Tamarind seed gum-hydrolyzed polymethacrylamide-g–gellan beads for extended release of diclofenac sodium using 32 full factorial design

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Tamarind seed gum-hydrolyzed polymethacrylamide-g–gellan beads for extended release of diclofenac sodium using 3^2 full factorial design

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Abstract:

Development of tamarind seed gum (TSG)-hydrolyzed polymethacrylamide-g-gellan (h- Pmaa-g-GG) composite beads for extended release of diclofenac sodium using 3^2 full factorial design is the main purpose of this study. The ratio of h-Pmaa-g-GG and TSG and concentration of cross-linker $CaCl_2$ were taken as independent factors with three different levels of each. Effects of polymer ratio and $CaCl_2$ on drug entrapment efficiency (DEE), drug release, bead size and swelling were investigated. Responses such as DEE and different drug release parameters were statistically analyzed by 3^2 full factorial design using Design-Expert software and finally the formulation factors were optimized to obtain USP-reference release profile. Drug release rate was found to decrease with decrease in the ratio of h-Pmaa-g-GG: TSG and increase in the concentration of Ca^{2+} ions in cross-linking medium. The optimized formulation showed DEE of 93.25% and an extended drug release profile over a period of 10 h with f_2 = 80.13. Kinetic modeling unveiled case-I-Fickian diffusion based drug release mechanism.

Key words: Hydrolyzed-polymethacrylamide-g-gellan, tamarind seed gum, beads.