Nanoemulsion-based electrolyte triggered in situ gel for ocular delivery of acetazolamide

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ABSTRACT

In the present work the antiglaucoma drug, acetazolamide, was formulated as an ion induced nanoemulsionbased in situ gel for ocular delivery aiming a sustained drug release and an improved therapeutic efficacy. Different acetazolamide loaded nanoemulsion formulations were prepared using peanut oil, tween 80 and/or cremophor EL as surfactant in addition to transcutol P or propylene glycol as cosurfactant. Based on physicochemical characterization, the nanoemulsion formulation containing mixed surfactants and transcutol P was selected to be incorporated into ion induced in situ gelling systems composed of gellan gum alone and in combination with xanthan gum, HPMC or carbopol. The nanoemulsion based in situ gels showed a significantly sustained drug release in comparison to the nanoemulsion. Gellan/xanthan and gellan/HPMC possessed good stability at all studied temperatures, but gellan/carbopol showed partial drug precipitation upon storage and was therefore excluded from the study. Gellan/xanthan and gellan/HPMC showed higher therapeutic efficacy and more prolonged intraocular pressure lowering effect relative to that of commercial eye drops and oral tablet. Gellan/xanthan showed superiority over gellan/HPMC in all studied parameters and is thus considered as a promising mucoadhesive nanoemulsion-based ion induced in situ gelling formula for topical administration of acetazolamide.

Keywords:

Acetazolamide Gellan gum Glaucoma Intraocular pressure Ion sensitive in situ gel Nanoemulsion