Introduction:

The enhancement of oral bioavailability of poorly water soluble drugs remains one of the most challenging aspects of drug development. Although salt formation, solubilization and particle size reduction have commonly been used to increase dissolution rate and thereby oral absorption and bioavailability of such drugs. There are practical limitations of these techniques. The salt formation is not feasible for neutral compounds and the synthesis of appropriate salt forms of drugs that are weakly acidic or weakly basic may often not be practical. The solubilization of drugs in organic solvents or in aqueous media by the use of surfactants and cosolvents leads to liquid formulations that are usually undesirable from the viewpoints of patient acceptability and commercialization. Although particle size reduction is commonly used to increase dissolution rate, there is a practical limit to how much size reduction can be achieved by such commonly used methods as controlled crystallization, grinding, etc. The use of very fine powders in a dosage form may also be problematic because of handling difficulties and poor wettability. [ Fude Cui et al, (2003)]

Solid Dispersion is a practical method whereby many of the limitations with the bioavailability enhancement of poorly water-soluble drugs can be overcome. From conventional capsules and tablets, the dissolution rate is limited by the size of the primary particles formed after the disintegration of dosage forms. In this case, an average particle size of 5µm is usually the lower limit, although higher particle sizes are preferred for ease of handling, formulation and manufacturing. On the other hand, if a solid dispersion or a solid solution is used, a portion of the drug dissolves immediately to saturate the gastrointestinal fluid, and the excess drug precipitates out as fine colloidal particle or oily globules of submicron size. Because of such easily promises in the bioavailability enhancement of poorly water-soluble drugs, solid dispersion has become one of the most active areas of research in the pharmaceutical field.[ G.V. D. Mooter et al, (2005)]

Solid dispersion appear to be better approach to improve drug solubility than other techniques, because they are easier to produce and more applicable. Solid dispersions are more acceptable to the patients than solubilization products since they give rise to solid dosage forms instead of liquid as solubilization products usually do. Solid dispersions are more efficient than the particle size reduction techniques, since the later have a particle size reduction limit around
2-5µm which frequently is not enough to improve considerably the drug solubility or drug release in the small intestine and consequently, to improve the bioavailability.[ C.S. Yong et al, (2010)]

Successful development of solid dispersion systems for preclinical, clinical and commercial use have been feasible in recent years due to the availability of surface-active and self-emulsifying carriers with relatively low melting points. The preparation of dosage forms involves the dissolving of drug in melted carriers and the filling of the hot solutions into hard gelatin capsules because of the simplicity of manufacturing and scale up processes, the physicochemical properties and, as a result, the bioavailability of solid dispersions are not expected to change significantly during the scale up. For this reason, the popularity of the solid dispersion system to solve difficult bioavailability issues with respect to poorly water-soluble drugs will grow rapidly. Because the dosage form can be developed and prepared using small amounts of drug substances in early stages of the drug development process, the system might have an advantage over such other commonly used bioavailability enhancement techniques as micronization of drugs and soft gelatin encapsulation.[ E. Badens et al, (2009)]

The effect of the particle size of the drugs on their dissolution rates and biological availability was reviewed comprehensively by scientists. For drugs whose gastrointestinal absorption is rate limited by dissolution, reduction of the particle size generally increases the rate of absorption and or total bioavailability. Solid dispersion is unique approach to reduce the particle size causing rapid dissolution rates that result in an increase in the rate and extent of the absorption of the drug, and a reduction in pre systemic metabolism.[ G.V. D. Mooter et al, (2005)]

Present study intended towards improvement of dissolution rate of poorly soluble drugs by Solid dispersion technology using various Polymeric materials, surfactants and sugars as carrier by adapting different methods of Solid dispersion technology.