

Food Technology 2018-The impact way of cooking on the content of bioactive ingredients in rose hip tea- Zilha Asimovic- University of Sarajevo

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The rose hip belongs to the species of roses (family Rosacea), and it is one of the most popular plants that is used as food and in medicinal purposes. This plant is known by many names, such as wild rose, dog rose, sweet briar and etc. The berries of the rose hip are rich in contents of vitamins, such as vitamins B1, B2, B3, D, pro-vitamin A, and in a wide range of other nutrients. The rose hip is especially rich in vitamin C content. The aim of this work was to determine total phenol and flavonoid content and anti-oxidative activity of rose hip tea (in bulk and filter bags) in dependence of way of cooking (cooking, microwave treatment and cooking on the water bath (with reflux). Determination of phenol, flavonoid and anti-oxidative activity was done by cooking (90°C, 15 min) and cooking in water bath with reflux, and microwave treatment.

The total phenols were determined with the Folin-Ciocalte reagent, an antioxidant activity with PFRAP and gallic acid (GAE) was used as standard. For flavonoid determination, method with AlCl₃ making complex, and catching (CE) was used. For statistical analysis two factor ANOVA was conducted. The highest phenols content was found in filter bags by microwave treatment (456.45 mg GAE/100g dw). The lowest phenols content was recorded with using cook (228.27 mg GAE). For flavonoid max was found in bulk using microwave, and min was in filter bags of tea (9.91 mg CE/100g dw) by cook. The max antioxidant activity was recorded in bulk where coked and min activity in filter bags 36.99 mg GAE /100g dw with using water bath. After statistical analysis, it was concluded that an alternative hypothesis is accepted and average total phenols, flavonoids and antioxidant activity was statistically different in relation

to way of cooking at level 95%.

Rosa canina pseudo fruits, often referred to as rose hips, have been used as herbal medicine for more than 2,000 years, yet research has only recently begun to clarify specific mechanisms by which this plant product affects human health. Numerous compounds have been identified, and speculations of their bioactivity have implicated flavonoids, carotenoids, and fatty acids (FAs). With more than 4,500 representatives, flavonoids have been subjected to comprehensive research, with results that suggest various individual structures may be health-promoting compounds, also in rose hips. The importance of carotenoids from *R. canina* is currently being debated, because the demonstration of specific bioactivity among this group is presently less clear. The benefits of specific FAs have been investigated for decades, and several types of FAs are termed "essential" for human health. The specific mechanisms for bioactivity associated with three FAs that are abundant in *R. canina* fruits have been clarified in research. For example, linoleic acid, α -linoleic acid (mostly present in the seeds from *R. canina*) and a galactolipid ((2S)-1,2-di-O-[(9Z,12Z,15Z)-octadeca-9-12-15-trienoyl]-3-O- β -D-galactopyranosyl glycerol), referred to as GOPO, have been shown to have anti-inflammatory properties. The aim of this review is to critically analyse the published literature on rose hip research, with emphasis on the broadness and varying significance of the publications. Initially, we describe the chemical ingredients of *R. canina* pseudo fruits, with some focus on what ingredients are found in the whole pseudo fruit and what we know is confined to the seeds (achene seeds), and/or the shells (hypanthium). Then, we evaluate important papers

describing the in vitro investigations of the bioactivity and impacts of the constituents of rose hip. One of the first publications to show that rose hip might be of relevance as an anti-inflammatory agent reported that a water extract of rose hip inhibited chemotaxis of polymorph nucleated (PMN) cells isolated from healthy humans at a dosage of 500 µg/mL. In the same study, a water extract of rose hip shells alone was shown to be superior in reducing chemotaxis of PMN cells, as compared to the effects achieved with extracts of the whole fruit, ie, from both shells and seeds.

As the 1999 study did not include extraction of FAs that are abundant in the seeds, the authors may have arrived at the wrong conclusion that *R. canina* shells are the most important part of the fruit as regards chemotaxis and antioxidant activity. This deduction can be made because subsequent studies have revealed high levels of fat-soluble elements in rose hip, including earlier mentioned FAs (in the section

FAs and galactolipids), with anti-inflammatory and antioxidant activity. Polyphenols (proanthocyanidins and flavonoids) with antioxidative properties, as demonstrated by their inhibition of chemotaxis in human PMN cells, were found in rose hip extracted with lipophilic solvents. This extract could inhibit reactive oxygen species in both cellular and cell-free systems, with half maximal inhibitory concentration (IC50) values ranging from 5.73 to 1.33 mg/L. Furthermore, the antioxidant effects were clearly shown not to be due to vitamin C alone, but were also due to substantial contributions from polyphenols.

Result: The literature search included articles from 1975 onward to identify studies on rose hip, *R. canina*, or dog rose. The search was restricted to English language articles. We further searched the authors' own files to improve the number of relevant papers. Finally, relevant papers were extracted independently by the three authors.