Development of Nano Drug Mediated Ocular Inserts for Improved Treatment of Eye Disorders

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Abstract:
Glaucoma is a second commonest source of visual disability disease which causes irreversible blindness and is characterized by increase in intra ocular pressure. Conventional eye drops are used to treat glaucoma but its poor bioavailability due to lachrymal dilution, drainage demands for frequent drug administration to the patients especially during chronic conditions. This necessitates the approach of delayed drug delivery to increase the contact time in the eye, bioavailability and decrease lacrimal drainage of the drug. Thus, the present research aimed to investigate sustained antiglaucoma activity of curcumin and boswellin with the development of biodegradable ocular inserts.

The formulations were developed using mucoadhesive polymers chitosan, thiolated chitosan and HPMC-K100 in different polymer blend ratios with propylene glycol as the plasticizer by solvent casting method using aluminium cup moulds. The formulated ocular inserts were evaluated for various pharmaco-technical parameters. The surface morphology and uniformity of the films formation were ascertained by SEM studies. The in-vitro drug release using Flow through cell apparatus and Keshary Chein cell for drug diffusion studies were studied and compared to recommend suitable method for ocular in-vitro drug release kinetics simulating eye physiological conditions. The gamma radiation dose was established for ocular inserts sterilization and the process confirmed by sterility testing. The sterile products were tested for ocular irritation in albino rabbits and there was no sign of eye irritation even after 72 hours of administration. Pharmacodynamic study results indicated the reduction of intra ocular pressure on hyaluronic acid induced glaucoma in albino rabbits with sustained action over a period of time.

Both ocular inserts of curcumin and boswellin inserted in the rabbits eye

Conclusion: The ocular inserts loaded with curcumin and boswellin exhibited sustained anti-glaucoma action with less frequency of administration and patient compliance compared to conventional marketed eye drops.