
Isolation, Characterization and Pharmaceutical Evaluation of *Helianthus annuus* Seed Mucilage as a Binder in Solid Dosage Forms

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Abstract

Background: Natural excipients are increasingly explored as alternatives to synthetic binders in pharmaceutical formulations due to their safety, sustainability, and cost-effectiveness. Plant-derived mucilage has shown potential as a binding agent. The current investigation was designed to isolate and characterize mucilage extracted from the Sunflower seed (*Helianthus annuus*) and evaluate its binding efficiency in paracetamol (PCM) tablet formulations compared with gum *Acacia*. **Materials and Methods:** Mucilage was isolated by hot maceration and characterised physicochemically. Morphology was analyzed by scanning electron microscopy (SEM), crystalline/amorphous nature by powder X-ray diffraction (PXRD) and differential scanning calorimetry (DSC), and structural confirmation by Fourier transform infrared spectroscopy (FTIR). PCM tablets were prepared by wet granulation using four graded concentrations of mucilage 3, 5, 10, and 15% w/v, which were employed in the formulation designated as HF1–HF4. Control tablets were prepared with gum *Acacia* at identical concentrations. Standard evaluation parameters for uncoated tablets were performed, followed by *in vitro* dissolution studies. **Results:** SEM revealed irregular particle shape and size of mucilage, PXRD and DSC indicated an amorphous nature, and FTIR confirmed polysaccharide presence. Among the formulations, HF1 (3%) and HF2 (5%) showed optimal binding efficiency, releasing 99% of the drug within 25–30 min. These results were superior to tablets prepared with gum *Acacia* at equivalent concentrations. **Conclusion:** Mucilage from *H. annuus* seed demonstrated excellent binding efficiency and favorable physicochemical properties, suggesting its potential as a promising natural excipient in conventional uncoated tablet dosage forms.

Key words: Excipient, *Helianthus annuus*, mucilage, natural binder, paracetamol, tablet formulation
