Original Article JQUMS, Vol.19, No.6, 2016, pp. 21-28

Comparison of antibacterial property of chitosan nanoparticles against Escherichia coli and Staphylococcus aureus

Z. Zahedi Yeganeh* M. Hadizadeh**

*M.Sc. Student of Nanobiotechnology, Iranian Research Organization for Science and Technology, Tehran, Iran
**Assistant Professor of Biochemistry, Department of Biotechnology, Iranian Research Organization for Science and Technology, Tehran, Iran

Abstract

Background: With the advent of modern sciences such as nanotechnology, the hope for treatment of infectious diseases has increased. Nanochitosan is one of the most widely used nanomaterials in this field that has been considered due to its characteristics such as biocompatibility, nontoxicity and bactericidal activity.

Objective: The aim of this study was to compare the antibacterial properties of chitosan nanoparticles against Escherichia coli and Staphylococcus aureus.

Methods: This in vitro study was performed at Iranian Research Organization for Science and Technology in 2014. Chitosan nanoparticles were prepared based on the ionic gelation. The characteristics of the prepared nanoparticles were determined by DLS and SEM. The antibacterial activities of chitosan nanoparticles against Escherichia coli and Staphylococcus aureus were evaluated by determination of minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC). Data were analyzed using One-way ANOVA and T-test.

Findings: Chitosan nanoparticles were formed with an average size of 160 nm. The MIC and MBC of chitosan nanoparticles were 0.25 and 1 mg/ml for Escherichia coli and were 0.5 and 2 mg/ml for Staphylococcus aureus. The diameter of zones of inhibition was 19 mm for Escherichia coli and 14 mm for Staphylococcus aureus in 10 mg/ml concentration of chitosan nanoparticles.

Conclusion: With regards to the results, it seems that nanochitosan has acceptable antibacterial activity against Escherichia coli and Staphylococcus aureus. But Escherichia coli is more sensitive to chitosan nanoparticles than Staphylococcus aureus.

Keywords: Nanotechnology, Chitosan, Anti-Bacterial Agents, Escherichia Coli, Staphylococcus Aureus

Citation: Zahedi Yeganeh Z, Hadizadeh M. Comparison of antibacterial property of chitosan nanoparticles against Escherichia coli and Staphylococcus aureus. J Qazvin Univ Med Sci. 2016; 19 (6): 21-28.

Corresponding Address: Mahnaz Hadizadeh, Department of Biotechnology, Iranian Research Organization for Science and Technology, Tehran, Iran
Email: hadizadeh@irost.org
Tel: +98-912-5236745
Received: 19 Apr 2015
Accepted: 29 Aug 2015