ABSTRACT

The main aim of our study is the incorporation of polymeric nanoparticles and solid lipid nanoparticles containing Simvastatin into transdermal patches. In our study, Simvastatin was selected because it possess the ideal characteristics that a drug should have for formulating into a transdermal drug delivery system that includes high lipid solubility, low molecular mass, effective in low plasma concentration as well as a high degree of first pass metabolism. The aim of our study mainly supports for the prevention of first pass metabolism and achieve the controlled release.

By using various phosphate buffer solutions, solubility studies were conducted and based upon their results phosphate buffer of pH 6.8 with 1% Tween 20 was selected as a medium for in vitro studies. By using FT-IR, compatibility studies were performed between the drug Simvastatin and excipients used in the formulation. In the nanoparticulated formulation there was no interaction between the drug and the excipients was shown by the compatibility studies. Solvent evaporation method was employed for the preparation of PLNs by using Chitosan, PLA, and PCL as polymers. Micro emulsion technique was employed for the preparation of SLNs by using Stearic acid, cholesterol and Glycerylmonostearate as lipids. The prepared PLNs (SP1 to SP12) and SLNs (SL1 to SL6) formulations were evaluated in case of various parameters like morphology, particle size, zeta potential, PDI and in vitro drug release and the results of the above parameters were observed to be in the desired range.

With different concentrations of HPMC, the formulations SP4 and SL6 were selected and incorporated into transdermal patch. Evaluation for the various parameters was done for the prepared patches (TPN1 to TPN3 and SLNP1 to SLNP3) and the results were recorded individually. Based on the results obtained TPN1 and SLNP2 were selected for formulating the transdermal patches by incorporating different permeation enhancers. Evaluation was done for the transdermal formulations (PLP1 to PLP12 and SLP1 to SLP12) and the results were recorded individually. PLP12 (Span 80 as permeation enhancer) and SLP9 (DMSO as permeation enhancer) were observed to be the best formulation and were selected and subjected to in vivo analysis separately and were compared with and without permeation enhancers patches. These final patches showed a significant decrease in the serum cholesterol, LDL, VLDL & triglycerides levels and have increased the HDL and total protein levels significantly.