

## Bioflavonoids derived from Mandarin processing wastes as bioengineered antioxidants: A nanotechnological intervention

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Mandarins, upon processing generate significant agrowastes in the form of peels which are potential sources of bioflavonoids that possess significant anti-oxidative character. However, a constraint for use of these flavonoids is the low bioavailability which substantially masks their functionality. This work entails extraction and identification of key flavonoids from mandarin peels, followed by preparing flavonoid-nanoparticle conjugates in order to overcome the limitation and finally their impregnation into edible hydrogels. Total flavonoids estimated in the mandarin peel SC-CO<sub>2</sub> extract were 48.10.65 mg/ml rutin equivalents. Polymethoxyflavones (PMFs) were the key compounds identified in the extract through mass spectral analysis. Food grade Poly-Lactide-co-Glycolic Acid (PLGA) was used as a carrier to encapsulate flavonoids. The extract exhibited free radical scavenging activity with an IC<sub>50</sub> of 0.55 µg/ml. The PLGA-PMF nanoconjugates, on the other hand, exhibit an improved antioxidant potential with an IC<sub>50</sub> of 0.49 µg/ml. The PLGA-PMF nanoconjugates furnished a particle size of 252.21.04 and PDI 0.1870.039. Also, the bioengineered nanoconjugates had a high entrapment efficiency of nearly 80.0% and stability of more than 1 year, which is favorable for their application in the food industry.

FE-SEM and confocal microscopy images revealed the smooth and spherical shape of nanoconjugates. Further, the nanoconjugates were provided an additional layer of protection to achieve sustained and controlled release for which edible hydrogels were prepared using natural polymer alginate thereby enabling the release and retention of the flavonoids from the matrix. The two significant features of the gel were its low porosity of nearly 20.0% and the high crosslinking polymer network visualized by cryo-SEM. These nanoconjugate impregnated hydrogels were subjected to simulated gastrointestinal studies which revealed sustained release. This double layered carrier for bioflavonoids lays the foundation for developing PLGA-PMF-hydrogels as functional foods affording enhanced bioefficacy which was otherwise challenged owing to pre-mature metabolism of flavonoids in the gastrointestinal tract.

### Biography:

Niharika Kaushal is a Research Fellow at the Department of Biotechnology, Punjabi University, Patiala, Punjab, India. Main objective of her work intends to unlock the potential of agro-industrial residue to be converted into a portfolio of eco-efficient nutraceutical products using nanotechnological interventions.