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RESEARCH ARTICLE

FORMULATION AND EVALUATION OF SUSTAINED RELEASE *IN SITU* OPHTHALMIC GEL OF NEOMYCIN SULPHATE

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The aim of the present work was to formulate and evaluate *in situ* gelling system of Neomycin sulphate. Neomycin sulphate is an antibacterial agent which exhibits rapid precorneal elimination and poor ocular bioavailability, when given in the form of conventional ophthalmic drops. To overcome this, an attempt has been made to formulate temperature-triggered *in situ* gelling system of Neomycin sulphate to provide sustained release of drug based on polymeric carriers that undergo sol-to-gel transition upon change in temperature. The Neomycin sulphate in situ gelling system was formulated by using Poloxamer 407 in combination with hydroxyl propyl methyl cellulose (HPMC) which acted as viscosity enhancing agent. The formulations were evaluated for clarity, pH measurement, gelling capacity, drug content estimation, rheological study, *in vitro* diffusion study and antibacterial activity. The developed formulation was stable and provided sustained release up to a time period of 8 h and it is a viable alternative to conventional eye drops.

Key words: Neomycin sulphate, *In situ* gel, Sustained release, Neomycin sulphate, Poloxamer 407.

INTRODUCTION

Ocular drug delivery is an extremely important topic, especially with the recent development of new drugs for the treatment of different eye diseases. An ideal drug therapy achieves effective concentration of drug at the target for a specified period of time in order to minimize general and local side effects (Lee and Robinson, 1986; Sasaki *et al* 1996). Eye is most interesting organ due to its drug disposition characteristics. Generally, topical application of drugs is the method of choice under most circumstances because of its convenience and safety for ophthalmic chemotherapy.

Since past few decades, there has been plenty of research reports exhibiting potential of controlled and sustained drug delivery systems (Chitra *et al* 2012; Basarkar *et al* 2013; Nagpal *et al* 2014; Mishra and Jain, 2014). Moreover, various approaches that have been attempted to increase the bioavailability and the duration of the therapeutic action of ocular drugs can be divided into two categories. The first one is based on the use of sustained drug delivery systems, which provide the controlled and continuous delivery of ophthalmic drugs and the second one involves maximizing corneal drug absorption and minimizing pre-corneal drug loss. Ideal ophthalmic drug delivery must be able to sustain the drug release and to remain in the vicinity of front of the eye for prolong period of time. Consequently, it is imperative to optimize ophthalmic drug delivery; one of the ways to do so is by addition of polymers of various grades, development of *in situ* gel or colloidal suspension or using erodible or non-erodible insert to prolong the pre-corneal drug retention (Robinson, 1993).