Characterization of Extended Release Matrices of Paracetamol Prepared by Hot Melt Extrusion of Polymeric Combination of Carbopol 971P and Polyox

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Abstract

Extended release matrix of Paracetamol within a polymeric combination, at different Polyox WSR N-10 to Carbopol 971P ratios, was prepared by either continuous Hot Melt Extrusion (HME) technology or conventional direct compression method. The investigation focuse on the influence of the proportion of the polymeric material on the release rate of the model drug from the matrices. Also, to evaluate the drug release rate with regard to preparation method (extrusion vs. compression). Three groups of matrices were formulated; the first group was prepared by hot melt extrusion process which has the polymer content in the range of 0 – 20 % of Carbopol 971P and 20 – 40 % of Polyox WSR-N-10. While the second and third groups were formulated by direct compression to produce tablets and mini tablets with polymer ratio in the range of (0– 19.61) % of Carbopol 971P and (19.61 – 39.22) % of Polyox WSR-N-10. Drug dissolution behavior was determined for each group via in vitro release studies. The results of the extrudate and mini tablet group formulations showed that only formulation with 2.5 % of Carbopol 971P provides a release profile for the model drug that match with the USP monograph. Contrary, none of the tablet group formulations was able to provide the required release profile that match the compendial requirements. Thermal analysis tests were performed to confirm paracetamol crystallinity and to detect any changes in the solid state of paracetamol during the thermal process. Differential scanning calorimetry and polarized light microscopy showed that the drug remains in the original crystalline form through the process. The study highlighted the suitability of polymer combination to extend the drug release at different levels. This research demonstrated that the drug release rate depends on the Carbopol 971P content. On the other hand, the drug release

rate is not affected by the preparation method. Thus, different range of release profile can easily be obtained through variations in Carbopol 971P content and tablet dosage form.