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### Plackett-Burman screening and optimisation of triple antibiotic based polymeric nanocapsules formulated by emulsification-solvent diffusion method

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Present study was performed to evaluate and screen various factors involved in the formulation of triple antibiotic based polycaprolactone nanocapsules using emulsification-solvent diffusion method. Triple antibiotics like ciprofloxacin HCL, metronidazole, minocycline HCL when combined together are beneficial in root canal therapy. 5-factor, 2-level Plackett-Burman Design was used to screen and optimise nanocapsules on the basis of Particle Size (PS), Zeta Potential (ZP) and Entrapment Efficiency (EE). Polymer Concentration (PC), Lipid Concentration (LC), Surfactant Concentration (SC), Homogenisation Speed (HS) and Homogenisation Time (HT) were selected as formulation factors. Particle size of nanocapsules ranged between 120 nm to 187 nm, zeta potential from 10 to 17 (mV), and entrapment efficiency between 45 to 52%. Pareto charts were used to establish the most important factors influencing the responses. It was found that HT and HS showed non-significant effect on PS, ZP, and EE in comparison to other factors. Optimised batch was obtained with PC-100 mg, LC-250 mg, SC-1.5%, HS-10000, HT-10 minutes. Further, infrared studies indicated compatibility between drug and excipients. X-ray Diffraction study showed transition of crystal nature of drugs into amorphous state. Observations of scanning electron microscopy showed spherical nanocapsules with smooth morphology. Antimicrobial studies of formulated nanocapsules established their effectiveness for the use in root canal therapy for combined inhibition of both aerobic and anaerobic infectious microorganisms.

#### Biography

Manish is pursuing MPharm under the supervision of Professor B Mishra from IIT (BHU), Varanasi. He has completed his BPharm from Pt B D Sharma UHS, Rohtak (Haryana). Currently, he is working on nanoparticulate based drug delivery.

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