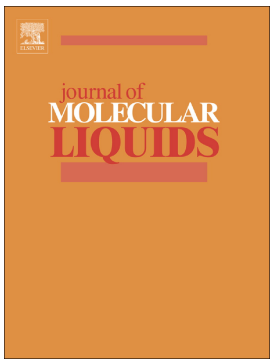

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In-vitro study of the novel nanocarrier of chitosan-based nanoparticles conjugated HIV-1 P24 protein-derived peptides

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Abstract

HIV-1 P24 protein-derived peptides-loaded chitosan nanoparticles (CS-NPs) were synthesized, based on the ionic gelation method and development of electrostatic interactions between CS-NPs and negatively charged of HIV-1 P24 protein-derived peptides. Dynamic light scattering analysis (DLS) revealed that CS-NPs had a mean diameter of 22nm. The prepared peptides loaded CS-NPs showed that peptide loading via incubation method led to an increase in the particle size to 70nm, in comparison to CS-NPs. The results obtained by Zetasizer revealed that the surface charge of CS-NPs is positive due to the presence of amine groups on its surface. Peptide adsorption on the nanoparticles would have decreased the positive surface charge of the cationic chitosan molecule and led to the decline in the values of zeta-potential in CS-NPs from+30.3 to+23.2mV. The rate of loading efficiency became 96%, the peptide was very quickly released in the first 24h, and after that the releasing rate was decreased. After 216h, more than 70% of the drug was released. Since the use of peptides in high concentrations is not economically feasible, this paper attempts to use the nano-carrier to overcome this limitation. The novelty of this work is to use of chitosan nanoparticles to increasing the effectiveness of peptides at low concentrations.

Keywords: Chitosan nanoparticles; HIV-1 P24; protein-derived peptides; Peptide controlled release.

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