CHAPTER 7

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This thesis deals with the investigations carried out on the preparation and characterisation of oil-in-water nanoemulsion containing Terbinafine HCl, with minimum surfactant concentration that could improve its solubility and oral bioavailability.

Based on the literature studies, various excipients like olive oil, surfactants (Tween80), cosurfactant (Ethanol) were selected for the preparation of nanoemulsion. In preformulation studies, based on the solubility studies of Terbinafine HCl in different oils, olive was selected as oil phase for the development of the formulation.

The compatibility between the selected drug and the selected oil, surfactant and cosurfactant were tested by FTIR peak matching method and it was found to be compatible in entrapping the selected drug Terbinafine HCl.

Calibration curve of the drug was developed using methanol and phosphate buffer pH 7.4 in the range of 5µg/ml to 25µg/ml.

In the formulation and development, pseudo-ternary phase diagrams were developed using aqueous titration method. Slow titration with aqueous phase was done to each weight ratio of oil and SMIX and visual observations was carried out for transparent and easily flowable o/w nanoemulsion. From each phase diagram constructed, different formulations were selected from nanoemulsion region, so that drug could be incorporated into the oil phase.
Selected formulations were subjected to thermodynamic stability and dispersibility tests. Those formulations that passed these tests were selected for further studies like globule size, zeta potential analysis, polydispersity index, viscosity, electroconductivity determination, refractive index, transmittance, drug content, TEM and in vitro release studies.

Oral bioavailability studies were carried out in albino wistar rats. Optimized nanoemulsion (NE2), marketed tablet (Terbiforce™, 250 mg), solid dispersion and pure drug suspension were administered orally to rats; blood samples were collected at different time intervals over period of 24 hours and analyzed by HPLC. Various pharmacokinetic parameters were calculated.

Based on higher drug release, optimum globule size, minimum polydispersity, lower viscosity, lower surfactant concentration, high electroconductivity and higher bioavailability has been optimized as NE formulation of Terbinafine HCl containing oleic acid, Tween80 and Brij35, ethanol as oil, surfactant and cosurfactant respectively. The in vivo studies revealed that there was 2.87-fold increase in bioavailability as compared to marketed tablet, 2.275-fold increase in bioavailability as compared to solid dispersion and 2.38-fold to that of drug suspension when Terbinafine HCl was given as a nanoemulsion.

Stability studies conducted at 40±2°C and 75±5% RH predicted a degradation of 0.90% of terbinafine HCl in the formulation NE2 at the end of 90 days. The result indicates the stability of the formulation.
Our studies illustrated the potential use of NE for the delivery of hydrophobic compounds, such as Terbinafine HCl by the oral route.