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Microbial deactivation properties of generation 2 and 4 poly(amidoamine) dendrimers on common bacteria found in the aqueous environment

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Introduction

The antibacterial properties of dendrimers, make them a good candidate, as a future alternative disinfectant, for water and wastewater treatment with minimal side effects. Therefore, this study was performed for evaluation of antibacterial effect of generation-2 and 4 poly (amidoamine) dendrimer (PAMAM) on the indicator bacteria found in the water resources.

Methods

Using the differential biochemical tests, bacteria were isolated and identified from water resources. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) against gram-positive and gram-negative bacteria were calculated. Standard discs were prepared by different concentrations of dendrimer (0.5 to 500 μg/ml) and evaluated through the disc agar diffusion method on Muller-Hinton agar plates. Finally, the inhibition zone diameter was measured.

Results

Main isolated bacteria from water resource were *Escherichia coli*, *Pseudomonas aeruginosa*, *klebsiella oxytoca*, *Bacillus subtilis*, and *staphylococcus aureus*. The results showed that the MIC and MBC for each of isolated bacteria were the same for both generations and were as follows: *Escherichia coli* 1250 and 2500 μg/ml; *klebsiella oxytoca* 500 and 1250 μg/ml; *staphylococcus aureus* 1 and 5 μg/ml and *Bacillus subtilis* 2.5 and 5 μg/ml. No MIC and MBC were observed on *Pseudomonas aeruginosa*, respectively. Also it was found that PAMAM dendrimer was more potent towards the gram positive bacteria than the gram negative bacteria. Although amino terminated G4 PAMAM dendrimers have a more functional groups, but no significant differences were observed in antimicrobial activity than G2 PAMAM dendrimers.

Conclusion

It can be concluded that G2 and G4 PAMAM dendrimer with amine terminations exhibited a positive impact on the removal of dominant isolates strains. It is therefore possible that in the future it could be used as an effective material for water disinfection.

Disclosure of interest

None declared.

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