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Development and evaluation of *Gymnema* sylvestre extract loaded polymeric nanoparticle for enhanced bioavailablity

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Diabetes mellitus (metabolic disorder) expected to increase over 333 million by 2025 i.e., 90% of these people will have type 2 diabetes according to International Diabetes Federation. Current main therapeutics for treating insulin resistance are thiazolidiones (TZD) and AMPK-activated protein kinase targetting such as metformin. However, TZDs can have undesirable side effects (weight gain, fluid retention and heart failure) and metformin acts mainly in liver rather than muscle. In this regard, plant extracts provide the best option for search of desired safe and effective medications. Gymnemic acids, the main phytoconstituents of *Gymnema sylvestre* possess potential natural pharmacological activities like supression of taste sensitivity to sweetness, inhibition of intestinal glucose absorption and lowering the plasma glucose levels. The purpose of the study is to develop *Gymnema sylvestre* extract loaded polymeric nanoparticle to enhance solubility, bioavailability and dose reduction. Quality by design based Taguchi method with L8 type of robust orthogonal array design was adopted to optimize the formulation. Three key dependent factors namely, drug amount, organic and aqueous ratio and amount of polymer were studied at two levels 5, 10 (mg); 15, 17.5 (mg); 1:1, 1:2 (v/v) respectively. Optimized batch was further subjected to solid state characterization, *in-vitro* drug release and stability studies. The particle size, polydispersity index, zeta potential and encapsulation efficiency of optimized extract loaded nanoparticle batch were found to be 209.5±12.5 nm, 0.224±0.04, -29.13±2.6 mV and 67.0±0.9%, respectively. *In-vitro* release showed biphasic behavior i.e. initial burst release followed by sustained release up to 24 hours. The drug release from the polymeric nanoparticle followed Higuchi model indicating diffusion controlled non-fickian drug release. Research outcomes suggested that, the optimized polymeric nanoparticle could be the potential alternative for drug delivery of gymnemic acid for controlled delivery and enhanced bioavailability.

Biography

Neha Singh is currently pursuing her Post-graduation (MPharm IDD) from Indian Institute of Technology, Banaras Hindu University (IIT-BHU) with CGPA 8.35 and ranked among top 5 students of the batch 2011-16. She qualified GATE-2015 examination and was selected for MHRD Post-graduate scholarship. For MPharm dissertation, she is working under supervision of Prof. Sanjay Singh, Department of Pharmaceutics, IIT-BHU.

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Notes: