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Preparation and evaluation of clopidogrel self-nano emulsifying drug delivery for enhanced solubility and dissolution

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A self-nano emulsifying drug-delivery system (SNEDDS) has been explored to improve the solubility and dissolution profile of poorly soluble drug clopidogrel. Different formulations were prepared using different oils, surfactants and co-surfactants. A pseudo ternary phase diagram was constructed to identify the self-micro emulsification region. Further, the resultant formulations were investigated for clarity, phase separation, drug content, % transmittance, globule size, freeze-thaw, in vitro dissolution studies, particle size analysis and zeta potential. On the basis of particle size, zeta potential and dissolution profile and other studies, F6 was found to be the best formulation of clopidogrel SNEDDS. The particle size of the emulsion is a crucial factor in self-emulsification performance because it determines the rate and extent of drug release as well as absorption. The average particle size of clopidogrel SNEDDS for transparent micro-emulsions should be less than 50nm. The particle size of the optimized SNEDDS formulation was found to be 5.2 nm and zeta potential was found to be -29 mV which comply with the requirement of the zeta potential for stability. The faster dissolution from SNEDDS may be attributed to the fact that in this formulation, the drug is a solubilized form and upon exposure to dissolution medium results in small droplet that can dissolve rapidly. The % release from optimized SNEDDS formulation F6 was highest (98.93%) and faster than other SNEDDS formulations and pure drug substance indicating influence of droplet size on the rate of drug dissolution. FTIR data revealed no physicochemical interaction between drug and excipients. Thus clopidogrel with SNEDDS formulation may be used for the improvement of solubility and dissolution rate in the effective management of heart disease.

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