

## EVALUATION OF FLAVONOIDS AND THEIR BIOLOGICAL SIGNIFICANCES FOR HUMAN

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### Abstract

There has been increasing interest in the research on flavonoids from plant sources because of their versatile health benefits reported in various epidemiological studies. Since flavonoids are directly associated with human dietary ingredients and health, there is need to evaluate structure and function relationship. The bioavailability, metabolism, and biological activity of flavonoids depend upon the configuration, total number of hydroxyl groups, and substitution of functional groups about their nuclear structure. Fruits and vegetables are the main dietary sources of flavonoids for humans, along with tea and wine. Most recent researches have focused on the health aspects of flavonoids for humans. Many flavonoids are shown to have antioxidative activity, free radical scavenging capacity, coronary heart disease prevention, hepatoprotective, anti-inflammatory, and anticancer activities, while some flavonoids exhibit potential antiviral activities. In plant systems, flavonoids help in combating oxidative stress and act as growth regulators. For pharmaceutical purposes cost-effective bulk production of different types of flavonoids has been made possible with the help of microbial biotechnology. This review highlights the structural features of flavonoids, their beneficial roles in human health, and significance in plants as well as their microbial production.

### FLAVONOIDS AND THEIR BIOLOGICAL IMPORTANCE

There have been considerable reports which recommended that vegetable and fruits utilization has a critical part in keeping up wellbeing and forestalling unending ailments, for example, coronary illness and disease. This defensive impact has been ascribed to nearness of the noteworthy measures of different sorts of flavonoids in such plant-based nourishments. For instance, Peterson et al. have recognized eight sorts of flavanones; in particular, didymin, eriocitrin, hesperidin, naringin, narirutin, neoeriocitrin, neohesperidin, poncirin in citrus fruits, for example, grapefruit, lemons, and limes in an aggregate sum of 17-27%. Flavonoids are

class of polyphenolic common items containing two benzene rings (A and B) linked with a heterocyclic pyran ring C (Figure 2.1).

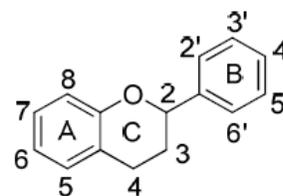
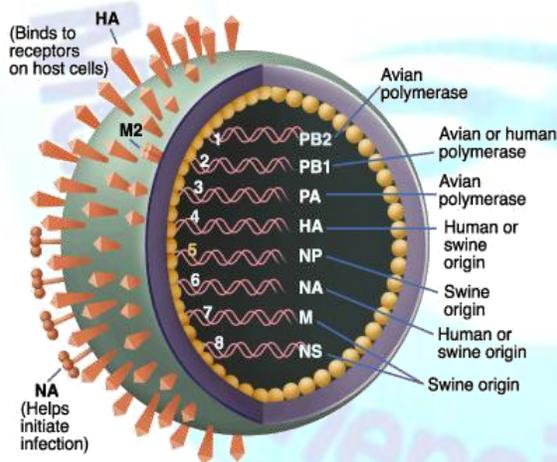


Figure 2.1 Basic flavonoid structures

Albeit more than 4000 one of a kind types of flavonoids have been distinguished.

**NEURAMINIDASE INHIBITION EFFECT**

The Orthomyxoviridae are a group of RNA infections, which incorporates five genera: Influenza infection A, Influenza infection B, Influenza infection C, Influenza infection D, Influenza infection E and Influenza infection F. Flu infection A, B and C can cause flu in feathered creatures, people and some different warm blooded animals and among them, type A infections are the most destructive human pathogens. Flu A is additionally arranged to subtypes like H1N1, H2N2, H3N2, H5N1, H7N7, H1N2, H9N2, H7N2, H7N3 and H10N7. H and N stand from hemagglutinin (H) and neuraminidase (N) which are proteins on the surface of the flu infection strain (Figure 2.3). Hemagglutinin is in charge of the authoritative of the infection to the host cells and causes agglutination of red platelets. Neuraminidase is a protein which is responsible for the start of the flu disease by advancing the arrival of the infection from the host cell.



