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Formulation Development and *In Vitro* Characterization of Sustained Release Matrix Tablets of Verapamil HCl Using Synthetic and Natural Polymers

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***SUMMARY*. The pharmaceutical attributes of sustained release (SR) oral tablets containing verapamil hydrochloride prepared by using synthetic polymers (HPMC K4M and Na carboxymethylcellulose) and natural hydrophilic matrix formers (xanthan gum and Acacia) were observed in the present work. Direct compression method was used for the preparation of sustained release matrix tablet using the polymers in different ratios. Compressed tablets were evaluated for hardness, friability, weight variation and *in vitro* dissolution using USP dissolution apparatus-II. Dissolution profiles of test formulations were obtained in 900 mL distilled water for 12 h at 37 °C. The data was then kinetically evaluated with different mathematical models *i.e.,* Zero Order, First Order, Higuchi, Hixson-Crowell, Baker & Lonsdale, Korsmeyer and Peppas, Weibull, Hoffenberg and Peppas Sahi. Different verapamil hydrochloride matrix tablet formulations have shown different dissolution behavior and it was concluded that the synthetic polymers HPMC K4M and Na carboxymethylcellulose in combination is a better choice for sustained release formulation development for verapamil hydrochloride. Furthermore, the results of similarity factor f_2 between the compressed formulations and Calan SR® have verified formulation F4 (having synthetic polymers) as optimized formulation due to greatest similarity.**

RESUMEN. Se estudiaron los atributos de liberación sostenida (SR) de tabletas orales que contienen clorhidrato de verapamilo preparado usando polímeros sintéticos (HPMC K4M y Na carboximetilcelulosa) y formadores de matriz hidrófilos naturales (goma xantan y goma de Acacia). El método de compresión directa se utilizó para la preparación de tabletas de liberación sostenida usando los polímeros en diferentes proporciones. Las tabletas comprimidas se evaluaron para dureza, friabilidad, variación de peso y disolución *in vitro* usando para la disolución el aparato II USP. Los perfiles de disolución de las formulaciones de ensayo se obtuvieron en 900 mL de agua destilada durante 12 h a 37 °C. Los datos fueron entonces cinéticamente evaluados con diferentes modelos matemáticos es decir, de orden cero, de primer orden, Higuchi, Hixson-Crowell, Baker & Lonsdale, Korsmeyer y Peppas, Weibull, Hoffenberg y Peppas Sahi. Las diferentes formulaciones de comprimidos de clorhidrato de verapamilo mostraron diferente comportamiento de disolución y se concluyó que los polímeros sintéticos HPMC K4M y Na Carboximetilcelulosa en combinación es una mejor opción para el desarrollo de formulaciones de liberación sostenida. Además, los resultados del factor de similitud f_2 entre las formulaciones y Calan SR® han verificado que la formulación F4 (con polímeros sintéticos) es la óptima debido a su mayor similitud.

KEY WORDS: Verapamil HCl, Synthetic polymers, Sustained release, Tablet evaluation techniques, Mathematical kinetics models.

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