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Effect of heat treatment and microwave treatment on β-Carotene content and their *In vitro* bioaccessibility in Betti amba variety (*Mangifera indica* L.)

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Vitamin A deficiency is one of the major health problems prevailing in Sri Lanka, irrespective of the fact that many common fruits are good sources of provitamin A. Mango (*Mangifera indica* L.) is one such fruit, which suffers a large scale loss due to lack of post harvest technology practices and the lack of processing and preservation techniques. Processing methods may, however, alter the nutritional composition including the provitamin A content. The objective of the present study was to determine the effect of heat treatment and microwave treatment on the content of β-carotene and *in-vitro* bioaccessibility in the mango variety Betti amba as it has the highest amount of provitamin A carotenoids and β-carotene as predominant provitamin A carotenoid, among local mango varieties.

The effects of different heat treatment [80 °C, 50 °C, freezing (-10 °C) and refrigeration (5 °C)] for 20 minutes and microwave treatment (for 2 minutes) were determined in Betti amba at the fully ripened stage. Carotenoids were extracted and identified with open column chromatography (OCC), followed by ultra violet visible absorption spectra (λ_{max} and spectral fine structure). Identification and quantification was also carried out using Reversed phase High Performance Liquid Chromatography with photo diode array detection (C_{18} column Spherisorb ODS2; gradient elution of mobile phase of Methanol, Acetonitrile and 0.05% Triethylamine in Ethylacetate). *In-vitro* bioaccessiblity was also assessed analyzed using Gastro Intestinal Tract simulation method.

The study revealed that microwave treatment (2.49 ± 0.93 μg g^{-1}) and heat treatment at 80 °C (2.24 ± 0.50 μg g^{-1}) were significantly ($p<0.05$) more effective methods of increasing the bioavailability of β-carotene content among other treatments. It was followed by freezing (0.94 ± 0.24 μg g^{-1}) and heat treatment at 50 °C (0.84 ± 0.10 μg g^{-1}). Refrigeration (0.41 ± 0.084 μg g^{-1}) found to be significantly least effective. In *in-vitro* bioaccessibility, β-carotene content was significantly higher in microwave treatment (2.76 ± 0.80 μg g^{-1}) and freezing (2.37 ± 0.96 μg g^{-1}). Heat treatment at 80 °C (0.141 ± 0.045 μg g^{-1}) and heat treatment at 50 °C (0.11 ± 0.00 μg g^{-1}) were found to be significantly lower values. The samples of Betti amba subject to different treatment, showed a considerable variation in β-carotene content revealing that the type of treatment affects the β-carotene content.

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