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## Role of Flavonoids- The Pharmacological Aspect

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Flavonoids are the low molecular weight secondary metabolites found in variety of plants or plant parts (fruits, stem, flowers, bark and leaves). Subdivided into 6 categories of importance where, quercetin, rutin, naringenin, hesperidin, epicatechin, gallic acid, luteolin, apigenin, pelargonidin, malvidin are found to possess medicinal and pharmacological properties. On the one side they act as plant growth regulators and on the other they act as antioxidants or free radical scavengers for which they are being extracted. Despite of this flavonoids are effective against the treatment of diabetes, neurological disorders, cancer, CVD and other cellular degradations.

Flavonoids are polyphenolic secondary metabolites which are low in molecular weight consisting of 15 carbon atoms, found in different fruits, vegetables plant parts such as bark, stem and flowers. Flavonoids are divided majorly into chalcones, flavanones, anthocyanins, anthoxanthins, flavones and isoflavonoids. Some important flavonoids of concern are quercetin, rutin, naringenin, hesperidin, epicatechin, gallic acid, luteolin, apigenin, pelargonidin, malvidin. They are responsible for colors in the buds and petals like anthocyanins are responsible for the red color of buds and leaves. The activity of flavonoids depends up on the configuration (structure), total number of hydroxyl groups, and position of functional groups. As concluded by researchers, fruits and vegetables are regarded as major dietary sources for humans and are responsible for variety of pharmacological activities like treatment against cellular damages, nutraceutical and medicinal applications (Panche *et al.*, 2016) Flavonoids play a major role in not only plants but are beneficial to animals or humans too. In plants the flavonoids are responsible for plant growth, development, propagation and protection against the unfriendly environmental conditions (frost, drought resistance, oxidative stress). Also they are responsible for color, aroma of flowers and fruits, spore germination and growth of seedling where they act as growth regulators. Flavonoids also possess antioxidant properties or free radical scavenging activity which is responsible for a number of protective and pharmacological functions. For example researchers have concluded that Epicatechin and rutin (flavonoids of major importance) are strong free radical scavengers (Tapas *et al.*, 2008) due to inhibitory activity of the enzyme Xanthine oxidase (XO). Flavonoids are also used against various health ailments such as diabetes, neurological disorders like alzheimer, cancer, cardio vascular diseases and other cellular degradations due to oxidative stress. With a combination of these properties, the flavonoids are being extracted and are used in pharmacological industries.

### Pharmacological activities of Flavonoids

Flavonoids can be used as potential drugs as they possess antimicrobial or bacterial, anti oxidative, anti cancer, anti diabetes and anti inflammatory properties. Lipid oxidation is the leading cause of number of disorders such as atherosclerosis, diabetes, inflammation and liver toxicity. Flavonoids are found to be effective in dealing with lipid peroxidation which is the root cause of the above mentioned diseases. Quercetin, a flavonoid helps in suppressing the lipid peroxidation in cell membranes hence preventing against the cellular damages. The another major reason for degenerative diseases is the oxidative stress which causes the generation of free radical various ailments such as cancer, CVD and for this flavonoids are proven to be effective. A diet rich in



flavonoids may decrease the risk of type 2 diabetes that is diabetes mellitus, though more research is needed to confirm the efficiency of flavonoids on blood sugar rise. Besides the oxidative property flavonoids are also known for their antimicrobial activity by which they are extracted and extensively used to work against any bacteria or microorganisms. Flavonoids like quercetin, naringin, hesperetin and catechin have been known to exhibit antibacterial activities. Quercetin extracted from lotus leaves is an antibacterial agent for inflammation of tissues around the teeth causing pain. They also act against cancer by preventing carcinogens; flavonoids have showed their effects on cytochrome P450 pathway which inhibits the growth or production of carcinogens in body. Some shows hormone like activity present in red wine, tea and some cereals which have control over neurological functions of brain. Hormone-like steroids protects against several chronic diseases, which has neuroprotective effects on the brain. In nutshell we can say that Flavonoids helps to regulate the cellular activity and deals with the oxidative stress by protecting the body against stress causatives and toxins produced in body so that our body functions efficiently. Hence flavonoids have full potency to be utilized in pharmacological industries to deal with degenerative ailments.

### **Conclusion:**

Flavonoids are secondary metabolites low in molecular weight found in variety of plants or plant parts (fruits, stem, flowers, bark and leaves). On extraction of flavonoids from different parts of the plant it is concluded that they possess some medicinal and pharmacological properties. Flavonoids are found to be effective against the treatment of diabetes, neurological disorders, cancer, CVD and other cellular degradations. More research needs to be carried on so as to deal with the degenerative disease of new era.

### **References**

- Panche, A., Diwan, A., & Chandra, S. 2016. Flavonoids: An overview. *Journal of Nutritional Science*, 5, E47. doi:10.1017/jns.2016.41
- Tapas, A. R., Sakarkar, D. M. and Kakde, R. B. 2008. "Flavonoids as nutraceuticals: a review," *Tropical Journal of Pharmaceutical Research*, vol. 7, pp. 1089–1099.
- <https://www.healthline.com/health/what-are-flavonoids-everything-you-need-to-know#:~:text=What%20do%20flavonoids%20do%3F,are%20also%20powerful%20antioxidant%20agents.>