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Preparation and evaluation of zinc sulfate sustained release tablets using lipophilic and hydrophilic matrix

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Background and Aims: Zinc usually administered orally as zinc sulfate to correct zinc deficiency. After oral administration, it has shown severe GI side effects such as abdominal pain, nausea, and gastritis. The main objective of the present study was to prepare a sustained release (SR) preparation of the zinc sulfate to diminish GI side effects and to increase drug absorption throughout the GI tract by gradual release of the zinc.
Methods: Sustained release zinc sulfate tablets were prepared using either lipophilic-based matrix or hydrophilic matrix system by hot-fusion (HF) granulation or direct compression (DC) method respectively. The SR tablets were evaluated for the hardness, weight variation, disintegration time, content uniformity and drug release behavior. Drug release studies were carried out using a dissolution apparatus (Erweka, DT700), paddle method (50 rpm) at 37°C in 900 ml of deionized water. At appropriate time intervals, samples were withdrawn and assayed for amount of drug by an atomic absorption spectrophotometer at 213.8nm.
Results: Most of the prepared formulations showed acceptable physicochemical properties. Among 30 formulations, SR tablets with lipophilic matrix-based showed slower release compared with tablets prepared based on hydrophilic matrix. Tablets containing carnauba wax showed slower release while tablets with hydrogenated castor oil represented faster release profile. A lipophilic matrix tablet containing zinc sulfate (110mg), beeswax (1.77mg), stearyl alcohol (3.76mg), stearic acid (1.88mg) and lactose (40.58mg) was selected as the best formulation. The percent of drug released from selected SR tablet was 48%, 57% and 61% after 30min, 60min and 180min respectively. Hardness and granule size had no effects on release rate in all formulations.
Conclusions: Lipophilic based SR tablets of zinc sulfate is suggested to the market as an alternative dosage form for conventional tablet or syrup of the drug which both suffer from causing GI side effects.

Keywords: Zinc sulfate; Lipophilic matrix; Hydrophilic matrix; Sustained release tablets