**Figure 2.3** Structure of the influenza virion

In spite of the fact that there are distinctive sorts of H and N proteins, the ones that regularly cause flu amid influenza seasons are H1N1 (swine and fowl influenza) and H3N2 (Hong Kong influenza). The most well-known reason

for human influenza in 2009 (Pandemic H1N1/09 infection) was the swine birthplace subtype H1N1 infection which tainted more than 1.6 million individuals with 19,633 passing cases around the world (Figure 2.4). The 2009 influenza outbreak in Malaysia began in August 2009 with imported cases from influenced nations like United States America and Australia took after by neighborhood transmission in June 2009 with 12,210 aggregate number of contaminated cases and 92 demise cases. Albeit, yearly, flu have been accounted for being caused various of mortality and grimness and hospitalizations, however the overall outbreak of the new strain of the infection that rose in 2009 reason a worldwide frenzy.

**ANTI-VIRAL EFFECTS**

A number of studies have been directed on the counter popular impact of flavonoids. Calophyllum coumainins and Baicalin have been accounted for to have hostile to HIV-1 action. Thus, disengaged flavonoids from Geranium carolinianum L have been appeared to have sensible hostile to viral movement against hepatitis B infection. Flavonoids like Glaranine and 7-O-methylglabranine were additionally answered to repress dengue viral development. Tan et al. as of late announced that panduratinin and its subordinations to display great aggressive inhibitory exercises towards dengue 2 infection NS3 serine protease. In another examination, Rajkumar and colleagues announced segregated flavonoids from Poncirus trifoliata, for example, Poncirin, rhoifolin, naringin and marmesin to be genuinely powerful mosquito repellent.

**ANTI-OXIDATIVE EFFECTS**

Oxygen metabolism is the most well-known explanation behind the creation of responsive oxygen and free radicals in the human body

which can cause cell film harm, cell passing and tissue harm. The nearness of free radicals in the body in the long run can bring about numerous sicknesses and difficulties, for example, liver malady, disease, asthma, and diabetes. Cell reinforcement operators can restrain or defer the development of free radical oxygen species by controlling the oxidation procedure of an oxidisable source. Flavonoids particularly polyhydroxylated flavonols and catechins, can enable the body to neutralize the impact of these free radical oxygen through different components like searching of the free radicals, extinguishing of the singlet oxygen by hydrogen gift and chelation of metal particles associated with free radical creation.

#### ANTI-INFLAMMATORY EFFECTS

Inflammatory responses are regularly caused by the arrival of abundance measure of various arbiters by initiated macrophages. For instance, nitric oxide can cause edema, encourage leukocyte development in vessels and deliver cytokine. Flavonoids like fluorinated chalcones are accounted for to keep the nitric oxide age from the nitric oxide synthase. Arrival of arachidonic corrosive by other ace inflammatory specialists like cyclo-oxygenase (COX) and 5-lipoxygenase can be avoided by Quercetin.

#### ANTI-CANCER EFFECTS

Flavonoids, for example, chromone and xanthone subordinations have been accounted for to be powerful inhibitors for aromatase protein. Aromatase is the key protein associated with hormone-based bosom growth. Abyssinone II and its subsidiaries, a gathering of regular flavanones, were assessed as aromatase inhibitors and have indicated palatable inhibitory action. Substituted quinolones have demonstrated cytotoxic and against tubulin impacts to different human tumor cell lines like

lung carcinoma (A-549), bosom malignancy (MCF-7), and renal growth (CAKI-1), and melanoma disease (SKMEL-2) in vitro. Thiochromones and thiochroman-4-ones were screened on CF1 male mice and effectively restrain tumor development. Likewise, it has been accounted for that flavonoids have antitumor action to the human kidney carcinoma cells TK-10 in vitro.

#### CONCLUSION

Prevention and cure of diseases using phytochemicals especially flavonoids are well known. Fruits and vegetables are natural sources of flavonoids. Variety of flavonoids found in the nature possesses their own physical, chemical, and physiological properties. Structure function relationship of flavonoids is epitome of major biological activities. Medicinal efficacy of many flavonoids as antibacterial, hepatoprotective, anti-inflammatory, anticancer, and antiviral agents is well established. These substances are more commonly used in the developing countries. Therapeutic use of new compounds must be validated using specific biochemical tests. With the use of genetic modifications, it is now possible to produce flavonoids at large scale. Further achievements will provide newer insights and will certainly lead to a new era of flavonoid based pharmaceutical agents for the treatment of many infectious and degenerative diseases. Conflict of Interests The authors declares that they do not have any conflict of interests.

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