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Development of Glutaraldehyde Cross-linked Metronidazole Loaded Chitosan Microcapsules: Analysis of Dissolution Data using DDSolver

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SUMMARY. The aim of this study was to develop sustained release formulation for improving bioavailability of metronidazole designing metronidazole loaded chitosan microcapsules (MLCM) using coacervation technique. Two solutions with different pH nature *i.e.* chitosan solution in 5 % glacial acetic acid containing metronidazole and 2 M NaOH solution were employed for the induction of coacervation. Glutaraldehyde was used as cross-linking agent. Different MLCM formulations were fabricated by varying chitosan and glutaraldehyde concentrations. Dissolution data was evaluated using new software, DDSolver. Microcapsules were discrete, brown, spherical and porous. Microcapsule size range was 343.6 ± 8.9 μm – 401.9 ± 9.6 μm and the entrapment efficiency ranged from 45.2 ± 6.4 – 64.3 ± 5.7 for all formulations. The F6 formulation with drug/polymer ratio 1:2 (w/w) was optimum regarding entrapment efficiency (64.3 ± 5.7 %), flow characteristics (Hausner's ratio = 1.3-1.5) and drug release properties, in all cases. The kinetic analysis of dissolution data confirmed diffusion controlled release of metronidazole from its microcapsules. From the results, it can be concluded that metronidazole can be successfully microencapsulated into the chitosan shells by coacervation and is influenced significantly by the quantity of chitosan and glutaraldehyde employed.

KEY WORDS: Characterization, Chitosan, Coacervation, Glutaraldehyde, Metronidazole.
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