Improved Physico-chemical and Biopharmaceutical Properties of Olanzapine through PLGA-Nanoparticles
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Purpose
The objective of this study was to design and develop PLGA-nanoparticles containing Olanzapine (BCS Class II drug), for modifying the physico-chemical and biopharmaceutical properties to improve the bioavailability.

Methods
The Olanzapine nanoparticles were formulated by nanoprecipitation method using biocompatible polymer poly (Lactic-co-glycolic acid) or PLGA and surfactant Pluronic F-68 (poloxamer-188). The prepared nanoparticles were evaluated for particle size, poly dispersity, zeta potential, entrapment efficiency, External morphology(SEM Study), crystallinity study (DSC) and in vitro release studies. Oral bioavailability studies were carried out in Albino Wistar rats where formulation (F2) and Olanzapine suspension were administered orally and pharmacokinetic parameters were calculated.

Results
The study revealed that the formulation(F2) with drug content of 5.61mg and a drug entrapment of 56.10%. The particle size distribution was between 126 – 234 nm and all the formulations were followed unimodel which was confirmed by the poly dispersity index (0.095 – 0.257). The SEM study revealed that nanoparticles in (F2) were spherical in shape and smooth surface. The DSC curve of Olanzapine showed a melting endotherm at 194.78 ºC. Reduction in the melting point (162.24 ºC) was observed in nanoparticles due to Incorporation of olanzapine inside the nanoparticles. The in vitro release of all drug loaded batches shows a biphasic pattern of release and the drug release from the nanoparticles in sustained manner over a period 24 hrs with maximum drug release 72.8% (Batch F2). The drug release from all the formulations were following First order kinetics which was evident from the correlation coefficient obtained for the First order equation and the mechanism of drug release was Higuchi’s diffusion. The AUC0→t values of olanzapine after oral administration of OL-PLGA Nanoparticles were 4-folds higher than those obtained with OL-Suspension.

Conclusion
The formulated PLGA-nanoparticles delivery system achieved desirable physico-chemical and biopharmaceutical properties of a poorly soluble drug Olanzapine by improved bioavailability.