Evaluation of Drug Release and Performance Parameters for Metformin Extended Release Tablets

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The objective of the current investigation was to evaluate the release of metformin from extended-release hydrophilic tablets and to assess their swelling, textural, and erosional behavior. Drug release from the matrix tablets was assessed using USP 26 apparatus II (paddle) modified with the insertion of mesh. The swelling and erosion behavior was investigated by textural analysis of the swollen tablets using a TA. XT2i texture analyzer. The release of metformin was pH-independent with a burst effect observed during the first two hours of the release. The rapid increase in swelling initially may be responsible for the burst effect in drug release. In HCl/KCl buffer, the drug release followed non-fickian (anomalous) release, while it followed Fickian (Case I) diffusion in phosphate buffer. The drug release was diffusion controlled rather than firstorder kinetics. The rate of water uptake followed an anomalous or complex behavior. Increased swelling and water uptake increased the drug release, while decreased work of penetration through the polymeric matrix decreased the drug release. Erosion was also one of the mechanisms that occurred in HPMC-matrix tablets. It is interesting to note that swelling and water uptake played a more important role than erosion during drug release.

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