

ABSTRACT

**THE EFFECT OF CROSSLINKING
ON PHYSICAL CHARACTERISTICS AND IN VITRO RELEASE
OF ARTESUNATE NANOPARTICLES**

(Prepared by Ionic Gelation - Spray Drying)

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Artesunate-chitosan nanoparticles can be used as a physical approach to alter and improve the pharmacokinetic and pharmacodynamic properties of artesunate. The purpose of this study is to investigate the influence of crosslinking on artesunate-chitosan nanoparticles's physical characteristics. Artesunate-chitosan nanoparticles was made by ionic gelation and spray drying method, with a drug-polymer ratio of artesunate:chitosan ratio 2:5 using tripolyphosphate (TPP) as the crosslinker. Particles were evaluated for its morphology, infrared spectra, DTA thermogram, X-ray diffraction, and drug recovery. Based on the results of scanning electron microscopy (SEM), the non-crosslinked system has more spherical shapes, smooth surface, and smaller size compares to the crosslinked system. The infrared spectra of crosslinked system shows that the peak of 1655cm^{-1} disappears and new peaks at 1645cm^{-1} and 1554cm^{-1} appears that indicate the interaction between $-\text{NH}^{3+}$ and $\text{P}_3\text{O}_{10}^{5-}$. The result of DTA crosslinked and non-crosslinked nanoparticles show sharp peak and different endothermic peak compared with artesunate. X-Ray diffractogram of crosslinked and non-crosslinked nanoparticles indicate that the crystalline peaks of artesunate disappeared. It means that artesunate has been trapped in the nanoparticle system. From independent t-test, the recovery of artesunate from crosslinked and non-crosslinked systems are $73,79\% \pm 1,80$ and $75,43\% \pm 0,85$ is not significantly difference statistically. Dissolution rate of nanoparticles are slower than artesunate substance. It show that artesunate nanoparticles are not able to enhance dissolution rate of artesunate. Then, dissolution rate of both crosslinked and non-crosslinked nanoparticles is not significantly difference statistically. Further more, the study about the in vitro release test in gastric fluid and solubility test still needed.

Keywords : artesunate, chitosan, tripolyphosphate, crosslinking, ionic gelation, spray drying