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Development of Cefuroxime Axetil Loaded Solid Self-Nanoemulsifying Drug Delivery System with Improved Pharmacokinetic Profile

Ishita SHAMPA [1], Md. Khalid ANWER [2], Mohd. A. MIRZA [3], Ramadan AL-SHDEFAT [4], Mohamad TALEUZZAMAN [5], Sushama TALEGAOKAR [1] & Zeenat IQBAL [1]*

[1] *Nanoformulation Research Lab, Department of Pharmaceutics, Faculty of Pharmacy, Jamia Hamdard University, New Delhi 110062, India*
[2] *Department of Pharmaceutics, College of Pharmacy, Prince Sattam Bin Abdulaziz University, Al-kharj, 11942, Saudi Arabia*
[3] *New Zealand Fulvic Limited, Mount Maunganui, Tauranga 3116, New Zealand.*
[4] *Department of Pharmaceutical Sciences, Faculty of Pharmacy, Jadara University, Irbid, Jordan*
[5] *Department of Pharmaceutical Chemistry, Glocal School of Pharmacy, Glocal University, Mirzapur Pole, Sharanpur, U.P, India*

***SUMMARY*. In the current study various self-nanoemulsifying drug delivery systems (SNEDDS) of cefuroxime axetil (CA) were developed. Based on solubility data of CA in various components, triacetin, cremophor EL and carbitol were selected as oil, surfactant and cosurfactant, respectively. The developed CA loaded SNEDDS were evaluated for thermodynamic stability, droplet size, morphology (TEM), refractive index, viscosity, transmittance and *in vitro* drug release. Results showed that the mean droplet size of all self-nanoemulsifying drug delivery system were found to be in the range (23.95 to70.69 nm). All formulae also showed good optical clarity and optimum viscosity. *In vitro* release of cefuroxime axetil from optimized (I2) self-nanoemulsifying drug delivery system formulae showed more than 84% of CA released in 10 h. The optimized self-nanoemulsifying drug delivery system was further incorporated into solid self-nanoemulsifying drug delivery system by extrusion-spheronization technique using microcrystalline cellulose and starch as a carrier. The *in vivo* data showed the bioavailability increased by four times in solid self-nanoemulsifying drug delivery system compared to the other marketed preparations.**

RESUMEN. En el presente estudio se desarrollaron varios sistemas de administración de fármacos auto-nanoemulsificantes (SNEDDS) de cefuroxima axetil (CA). Basándose en los datos de solubilidad de CA en diversos componentes, se seleccionaron triacetina, cremophor EL y carbitol como aceite, surfactante y co-tensioactivo, respectivamente. Se evaluó la estabilidad termodinámica, el tamaño de las gotitas, la morfología (TEM), el índice de refracción, la viscosidad, la transmitancia y la liberación *in vitro* del fármaco. Los resultados mostraron que el tamaño medio de las gotitas de todos los sistemas de suministro de fármaco auto-nanoemulsificantes se encontraba en el intervalo (23,95 a 70,69 nm). Todas las fórmulas mostraron una buena claridad óptica y una viscosidad óptima. La liberación *in vitro* de cefuroxima axetil a partir de fórmulas del sistema de administración de fármaco auto-nanoemulsificante optimizado (I2) mostró que más del 84% de CA se liberó en 10 h. El sistema de suministro de fármaco auto-nanoemulsificante optimizado se incorporó adicionalmente en el sistema de administración de fármaco auto-nanoemulsificante sólido por técnica de extrusión-esferonización utilizando celulosa microcristalina y almidón como vehículo. Los datos *in vivo* mostraron que la biodisponibilidad aumentó cuatro veces en el sistema de suministro de fármaco auto-nanoemulsificante sólido comparado con las otras preparaciones comercializadas.

KEY WORDS: bioavailability, carbitol, cefuroxime axetil, cremophore, S-SNEDDS, triacetin.

* Author to whom correspondence should be addressed. *E-mail:* ziqbaljh@yahoo.co.in

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