Research Journal of Agriculture and Environmental Management. Vol. 3(2), pp. 080-081, February, 2014
Available online at http://www.apexjournal.org
ISSN 2315 - 8719© 2014 Apex Journal International

Short Communication

Citrus, rutin and on their vein permeability effects

Başar ALTINTERİM

Inonu University, Fisheries Faculty, Battalgazi Campus, Malatya, Turkey. E-mail: basar.altinterim@inonu.edu.tr, Tel: 0 422 846 12 65 / 149,

Accepted 29 January, 2014

Rutin is one of a class of flavonoids that also includes hesperidin, quercetin, eriodictyl and citron and is necessary for the absorption of vitamin C. Bioflavonoids may be found in herbal plants, fruits and fruit rinds (especially citrus fruits: orange, grapefruit, lemon, lime and contained mainly in the edible pulp of the fruits, rather than in the strained juices), vegetables and nuts, etc.; and because they cannot be manufactured by the body, they must be supplied through the diet.

Key words: Citrus, rutin, vein, permeability.

INTRODUCTİON

Rutin normally found in highly nutritious foods, such as citrus, red apples, teas, broccoli and onions, etc., you can easily take it in supplement form; and because the human body cannot produce bioflavonoids, they must be supplied through the diet .

Bioflavonoids are a class of flavonoids that includes Rutin, Hesperidin, Quercetin, Eriodictyl and Citron, and they are essential for the absorption of vitamin C, which should be taken simultaneously, so they may act synergistically for maximum benefit. Glycoside of the flavonol rutin is available as dietary supplements without a prescription in the U.S. Other names for rutin include rutinoside, quercetin-3-rutinoside, and sophorin (Hendler and Rorvik, 2001).

THE MECHANISMS OF ACTION

Rutin is found in many plants, especially the buckwheat plant *Fagopyrum esculentum* Moench, Family Polygonaceae (Kreft, Knapp and Kreft, 1999). Extraction of rutin from buckwheat (*Fagopyrum esculentum* Moench) seeds can be determined by capillary electrophoresis (Kreft et al., 1999). Rutin inhibits platelet aggregation, as well as decreasing capillary permeability, making the blood thinner and improving circulation. There is also some evidence that rutin can be used to treat hemorrhoids, varicosis, and microangiopathy (Heather et al., 1995).

Several key studies have shown that the anti-inflammatory properties of Citrus flavonoids are due to its inhibition of the synthesis and biological activities of different pro-inflammatory mediators, mainly the arachidonic acid derivatives, prostaglandins E_2, F_2, and thromboxane A_2. The most abundant Citrus flavonoids are flavanones, such as hesperidin, naringin, or neohesperidin. However, generally, the flavones, such as diosmin, apigenin, or luteolin, exhibit higher biological activity, even though they occur in much lower concentrations. Diosmin and rutin have a demonstrated activity as a venotonic agent and are present in several pharmaceutical products (Benavente-García and Castillo, 2008).

To date four main potassium channels have been identified in vascular smooth muscle cells including calcium activated potassium channels [BK_{Ca}], ATP-sensitive potassium channels [K_{ATP}], voltage-gated potassium channels [K_V], and inward rectifier channels [K_{ir}] . Activation of any type of potassium current in vascular smooth muscle cells leads to membrane hyperpolarization thereby inducing vasodilation (Ko et al., 2008).

Contradicting its reported vasodilatory effect, activation of vascular calcium channels has been reported for quercetin and its rutinoside rutin, however, this obvious discrepancy seems to be explained by a second hierarchically prevailing vascular target of quercetin that might be represented by protein kinase C (Saponara et al., 2002; Fusi et al., 2003; Saponara et al., 2008). Quercetin and rutin have been used as effective constituents of several pharmaceuticals used for

treatment of capillary fragility and phlebosclerosis.

The flavonoids O-[b-hydroxyethyl] rutoside, [+]-catechol, trihydroxyethylrutoside increased the negative charge density of the blood vessel wall *in vitro* and were markedly antithrombogenic (Griffith and Ballow, 1972). Other antiaggregatory flavonoids reported were 3-methyl quercetin, toxerutin, fisetin, dihydroquercetin and flavone. Nobeletin and sinensetin decreased erythrocyte aggregation and sedimentation in vitro and might be useful in dietary control of high blood viscosity syndrome (Felicia et al., 1996).

