

ABSTRACT

Charles University in Prague, Faculty of Pharmacy in Hradec Králové

Department of Biological and Medical Sciences

Student: Cristián Balko

Thesis Tutor: PharmDr. Miroslav Kovařík, Ph.D.

Consultant: PharmDr. Jan Marek, Ph.D.

Diploma thesis

Background: Evaluation of the disinfection efficacy of new disinfection agents

Study program: Pharmacy

Purpose of work: The aim of this diploma thesis was to determine the antimicrobial effectiveness of quaternary ammonium salts in a microbiological laboratory and the evaluation, which took place through the determination of the minimum inhibitory concentration.

Methods: The sensitivity of 8 bacterial strains was determined to new substances of the quaternary ammonium salt type using the microdilution broth method. Of the 10 substances supplied by the Center for Biomedical Research, it was possible to use eight substances that did not precipitate, or were diluted after precipitation, which reduced their concentration by half. Using the readings of the minimum inhibitory concentration, it was clear which substance has the greatest effect.

Results: Of the eight substances tested, the substance with the designation 3A had the best effect on *Staphylococcus aureus*, methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant *Enterococcus* and *Staphylococcus epidermidis* bacteria. Other substances showed minimal effectiveness after minimum inhibitory concentration testing, or for their further examination it would be necessary to increase the concentration of the tested substance $> 500 \mu\text{mol/l}$.

Conclusion: Of the substances based on quaternary ammonium salts that were tested, they were primarily effective against Gram-positive bacteria. The quaternary

ammonium salts based agents were tested mostly effective on gram-positive bacteria, due to the composition of their cell wall. The effect on other gram-negative strains was not achieved despite multiple testing. The quaternary ammonium salts based substance with C₁₂ carbon number on quaternary nitrogen showed the highest effect.

Key words: quaternary ammonium salts, minimum inhibitory concentration, disinfection, structure of ammonium salts, gram-positive and gram-negative bacteria

