

Temperature and pH-sensitive co-polymers of glucosamine: synthesis, characterization and antibacterial activities

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Background and Aims: This study was focused on synthesis of new hydrogel copolymers of Glucosamine with temperature and pH-sensitive properties and antimicrobial activity.

Methods: Glucosamine co-polymers with temperature and pH-sensitive properties were successfully prepared by free radical precipitation polymerization, and these polymers were characterized by infrared spectroscopy (IR) and elemental analysis. The thermo- and pH-responsive properties of the hydrogels were obtained by incorporation of 2-Acrylamido-2-methyl propane sulfonic, N,N'-Methylendiacylamid, N-Hydroxymethylacrilamide and acrylic acid (AAc) to copolymerize with acrylamido-2-deoxyglucose (AADG). The stimuli sensitivity of the hydrogels was studied by the determination of their swelling ratio (SR) under different conditions. The cross-linked derivative was subjected to microbial experiments and antimicrobial activity of hydrogels on Gram-negative and Gram positive bacteria was studied with minimum Inhibitory concentration test (MIC).

Results: The results showed that the synthesized hydrogels were responsive to temperature and pH, and these properties could be improved by using different monomers in the copolymerization process. The cross-linked hydrogel showed slight antimicrobial activity on Meticilline-resistente Staphylococcus aureus (MRSA) and Escherichia coli (E. Coli) and this activity was stronger on MRSA than E. Coli.

Conclusions: In this study new co-polymers of Glucosamine with temperature and pH-sensitive properties and antimicrobial activity were synthesized.

Keywords: Stimuli-sensitive hydrogel; Glucosamine; Antimicrobial activity