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Formulation and Evaluation of Metformin Hydrochloride Sustained Release Tablet

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Abstract: *Metformin hydrochloride (MET) is a widely used oral hypoglycemic agent that improves glucose tolerance in patients with type 2 diabetes by lowering basal plasma glucose levels. However, its relatively short plasma half-life and low bioavailability necessitate frequent administration (2–3 times daily), which may reduce patient compliance and increase dose-dependent side effects. To address these limitations, sustained-release (SR) matrix tablets of MET were developed using the wet granulation technique with Polyvinyl pyrrolidone K30 and hydroxypropyl methylcellulose (HPMC) of varying viscosity grades (K4M, K15M, and K100M). The impact of different polymer ratios on drug release was evaluated, with results indicating that while HPMC K100M alone was insufficient to achieve the desired release profile, its combination with PVP K30 provided optimal kinetics. Among all formulations, batch F3 demonstrated superior performance, achieving controlled release over 8–12 hours. Such a formulation has the potential to reduce dosing frequency, enhance patient adherence, and minimize adverse effects. This the promise of matrix-based sustained release systems as an effective strategy for optimizing the therapeutic performance of metformin hydrochloride.*

Keywords*:* Sustained-release drug delivery, Matrix tablet formulation, Diffusion mechanism, Rate-controlling polymer, Antidiabetic agent, Metformin hydrochloride, HPMC K100M, Wet granulation method

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