Magnetite Nanoparticles $Fe_3O_4$for Preconcentration and Determination of Trace Amount of Tamsulosine hydrochloride in Human Plasma

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Abstract

In the present study, magnetite nanoparticles Fe_3O_4modified with Cetyltrimethylammonium bromide (CTAB) was successfully prepared and their application as a sorbent in the magnetic-dispersive solid phase extraction(M-dSPE)mode to preconcentration and determination of Tamsulosinhydrochloride (TMS) in human plasma was investigated by coupling with high performance liquid chromatography-ultraviolet detection (HPLC-UV).The influence of sorbent amount, pH of sample solution, extraction and desorption conditions were studied. The maximum adsorption capacity, and qmax, was obtained from Langmuir's model.The structure, morphology and magnetic properties of adsorbent were characterized using scanning electron microscopy (SEM).

Introduction: TMSbelongs to a class of drug called alpha-1(α_1) adrenergic receptor antagonists. Since TMS is widely used as an effective α_1 blocker, the development and validation of analytical methods for its determination in biological fluids are essential. Many of these methods are however, expensive,toxic, requiring a derivatization step and specific solvent extraction. Based on magnetite nano Fe_3O_4, a simple, fast and inexpensive, nontoxic M-dSPE method was established.

Methods and Results: First the Fe_3O_4 nanoparticles were synthesized via co-precipitation.Then Fe_3O_4(3mg) and CTAB 0.02- 4 mL of 0.1 %(w/v) were dispersed into phosphate buffer(pH=7.0) and added to the sample solution.The suspension was vigorously shaken to reach adsorption equilibrium, and the sorbent was subsequently isolated with a strong magnet. After that, the sorbent was eluted with buffer solution of pH 10.0 (100 µL) as the eluent solvent .Finally, the eluate was isolated from the sorbent by a strong magnet, and the supernatant was filtered and 20 µL of filtrate was injected into the HPLC-UV system for analysis in triplicate for each concentration.

Conclusions: In this work a magnetite nanoFe_3O_4- based M-dSPE clean up combined with HPLC-UV developed as a new approach for the efficient determination of trace amount of TMS in plasma samples.This method provided effectively clean extracts and removed interfering peaks from the plasma. Furthermore this method was very fast,convenient,cost effective, nontoxic and with a very low consumption of solvent.**Key words:** Magnetite Nano Fe_3O_4, TMS, Human Plasma,M-dSPE.