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ABSTRACT BOOK

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Formulation and Optimization of Nanostructured Lipid Carriers of Poorly Soluble Anticancer Drug Using Box-Behenken Design

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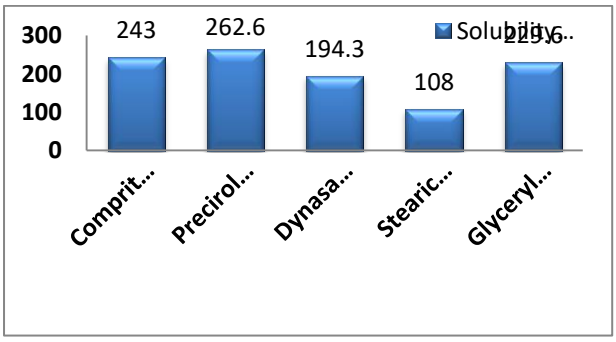
Keywords: Lipids , Box-Behenken design, Nanostructured lipid carriers, Solubility, Anticancer drug.

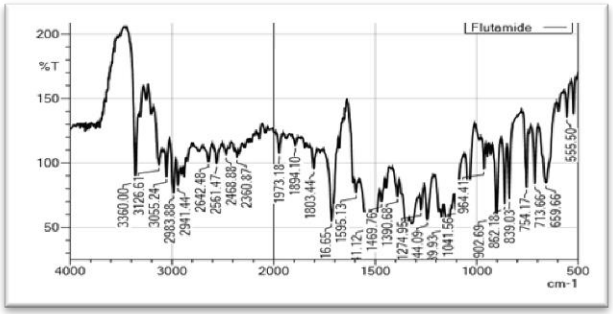
Aim: The present investigation was aimed at formulation and optimization of nanostructured lipid carriers of poorly soluble anticancer drug using Box-Behenken design.

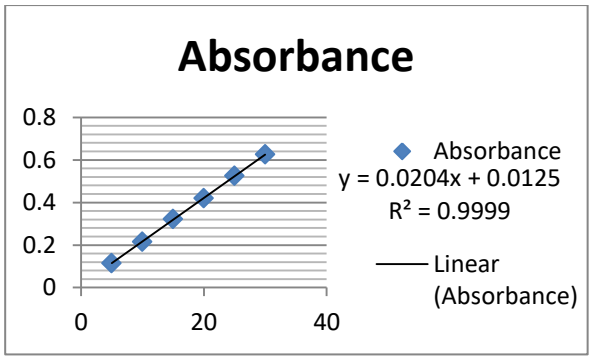
Objectives: To develop nanostructured lipid carriers of anticancer drug with a goal to increase the solubility of the drug.

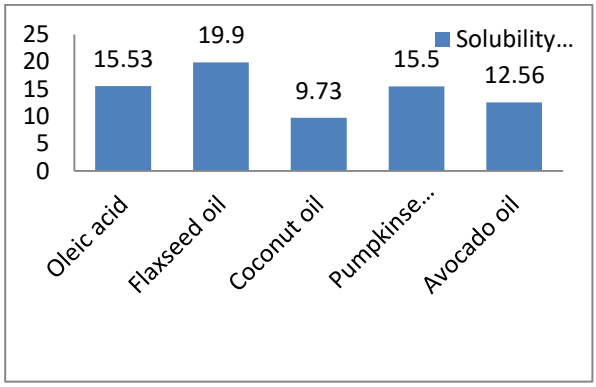
Methodology: Nanostructured lipid carriers of poorly soluble drug flutamide were prepared with biocompatible lipids and surfactants. Flutamide loaded NLCs were prepared by melt emulsification ultrasonication method in which Precirol ATO 5 was used as solid lipid and flaxseed oil as liquid lipid. Koliphor RH40 and Tween 80 were used in combination in 1:1 ratio. Three factor three level Box-Behenken response surface methodology was used to identify key formulation parameters influencing particle size, polydispersity index and entrapment efficiency of the NLCs. The solubility of flutamide and flutamide loaded NLCs was determined in water, pH 1.2 buffer, pH 6.8 buffer and pH 7.4 buffer. Solubility analysis was carried out by using UV-spectrophotometer.

Results and Discussion: The optimized formulation revealed spherical morphology with smooth surface under scanning electron microscopy. Optimized formulation achieved a high drug entrapment of 97.81±0.70%. Drug-excipients interaction was investigated by FTIR study. Phase transition of flutamide during NLC processing was confirmed by differential scanning calorimetry. X-ray diffraction study revealed transformation of flutamide from crystalline to amorphous form. Significant increase in solubility of flutamide was observed when prepared in form of NLCs. Solubility of flutamide loaded NLCs was found eighteen times higher (0.0493mg/mL) than pure drug (0.00261 mg/mL) in water. The solubility of flutamide loaded NLCs in pH 1.2, 6.8 and 7.4 buffers increased five times, three times and four times higher (0.0746 mg/mL, 0.0653 mg/mL and 0.0577mg/mL) than the pure drug (0.0127 mg/Ll, 0.0130 mg/mL and 0.01225mg/mL).









Conclusion: Flutamide loaded NLCs were successfully optimized using the Box–Behnken design and based on the results, it can be concluded that flutamide can be formulated into nanostructured lipid carriers with enhanced solubility.

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