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Design and development of solid lipid nanoparticle for the oral delivery of Decitabine

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The aim of current study entails to develop a solid lipid nanoparticle (SLN) as a novel lipid nanocarrier for the oral delivery of decitabine (DCB) using cold homogenization technique. A Box-Behnken design (3^3) with 17 experimental runs was constructed to identify the key independent variables influencing on dependent variables. The optimized batch (SLN-11) was further characterized with particle size distribution, zeta potential, TEM, entrapment efficiency, drug content, rheological study, DSC, *in vitro* drug release, and accelerated stability. The optimized batch revealed spherical morphology under TEM analysis with particle size of 136.6± 2.35 nm and 0.244±0.002 PDI. Zeta potential and %EE was found to be -31.34±0.67 mV and 58.89% ±0.78 respectively**.** *In vitro* release studies showed burst release at the initial stage followed by sustained release up to 24 hrs in intestinal medium and the data was further studies using release kinetic models which revealed Higuchi matrix as a best fitted model. Finally, SLN prepared using Precirol ATO5 as solid lipid and surfactants as Poloxamer 188, Tween 80 and Solutol HS15 (2:1:2 ratio) posses high potential to entrap DCB in lipid nanoparticle, showed better prospects for the oral delivery of DCB.

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