Stability of Chitosan Solutions for Potential Use in Ocular Drug Delivery

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ABSTRACT

In this study, the physicochemical properties of chitosan and its stability in solution for potential use as an ocular drug delivery vehicle were studied. The physicochemical properties of the chitosan used were characterized in terms of its moisture content, degree of deacetylation (DD) and viscosity-average molecular weight ($\overline{M}_v$) and were found to be 13.5%, 94.0% and 6.03 x 10^5, respectively. Chitosan solutions of 0.1% and 0.3% w/v concentrations in 1% aqueous L(+)-lactic acid were prepared. Sterilization of the solutions by autoclaving at 121°C at 15 psi pressure for 15 mins resulted in rapid acid-catalysed hydrolytic chain scission of the chitosan which, in turn, resulted in a drastic reduction in solution viscosity. Thereafter, the solutions remained stable during storage at 30°C, slightly more so at 2-8°C, with only slow and relatively small further decreases in viscosity over a period of 60 days.

The main conclusion to be drawn from this study is that 0.1% and 0.3% w/v chitosan solutions may be of value as ocular drug delivery vehicles because of their low toxicity, good ocular tolerance and storage stability.

Key words: Chitosan solution, Storage stability, Ocular drug delivery vehicle

INTRODUCTION

Chitosan has found widespread application in conventional pharmaceutical devices as a potential formulation excipient due to its suitable binding, disintegrating and tablet-coating properties (Singla and Chawla, 2001). The polymer has also been investigated as a potential adjuvant for swellable-controlled drug delivery systems. The use of chitosan in novel drug delivery as a mucoadhesive, in gene and peptide drug administration via the oral route, as well as its absorption-enhancing effect