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Pickering Dry Emulsion System for Dissolution Enhancement of Poorly Water Soluble Drug (Fenofibrate)

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Abstract : Poor water soluble drugs are difficult to promote for oral drug delivery as they demonstrate poor and variable bioavailability because of its poor solubility and dissolution in GIT fluid. Nowadays lipid based formulations especially self microemulsifying drug delivery system (SMEDDS) is found as the most effective technique. With all the impressive advantages, the need of high amount of surfactant (50% - 80%) is the major drawback of SMEDDS. High concentration of synthetic surfactant is known for irritation in GIT and also interference with the function of intestinal transporters causes changes in drug absorption. Surfactant may also reduce drug activity and subsequently bioavailability due to the enhanced entrapment of drug in micelles. In chronic treatment these issues are very conspicuous due to the long exposure. In addition the liquid self microemulsifying system also suffers from stability issues. Recently one novel approach of solid stabilized micro and nano emulsion (Pickering emulsion) has very admirable properties such as high stability, absence or very less concentration of surfactant and easily converts into the dry form. So here we are exploring pickering dry emulsion system for dissolution enhancement of anti-lipemic, extremely poorly water soluble drug (Fenofibrate). Oil moiety for emulsion preparation was selected mainly on the basis of higher solubility of drug. Captex 300 was showed higher solubility for fenofibrate, hence selected as oil for emulsion. With Silica (solid stabilizer); Span 20 was selected to improve the wetting property of it. Emulsion formed by Silica and Span20 as stabilizer at the ratio 2.5:1 (silica: span 20) was found very stable at the particle size 410 nm. The prepared emulsion was further preceded for spray drying and formed microcapsule evaluated for in-vitro dissolution study, in-vivo pharmacodynamic study and characterized for DSC, XRD, FTIR, SEM, optical microscopy etc. The in vitro study exhibits significant dissolution enhancement of formulation (85 % in 45 minutes) as compared to plain drug (14 % in 45 minutes). In-vivo study (Triton based hyperlipidaemia model) exhibits significant reduction in triglyceride and cholesterol with formulation as compared to plain drug indicating increasing in fenofibrate bioavailability. DSC and XRD study exhibit loss of crystallinity of drug in microcapsule form. FTIR study exhibit chemical stability of fenofibrate. SEM and optical microscopy study exhibit spherical structure of globule coated with solid particles.

Keywords : captex 300, fenofibrate, pickering dry emulsion, silica, span20, stability, surfactant
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