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Furosemide Loaded Self Nano Emulsifying Drug Delivery System Enhanced Diuresis and Natriuresis in Rats

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Objectives: Poor water solubility is one of the reasons for erratic absorption after oral administration of furosemide (FSM), an antihypertensive loop diuretic. This study was designed to improve water solubility, permeability and ultimately bioavailability of FSM by Self Nano Emulsifying Drug Delivery System (SNEDDS) and pharmacodynamically evaluate its performance in rats.

Methods: FSM solubility was determined in various vehicles oils, surfactants and co-surfactants. Self-emulsification region for the rational design of SNEDDS formulations was identified by pseudoternary diagrams. Developed formulations were characterized by zeta potential determination, droplet size analysis, dilution test, viscosity determination, in vitro dissolution studies and in vivo pharmacodynamic evaluation via measurement of cumulative urine output and concentration of sodium in urine.

Results: A remarkable increase in dissolution rate was observed for the optimized SNEDDS when compared with the plain FSM and marketed formulation by in vitro dissolution studies. Significantly ($p<0.05$) increased cumulative urine output and sodium ion concentration was noticed in SNEDDS group as compared to plain FSM group.

Conclusions: The study confirmed that the SNEDDS formulation improved the bioavailability of FSM and it can be used as a possible alternative to traditional oral formulations.