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# Development and Evaluation of Sustained Oral Ketorolac Tromethamine Particulate Matrix via Bioadhesive Chitosan Based Freeze-Dried Solid Dispersions



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**Abstract**

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**Objectives:** This study aimed to develop and evaluate chitosan (CTS) solid dispersion particulate matrix (SDPM) for sustained oral delivery of ketorolac tromethamine (KT). **Methods:** SDPM formulations were prepared by freeze drying method and characterized for their effectiveness and biological activities via in vitro and in vivo assessment. **Key findings:** Powder's flowability and bioadhesion of SDPM increased compared to KT-CTS physical mixtures and the raw materials. DSC analysis proved that the extent of drug crystallinity in matrix particles reduced as the amount of CTS content increased. FT-IR spectroscopy suggested drug-polymer interaction that was prominent in SDPM (1:7). In vitro drug release and simulated plasma profiles showed the superiority of SDPM (1:7) in sustaining drug release up to 12h. The optimized formula was stable during the storage time whereas the similarity factor ( $f_2$ ) for in vitro release data before and at the end of the study was 92%. Furthermore, in vivo bioactivity studies confirmed that the ulcerogenic property of SDPM (1:7) remarkably decreased compared to the standard drug while the analgesic and anti-inflammatory properties were maintained. **Conclusion:** Results suggested freeze-dried chitosan based SDPM (1:7) as a potential candidate for sustained oral administration of KT.

**Keywords:** Bioadhesion; Chitosan; Convolution; Freeze-drying; Ketorolac tromethamine; Solid dispersion

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