Development of sustained release matrix tablets of drugs based on the rheological properties of Albizia procera gum

Synopsis submitted by

Sudipta Mukherjee

Doctor of Philosophy (Pharmacy)

DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY,
FACULTY COUNCIL OF ENGINEERING & TECHNOLOGY
JADAVPUR UNIVERSITY
KOLKATA-700032, INDIA
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Abstract:

The research delves into Albizia procera, a prolific species thriving in Indian and Vietnamese tropical forests, renowned for its root suckering and adaptability. It ventures into the potential of A. procera gum in drug delivery systems, analyzing its galactose and arabinose components and their influence on rheological properties. The core explores chemical modifications of the gum to impact stability and drug diffusivity in delivery systems.

By scrutinizing its molecular components, the study aims to customize the gum through chemical modifications, potentially altering its stability and impact on drug diffusivity within delivery systems. Understanding its rheological behavior is pivotal in predicting drug release patterns and evaluating polymer matrix strength, crucial for effective drug delivery systems.

Characterization methodologies uncover intricate details about NAP, from hydrogen bonding mechanisms to thermal stability and amorphous nature. These findings offer pivotal insights into its composition and structure. Further studies on carboxymethylation transformations (CMAP) and crosslinking (CCMAP) illuminate structural alterations and their impacts, highlighting potential applications in pharmaceuticals and industries.

Investigations into RBC properties reveal minimal influence from NAP, CMAP, and CCMAP, suggesting their suitability for applications involving RBCs. Rheological assessments uncover distinct behaviors among the polymers, emphasizing their sensitivity to pH variations and the impact of crosslinking on their properties.

Pre-formulation studies explore micromeritic properties, swelling, and erosion behaviors, indicating their applicability in pharmaceutical formulations. Granules maintain favorable properties crucial for pharmaceutical processing, hinting at potential impacts on overall characteristics.

In-depth drug-polymer interaction assessments via FTIR and thermal analyses support the compatibility of polymers (NAP, CMAP, CCMAP) with Metformin and Diltiazem, suggesting their suitability in formulations without altering drug properties.

Matrix tablet formulations demonstrate uniformity and compliance with pharmaceutical standards, while in-vitro drug release studies highlight distinctive release profiles among the formulations, crucial for tailored drug delivery designs.

For instance, MET-loaded CCMAP matrices exhibit sustained release patterns, promising controlled-release formulations. Similarly, DIL-loaded NAP matrices show controlled release properties, while CMAP formulations exhibit rapid release behaviors.

Understanding drug release mechanisms and correlation with polymer rheology reveals nuanced relationships, with CCMAP's crosslinking influencing sustained release and CMAP's electrostatic repulsion prompting faster drug release.

Accelerated stability studies over six months confirm the enduring stability of formulations under stress conditions, showcasing consistency in drug content, dissolution profiles, and physical characteristics.

The research provides comprehensive insights into A. procera gum and its modified forms, outlining their potential in tailored drug delivery systems through meticulous characterization, formulation, and stability studies. These findings pave the way for nuanced applications catering to varied medical needs.