

## ABSTRACT

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Iron is an essential element, necessary for the proper functioning of the human body. It is involved in many cellular processes where it acts as a cofactor. It is physiologically very important, especially for its ability to readily accept and deliver electrons. Its amount in the body is strictly regulated because in excess of the free metal, harmful radical reactions and the development of oxidative stress could result. Oxidative stress is responsible for many pathological processes.

Flavonoids are natural polyphenolic substances that are found in many plants. Their consumption is associated with beneficial effects on human health, including antioxidant, anti-inflammatory, and cardioprotective properties. Despite their beneficial effects, they may, under certain circumstances, possess pro-oxidant effects related to their redox properties. During the metabolism of flavonoids, the gut microbiome degrades them to simple phenolic acids, including propionic acids.

In this thesis, the tested propionic acids were exposed to the iron-catalyzed Fenton reaction, which produces hydroxyl radicals. Their effect on reducing or increasing the production of free radicals was investigated at two pH values (4.5 and 7.5) using an HPLC instrument. 3-(3-hydroxyphenyl)propionic acid and 3-(2,4-dihydroxyphenyl)propionic acid showed antioxidant properties. The opposite result was shown by 3-(3,4-dihydroxyphenyl)propionic acid, which appeared to be pro-oxidant.