11. Abstract

Stonawská, M. Chelation of ferrous and ferric ions by flavonoids. **Charles University in Prague, Faculty of Pharmacy in Hradec Králové, 58 pp.**

The iron is a very important element for human organism. It participates in a cellular respiration, redox reactions and it is used for the synthesis of blood and muscle pigments. Disorders of iron metabolism are manifested by deficiency or surplus. The iron overloaded human body has insufficient mechanism for iron excretion – the iron is accumulated in the cells and mediates the creation of oxygen radicals, that cause lipid peroxidation of cell membranes.

The iron surplus is treated with iron chelators, which are substances forming a complex with iron, which is excreted. The most commonly used chelator is deferoxamine, but it has many disadvantages. For these reasons, we are looking for new iron-chelating structures, which will be able to be administered orally.

Flavonoids are plant polyphenols. From the chemical point of view they are glycosidically linked derivatives of phenylchroman. They have antioxidant effects – they interact with free radicals and chelate some metal ions.

In this study, we focused on research of chelating activity of flavonoids quercetin, rutin, epicatechin, hesperetin, hesperidin and apigenin. For comparison, we used the standard chelator deferoxamine. Chelation efficiency was measured using a spectrophotometer. As an indicator of iron ions, we used ferozin and as a reducing agent for determination of overall chelation, we used hydroxylamine.

We compared the efficacy of flavonoids in two different concentrations. In the ratio of chelator: iron 1:1, deferoxamine was the most effective, followed by quercetin, rutin and apigenin. In the ratio 10:1, deferoxamine was again the most effective, followed by apigenin, quercetin and rutin. It results from these findings that the concentrations of flavonoid affects quality and quantity of iron chelation.

We derived from the structure-activity relationships, that flavonoids, which chelated iron well, have double bond between C2 and C3, in the C4 have oxo group and in the C3 or C5 have hydroxy group in their structure. Lower chelating activity has catechol structure in the ring B or hydroxy groups in the C7 and C8. The structure-activity relationships were compared with previously published findings and contribute to confirm their veracity.