Flavonoids as a New Pharmacological Tool

Velázquez Domínguez José Antonio*

Escuela Nacional de Medicina y Homeopatía IPN, Av. Guillermo Massieu Helguera, No 239, Col La Escalera, C.P. 07320. CDMX, México.

*Corresponding Author(s): José Velázquez-Domínguez
National School of Medicine and Homeopathy IPN, Av. Guillermo Massieu Helguera, No. 239, La Escalera, Mexico City 07320, Mexico.
Email: jauam14@yahoo.com.mx

Received: Aug 19, 2022
Accepted: Sep 16, 2022
Published Online: Sep 19, 2022
Journal: Annals of Infectious Diseases & Preventive Medicine
Publisher: MedDocs Publishers LLC
Online edition: http://meddocsonline.org/
Copyright: © Velázquez-Domínguez J (2022). This Article is distributed under the terms of Creative Commons Attribution 4.0 International License

Mini review

Flavonoids are a large family of plant substances that were described by Szent-Gyorgi A. (Nobel Prize in Biochemistry); who in 1930 isolated citrine from the lemonpeel, an active principle that regulates the permeability of capillaries, was also called vitamin P (for permeability) and also vitamin C2 (because some flavonoids had properties similar to vitamin C). Flavonoids comprise several classes of natural substances, which give them a variety of colors: Yellow, orange, red, violet, and blue [1]. Their molecular structures meet any of the three important characteristics for their function, having the presence of: A) In ring B of the catechol or O-dihydroxy structure; B) A double bond in position 2,3; C) Hydroxyl groups in position 3 and 5. For its part, quercetin presents the three characteristics; however, catechin only presents the second, while diosmetin presents the first [2]. Its molecular structure comprises a variable number of phenolichydroxyl groups in addition to two benzene (or aromatic) rings, linked through a chain of three carbonatoms, in addition to phenolic hydroxyl groups and excellent chelation properties for iron and other transition metals, which gives them great antioxidant capacity, in addition to other properties that include the stimulation of communications through gap junctions, the impact of cell growth regulation, the induction of detoxification enzymes such as monoxygenases dependent oncytochrome P450 and its anti parasitic effect. They are classified into several groups: chalcones, flavones, flavonols, flavanones, flavonones, flavanons, anthocyanidias, cateruins, epicatechins, aurones, isoflavonoids, pterocarpans, rotenoids, etc. They are extremely abundant in the families: Lamiales and Asterales, Gentianales, Geraniales, Fabales and Astereaceae of this last family, so far 1200 different isofoms have been described in terms of function and activity. They are organized as linear acycliccompounds, play a protective role against predators, and form part of foliar coatings that limit water loss [2]. They are widely distributed in fruits, vegetables, seeds, and flowers, as well as in beer, wine, green tea, black tea, soybeans, blueberries, gingkobiloba, and milkthistle. They are mostly consumed in the human dieton a regular basis and can also be used as nutritional supplements, along with certain vitamins and minerals [3].

These compounds play an important role in plant biology; they respond to light and control the levels of auxins that regulate plant growth and differentiation. Other functions include an antifungal and bactericidal role, they confer coloration, which can contribute to pollination phenomena [2]. In addition to their physiological role in plants, they have various properties, they can bind to biological polymers, such as enzymes, transport proteins [4], and DNA, chelate transient metal ions, such as Fe²⁺, Ca²⁺, and Zn²⁺, catalyze electron transport and scavenge free radicals. Due to this fact, protective effects against oxidative damage phenomena have been described; similarly, a protective role has been observed in pathologies such as diabetes [5], cancer [6,7], heart disease [8]. Other activities that deserve to be highlighted are antithrombotic [9,10], ant-inflammatory [11,12], antiviral [13], antiasthmatic [6], and inhibitors of the enzymes reverse transcriptase, protein kinase C, tyrosine kinase C, calmodulin, ornithine decarboxylase, hexokinase, aldolase reductase, phospholipase C, and topoisomerase II [14].

Interestingly, it is worth mentioning the importance of flavonoids and their antiprotozoal action. In 2004 Mendoca-Fino et al., [15] reported the anti-leishmanial effects of the extract rich in flavonoids from Cocos nucifera, finding that 10 µg/ml completely inhibits the growth of the parasite, in addition to its lysis. Pérez-Victoria et al., 1999 [16], showed that flavonoids inhibit daumycinic flux and reverse daumycin resistance by binding to the cytosolic domain of the P-gp transporter in L. tropica. The anti-parasitic effects of some other flavonoids that have been isolated from Helianthemumglomeratum and Geranium mexicanum have recently been described, exhibiting in vitro antiparasitic activities: Giardialamblia [17]. Epicatechin [18,19], Kaempferol (Kp) the latter was isolated from the Cupheaspinetorum family, which showed anti amoebic activity with an IC50 of 7.93 µg/ml [20]. Recent studies have shown that (epicatechin and Kp) directly affect the structure of the cytoskeleton in protozoan parasites (Entamoebahistolytica, Giardialamblia), de-polymerizing actin and inhibitor the union of some accessory proteins (myosin II short chain) which induces an ultrastructural alteration that contributes to the death of the parasite [21,22]. Furthermore, in vivo analysis has shown that Kp inhibits the development of amoebic liver abscess without showing evidence of liver and kidney tissue changes [22]. Although dosage and pharmacovigilance studies in humans are needed, they could be suitable candidates to propose them as possible new treatments in patients with parasitosis.

References