Bimatoprost and Sparfloxacin is successfully formulated by using Nanosuspension technology to overcome problems associated with Bimatoprost and Sparfloxacin for ocular delivery. In preformulation study, Bimatoprost and Sparfloxacin was characterized for its physical and chemical properties such as its solubility, melting point and absorption maxima. The purity of both the drugs was confirmed by the FTIR and DSC studies. From the study, it was found that both drug samples obtained was pure. The solubility of Bimatoprost and Sparfloxacin in water and different pH media was studied to select suitable solvent/co-solvent for the Bimatoprost and Sparfloxacin. The R-HPLC method was developed and validated for the evaluation of Bimatoprost and UV spectroscopic method for Sparfloxacin has been developed which was simple and suitable. The compatibility of Bimatoprost and Sparfloxacin with excipients was verified by DSC and FTIR studies and which was found to be compatible with excipients used in the formulation. The nanosuspensions of Bimatoprost and Sparfloxacin were prepared by homogenization followed by probe sonication method. Based upon trial and error laboratory experiments the composition like polymer and surfactant concentrations were optimized. During optimization the effects of different independent variables on dependent variables were studied for all nine batches.

While optimization nanosuspension, batch with clear appearance, zeta charge, % cumulative drug release and minimum particle size were selected as a optimized batch and subjected for further study. Optimized nanosuspension formulations were subjected for the evaluation. Optimized formulations were evaluated for different parameters like pH, particle size and charge, entrapment efficiency, \textit{in vitro} drug release study, \textit{in vitro}...
and *in vivo* ocular irritation studies, cytotoxicity screening, *ex vivo* and *in vivo* microbiological studies (Sparfloxacin nanosuspension), *ex vivo* corneal permeation study, isotonicity study, Pharmacokinetic study, anti-glaucoma study, (Bimatoprost Nanosuspension) and surface morphology (TEM) followed by stability study.

From the evaluation, it was observed that the drugs were successfully incorporated into the formulation. *In vitro*, drug release study, it was noticed that the optimized formulations showed better drug release than the marketed formulation when compared. From irritation study, isotonicity study and cytotoxicity study, it was confirmed that the both Sparfloxacin and Bimatoprost nanosuspension formulations were found non-irritating, isotonic and safe. Thus, the optimized formulations were confirmed as safe as marketed formulation.

The developed Sparfloxacin nanosuspension formulations were tested for antimicrobial potential. Optimized SNF3 formulation showed greater antimicrobial potential than the marketed formulation and Bimatoprost Optimized BNF3 formulation nanosuspension showed greater pharmacokinetic and pharmacodynamic behavior than commercial formulation which confirmed increased drug release, and diffusion of poorly soluble Bimatoprost and Sparfloxacin.