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Supercritical fluid extraction followed by nanostructured supramolecular solvent extraction for extraction of levonorgestrel and megestrol from whole blood samples

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Abstract

Supercritical fluid extraction (SFE) followed by supramolecular solvents microextraction (SUPRAS) has been developed for extraction and determination of levonorgestrel (LeV) and megestrol acetate (MA) in blood samples. LeV and MA were employed as model compounds to assess the extraction procedure and were determined by high performance liquid chromatography coupled with ultraviolet detection. SUPRAS is a nano-structured liquid, generated from the amphiphiles through a sequential self-assembly process occurring on two scales; molecular and nano. SUPRAS tests were generated from solutions of reverse micelles of decanoic acid (DeA) in tetrahydrofuran (THF) by addition of water, which acted as the coacervating agent. In SFE-SUPRAS procedure, the blood sample were mixed with anhydrous sodium sulfate and loaded into SFE extraction vessel and extraction was performed in a predetermined time. The DeA solution and SFE (THF) collecting solvent were immediately injected into water for SUPRAS formation. The effective parameters on the SUPRAS efficiency were studied and optimized utilizing rotatable central composite design (RCCD). The Taguchi orthogonal array (OAD) experimental design with an $OA_{16}(4^5)$ matrix was employed to optimize the SFE conditions. The calibration plots were linear in the range of 0.5–7.0 mg kg⁻¹ and the limits of detection (LODs) were 0.1 and 0.2 mg kg⁻¹ for MA and LeV, respectively. Analysis of drugs in different blood samples showed that the improved technique has great potential for extraction and determination of LeV and MA in blood samples.

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