4: Leukotriene B4; LPS: Lipopolysaccharides; RNS: Reactive species of Nitrogen; RSS: Reactive species of Sulfur.

Editorial

This editorial is a sequence to the publication made in BEBA volume 4, issue 1, December 2020 (DOI: 10.23880/drink-16000145, ISSN: 2578-4803) and aims to continue relating the importance of phenolic compounds naturally present in food and their participation in antioxidant and anti-inflammatory processes in the body.

Phenolic compounds present in food cover a high range of structures that have different biological properties. Several studies have been carried out to identify its characteristics and properties in the animal organism [1]. One of the main focuses is related to the antioxidant properties of phenolic compounds related to plant foods, especially spices, herbs and other foods [2].

Some phenolic compounds naturally present in spices can be highlighted by antioxidant activity such as: clove presents eugenol, pineno, galic acid, vanillin and flavonoids among others. Cinnamon also has eugenol, limonen, pineno catechins and other phenolic compounds in its composition. The anise has pineno, rutin, apigenin. Oregano has apigenin, quercitina, rosmarinic, caffeic, p-cumaric acids, and others. Rosemary presents the carnosic, rosmarinic, caffeic and hydroxycinamic and also has flavonoids such as apigenin, naringin, luteonin, quercitin and others [3].

The phenolic compounds listed here have in their structure one or more hydroxyls that have the property of donating the hydrogen atom to the free radical structures blocking the triggering of the oxidative process and also acting on reactive species of oxygen (ROS), nitrogen (RNS) and sulfur (RSS). Therefore, the antioxidant action, common to phenolic compounds, is due to the potential of oxide reduction of the molecule and their ability to compete for active sites and receptors in the various cellular structures or, also, to the modulation of the expression of genes that encode proteins involved in intracellular defense mechanisms against oxidative and degenerative processes of cellular structures [4].

In addition to the ability to donate protons, phenolic compounds can also block the action of pro-oxidant metals, act in the potentiation of antioxidant enzymes such as superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidases (GTX), in addition to other metabolic activities. These activities of phenolics, in addition to other metabolic activities. These activities of phenolics lead to increased cellular protection of the body, favoring the fight of the degenerative process, which can be caused by viruses, bacteria, fungi, stress among other situations of metabolism [5].

Regarding plant extracts, which are the oldest and most widespread forms as medication among the general public, the main ones today are called nutraceuticals or phytochemicals and including compounds such as phenols and polyphenols, vitamins, omega-3 fatty acids, dietary fibers, conjugated linoleic acid [5,6].

In the partnership of the FCF Lipid laboratory with the Virology Laboratory of the Butantan Institute, different spices such as mustard, fennel, rosemary, cinnamon and oregano were also studied. The methodologies used were based on the literature, highlighting the association of beta-carotene with linoleic acid, DPPH, ORAC and FRAP, which are used internationally and provide an optimal support for evaluating antioxidant activity in vitro. Similarly, in vitro cultures of cells such as CaCo2, HEP G2, MDCK, VERO and RAW were used, and great results were also obtained [7]. Studies for in vivo evaluation were carried out with laboratory animals such as rats and mice. It should be noted that in the various works done with algae and partnership of Novoa of the University of Havana (Cuba) showed excelent results [8,9]. The initial studies were directed to evaluate the antioxidant activity in dried fruits such as brazil nuts, and cashew nuts and oil nut, watr melon, pequi, cashew. Following studies were carried out with citrus fruits, cocoa from the Peruvian Amazon, coffee, passion fruit and grape [10,11].

Another highlight in relation to food phenolics refers to the inflammatory process, however oxidation inhibition is the primary process of inflammation. The participation of spice extracts in inflammation models can be observed reduction in concentrations of prostaglandin E2 (PGE2), leukotriene B4 (LTB4), IL-6 and TNF-α in a dose-dependent manner, in addition to decreasing the recruitment of inflammatory cells to the site of inflammation, it was also observed that the anti-inflammatory activity of spices is related to the increase in the activities of SOD enzymes, cat and in reducing lipid peroxidation. In culture of neutrophils stimulated with lipopolysaccharides (LPS) and treated with spice extracts, the production of nitric oxide was reduced without toxicity to in vitro cells [4,5]. The phenolic compounds of spices can act both as antioxidants and anti-inflammatory drugs and also with the potential to interfere in the production of eicosanoids and cytokines.

Rats and mice were used in laboratory animal studies. These received during different periods extracts of spices and fruits in evaluation of antioxidant action. Results were presented in reviews on antioxidants naturally present in vegetables that highlight, in humans, their participation in different pathologies [12,13].

The evaluation of the properties of phenolic compounds, carried out by us, has been made in laboratory animals, already described, and also in vitro, in cell culture which present important responses both in the influence of them on cell development and in the inhibition of the proliferation of viruses and bacteria and the effect of extracts with antioxidant activity in cells of the CaCo-2 lineage and in MDCK cells [14]. The synergistic effect of the association of synthetic and natural antioxidants against the proliferation of influenza virus was also evaluated, the antioxidant effect of cinnamon extracts on the inhibition of influenza virus in MDCK and VERO cells, the effect of rosemary extracts and extracts on the inactivation of Herpes 1 (HSV-1) DNA in VERO cells was verified [15,16].

Conclusion

It should be highlighted the importance in the use of medicines for specific pathological situations, however we should also highlight the importance of compounds naturally present in foods that can help in increasing the body's resistance in combating infections. The participation of phenolic compounds naturally present in fruits and vegetables are phytochemicals that have been shown to have effects in combating in situations that can cause damage to the body such as reactive species ROS, RNS and RSS and in the triggering of the entire oxidative process.

With the scientific knowledge demonstrating the presence and properties of the effect of phenolic compounds in the body is that the basis for stimulating the consumption of fruits and vegetables is highlighted as spices as teas or their extracts.

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