

The Effects of Thermal Treatment on Antioxidant Properties of Fruit Peels from Pomegranate (*Punica granatum* L.) Cultivars Grown in Sri Lanka

P.D.S.N.H. Panapitiya¹, M.K.B. Weerasooriya²

Pomegranate peel (PP), a primary by-product of the pomegranate juice producing industry, is reported to possess diverse range of bioactive compounds which are believed to bear anticancer, antimicrobial, anti-inflammatory and antioxidant properties. In recent years, natural antioxidants are gaining more and more attention due to its possible medicinal and food applications and have preferred by consumers over synthesized antioxidants. Heat treatment is known as processing step for fruit peels to release variety of bound polyphenolics from tissues of peels by improving their bioavailability or modifying chemical structure to enhance absorption, and to intensify nutritional effects. Thus, the aim of this study was to determine the effects of heat treatment on antioxidant properties of pomegranate peel (PP) of Sri Lankan cultivars, named as Nayana, Kalpitiya red, and Nimali. Peel powder (2.00 g) heated at 160 °C in an oven for 2 hours and non-heated peel powder of each cultivar extracted with ethanol (70% v/v, 25.00 mL). Free radical scavenging activities of PP extracts were evaluated by 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay and expressed as IC₅₀ value. Color changes of PP powder before and after thermal treatments were investigated. All the extracts exhibited significant dose dependent inhibition activity. Therefore, DPPH scavenging activity increased as the concentration of the sample was increased up to a certain concentration that was varied from cultivar to cultivar. According to the results, heat-treated PP powders of each cultivar showed significantly higher (p<0.05) antioxidant activity compared to the non-treated PP powder of each cultivar. Antioxidant activities of PP increased due to the thermal treatment. IC₅₀ values of the non-treated PPs of Nimali, Kalpitiya red and Nayana cultivars, were found to be 19.067 ± 0.291^c, 21.067 ± 0.233^b and 22.233 ± 0.145^a µg/mL, respectively, while the IC₅₀ values of heat-treated PP samples of cultivars were 11.100 ± 0.265^c, 17.600 ± 0.115^b and 20.400 ± 0.115^a µg/mL. All the IC₅₀ values of PP extracts were compared with that of Gallic acid (GA) as the standard compound and IC₅₀ value of GA was 4.65 µg/mL. Hence, antioxidant activities of both heat-treated and non-treated PP extracts were lower than that of GA. The peel of Nimali exhibited the highest DPPH radical scavenging properties than the other cultivars, in which antioxidant properties were highly improved by heat treatment and also, its change in IC₅₀ value (ΔIC₅₀) before and after heat treatment, is significantly higher than other cultivars. It might be higher concentrations of polyphenolics released. Initial color of PP powder of each cultivar was converted from brownish-yellow to dark brown during heat treatment. IC₅₀ values were significantly different (p<0.05) among cultivars and temperature. According to the results, thermal treatment had no negative effects on the antioxidant capacities of the PP powder up to 160 °C. Therefore, bakery products (specifically cookies) can be considered as the most acceptable carriers of such pomegranate peel powder supplements. Furthermore, examined heat treatment can be used as an acceptable method to sterilize the PP powder. Considering the findings, thermal treatment might be a good alternative strategy for improving health benefits of PP, adding value to the PP, and could be helpful for development of potential dietary supplements. PP powder which possess extremely high antioxidant properties, has a great potential to be used as a source of food additives in food products such as natural food preservatives (antioxidants) and a therapeutic agent.

Keywords: “Pomegranate peel; Antioxidant property; DPPH assay; IC₅₀ value; Thermal treatment”

¹Department of Chemistry, University of Kelaniya, Kelaniya, Sri Lanka, sonalipanapitiya@gmail.com

²Department of Chemistry, University of Kelaniya, Kelaniya, Sri Lanka