Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

Modelling the processes of sample preparation of biological objects for the subsequent determination of metronidazole

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Abstract

Sample preparation is the first step of toxicological screening and should provide an appropriate level of analyte recovery from biological matrices. The aim is to research the metronidazole behaviour under the conditions of a number of methods commonly used for sample preparation of biological liquids and tissues in chemical toxicological analysis and to determine the validation parameters «specificity/selectivity» and «recovery» for the most effective procedures. Taking into account the amphoteric properties of metronidazole we have proposed the extraction procedures in two variants: 1) liquid-liquid extraction with organic solvents immiscible with water (chloroform and the mixture of chloroform and 2-propanol (8:2) were used as organic solvents); 2) extraction by amphiphylic solvents followed by «salting out» with ammonium sulphate (2-propanol, acetonitrile and ethanol were used as amphiphylic solvents). The medium pH have been created with 6 M and 0.1 M solutions of hydrochloric acid, 25% ammonium hydroxide solution or 10% sodium hydroxide solution, and also using universal buffer solutions. The amount of extracted medicine has been determined by three methods. The recovery for liquid-liquid extraction of metronidazole with chloroform in the strong acid medium is too low that makes possible to recommend such processing mode for purification of aqueous extracts from coextractive substances. Processing the aqueous solutions with amphiphylic solvents followed by «salting out» with ammonium sulphate in all cases allows to extract not less than 80% of metronidazole in all media excluding application of ethanol in the strong acid and alkaline medium.

Keywords: metronidazole, extraction, recovery, specificity/selectivity