

## Synthesis and characterization of magnetite nanoparticles conjugated with PEG as a carrier for ciprofloxacin

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**Background and Aims:** We report the synthesis of magnetite (Fe<sub>3</sub>O<sub>4</sub>) nanoparticles conjugated with poly ethylene glycol (MNPs-PEG) as a carrier for ciprofloxacin. MNPs have several potential applications in different fields especially such as drugs delivery. MNPs composed of a polymeric coating which plays a critical role in the stability, toxicity, and encapsulation efficiency of these nanoparticles. In this study, MNPs were synthesized with SDS and subsequently were conjugated with polyethyleneglycol (PEG) and encapsulated with ciprofloxacin and characterized as a carrier.

**Methods:** MNPs were synthesized by co-precipitation method and functionalized with 3-aminopropyl triethoxysilane by a salinization reaction. PEG-COOH was synthesized by succinic anhydride and conjugated with MNPs-APTS. Encapsulate drug in the conjugated MNPs-PEG; they were shaken with ciprofloxacin solution. The MNPs were characterized with DLS, FTIR, SEM, and Xrd. Subsequently, the MNPs were separated by magnet and the extent of drug loading was evaluated by UV-Vis spectroscopy. Drug release behavior of MNPs was also studied at three different pH.

**Results:** The synthesis of MNPs were confirmed with (XRD), according to Debye scherer equation it was found that the size of nanoparticles were about 52.7 nm. The SEM image revealed that the most of the particles had a spherical shape and approximately 50 nm. Particles size was also determined by (DLS) techniques and the results were 233 nm. Conjugation of MNPs with PEG was demonstrated with FTIR. Change in zeta potential of MNPs was considered as another evidence for Conjugation and drug loading. The Particles size of conjugated and loaded MNPs was found to be 215.8 nm and 250.3 nm, respectively.

**Conclusions:** The drug- loading was determined to be 76.75%. The release of ciprofloxacin in three PH (5, 7.4, 8) were also studied and the findings showed that totally 28.5%, 21.5% and 52.2% of loaded drug were released under experimental condition, respectively.

**Keywords:** Ciprofloxacin; Nanoparticles; Poly ethylene glycol; Carrier; Magnetite