Rutin protected the intracellular GSH antioxidant system and prevented H_2O_2-induced apoptosis of HUVECs through regulating reactive oxygen species mediated mitochondrial dysfunction pathway (Gonga et al., 2010). In conclusion, rat peritoneal microvascular permeability was strongly increased by reactive oxygen species, an effect that was significantly reduced by intraperitoneal, intravenous and oral calcium dobesilate. These results support the hypothesis that the antioxidant properties of calcium dobesilate could play a role in its angioprotective properties *in vivo* (Bruneta et al., 1998).

CONCLUSİON

Rutin is especially helpful in the prevention of recurrent bleeding arising from weakened blood vessels and in the treatment of varicose veins, haemorrhoids and other circulatory problems. Their capillary strengthening action makes them important for declining sight or blindness in diabetics. Furthermore, they have an anti-allergy action, may aid in reducing blood pressure and may help prevent miscarriage.

Rutin, an active flavonoid compound, is well known to possess potent antioxidant properties against oxidative stress insults through undefined mechanism. Substances with Vitamin P activity have been reported to influence capillary permeability and fragility. Rutin treatment could be useful for preventing oxidative damage.

REFERENCES

Benavente-García, O., Castillo, J. (2008). Update on Uses and Properties of Citrus Flavonoids: New Findings in Anticancer, Cardiovascular, and Anti-inflammatory Activity. *J. Agric. Food Chem.*, 56(15): 6185–6205.

Bruneta, J., Farineb, J., Garaya, R., Hannaerta, P. (1998). Angioprotective action of calcium dobesilate against reactive oxygen species-induced capillary permeability in the rat. *Eur. J. Pharmacol.*., Volume 358, Issue 3,;9. 213–220.

Felicia, V.S., Najla, G., Ann, P.C., Madeleine, M., Keneeth, K.C. (1996). Inhibition of Human Breast cancer cell proliferation and delay of mammary tumorigenisis by flavonoides and citrus juices. *Nutr Cancer*, 26: 167-81.

Fusi, F., Saponara, S., Pessina, F., Gorelli, B., Sgaragli, G. (2003). Effects of quercetin and rutin on vascular preparations: A comparison between mechanical and electrophysiological phenomena. *Eur. J. Nutr.*, 42: 10–17.

Gonga, G., Qina, Y., Huanga, W., Zhoub, S., Yangb, X., Lia, D. (2010). Rutin inhibits hydrogen peroxide-induced apoptosis through regulating reactive oxygen species mediated mitochondrial dysfunction pathway in human umbilical vein endothelial cells. *Eur. J. Pharmacol.,* 628(1–3): 25. 27–35.

Griffith, L.A., Ballow, A. (1972). The fate of orally and parenterally administered flavonoids in the mammal, the significance of biliary excretion. *Angiologica*, 9: 162-74.

Heather, S., Demrow, B.S., Peter, R., Slane, B.S., John, D.F. (1995). Administration of Wine and Grape Juice Inhibits In Vivo Platelet Activity and Thrombosis in Stenosed Canine Coronary Arteries. *Am. Heart Assoc.,* 91: 1182-1188.

Hendler, S.S., Rorvik, D.R. (2001). PDR for Nutritional Supplements. Montvale: Medical Economics Company, Inc.

Ko, E.A., Han, J., Jung, I.D., Park, W.S. (2008). Physiological roles of K+ channels in vascular smooth muscle cells. *J. Smooth Muscle Res.*, 44: 65–81.

Kreft, S., Knapp, M., Kreft, I. (1999). Extraction of Rutin from Buckwheat (Fagopyrum esculentum Moench) Seeds and Determination by Capillary Electrophoresis. J Agric Food Chem., 47 [11]: 4649–4652.

Saponara, S., Sgaragli, G., Fusi, F. (2002). Quercetin as a novel activator of L-type Ca[2+] channels in rat tail artery smooth muscle cells*. Br. J. Pharmacol.,* 135: 1819–1827.

Saponara, S., Sgaragli, G., Fusi, F. (2008). Quercetin antagonism of Bay K 8644 effects on rat tail artery L-type Ca [$^{2+}$] channels. *Eur. J. Pharmacol.*, 598: 75–80.