**Facile method to deliver naringenin in functional foods using basil seeds gum water-soluble extract.**

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Consumer trend towards sustainable food options emphasises the food ingredients to be natural, health promoting and economical1. Hence, to meet this growing demand, future food systems need to be free from excessive processing and toxic ingredients. Designing food grade delivery systems for sensitive bioactives to protect them from external and internal environmental stress factors and to ensure controlled release serves a key role in future food systems. Number of studies have shown that plant gums can be developed as encapsulation systems to deliver health promoting ingredients and further attention is required to make it more sustainable.

Basil Seeds Gum (BSG) is an emerging plant hydrocolloid which has shown remarkable rheological properties, emulsification properties, gelation and adsorption properties as similar as commercially available gums2. In this study, we aimed to use the water-soluble fraction of basil seeds gum (BSG-WSE) in combination with a protein candidate (sodium caseinate) to develop an encapsulation system for hydrophobic flavonoids using naringenin as the model compound. Naringenin has been recognised as a Class ⅱ substance according to the biopharmaceutical classification system, indicating its poor solubility and high permeability and the proven therapeutic benefits tend to be hindered due to excessive metabolism and gastric degradation. In this study we hypothesis that the surface-active protein candidate binds to both naringenin and polysaccharides in BSG-WSE and create a stable colloidal system, stabilised by polysaccharides in BSG-WSE. To avoid using organic solvents to dissolve naringenin, a pH driven method was used wherein, naringenin dissolves at high pH (pH 11-12) owing to its high pKa3.To analyse the encapsulation efficacy of the proposed system, three biopolymer ratios were selected ( 1:1, 1:3 and 1:5) with similar amounts of naringenin and the ternary mixtures were subjected to the pH treatment (acidification) followed by a mild heat treatment (60 ºC, for 30 min). Samples at different pH values (7, 5 and 4) were selected to analyse the encapsulation efficiency (EE) and loading capacity (LC). Results indicated that electrostatic complexation between protein and BSG-WSE plays a significant role in encapsulating naringenin, showing the highest EE of 71.55±0.77% and LC of 11.18±0.17% at pH 4. Particle sizes were within the nanometre range (170 nm - 400 nm) and zeta potential values were within -25 mV to -30 mV for samples at pH 5 and 4. Interactions were further confirmed by Fourier transform infrared spectroscopy and powder X-ray diffraction patterns showed amorphous nature in contrast to the crystalline nature of naringenin control. pH stability studies showed a pH-triggered release where alkaline pH released higher percentage of naringenin. Therefore, this method can be introduced as a green approach to orally deliver hydrophobic flavonoids via functional foods.

*References:*

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