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Air-assisted liquid-liquid micro-extraction using floating organic droplet solidification for determination of Atorvastatin by UV-vis

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ABSTRACT

An air-assisted liquid-liquid micro-extraction by applying the solidification of a floating organic droplet method (AALLME-SFOD) was developed for extraction of atorvastatin from aqueous and serum samples and UV spectrophotometry was used for its detection. In the present study, 7.0 mL water sample was extracted by 100 µL of 1-dodecanol and some parameters that can affect extraction such as type and volume of extraction solvent, the effect of salt, pH, and the effect of centrifuging rime and rate were optimized. Under optimized experimental conditions, the calibration curve was found to be linear in the range of 0.3–5 µgmL^{-1}, and the correlation coefficient and the limits of detection were 0.9964 and 0.09 µg/mL, respectively. The accuracy of the method in terms of average recovery of the compound in water samples was about 90%.

Keywords: Atorvastatin, Preconcentration, Dispersive Liquid-Liquid Micro-extraction

1.INTRODUCTION:

Atorvastatin (ATR), [(R-(R*,R*)]-2-(4-fluorophenyl)-b,d, dihydroxy- 5-(1-methylethyl)-3-phenyl-4-[(phenyl-amino)-carbonyl]-1Hpyrrole-1-heptanoic acid calcium salt (Fig. 1.) belongs to the group of statins and it is a second generation HMG-CoA reductase inhibitor recently approved for clinical use as a cholesterol lowering agent [1]. These drugs inhibit the rate limiting key enzyme known as 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase involved in cholesterol biosynthesis [2]. This enzyme catalyzes the conversion of HMG-Co A to mevalonate, an early and rate limiting step in cholesterol biosynthesis. More than 90% of atorvastatin is bound to plasma proteins. About 70% of the total plasma HMG-CoA activity is attributed to active metabolites of atorvastatin, even if their concentrations are very low. Information about the actual plasma concentration of atorvastatin is of interest in pharmacokinetic studies and investigations of the mechanisms of drug-drug interactions [3].

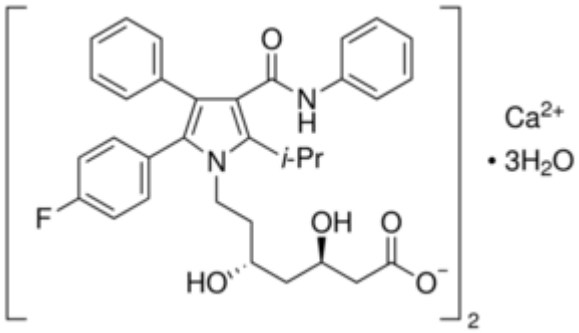

Fig. 1. *Structure of atorvastatin calcium salt.*

Literature survey revealed that extractive spectrophotometry [4,5], liquid chromatographic (LC) [6,7], GC-MS [8], LC-MS [9], LC- electrospray tandem mass spectrometry [10] and HPTLC [11], RPHPLC/ UV [12,13], Voltammetry [14], British Pharmacopoeia [15], pharmaceutical preparations [16], along with impurities in pharmaceutical preparations [17,18], in combination with amlodipine [19], nicotinic acid [20] and ezetimibe [21] in dosage forms. An UPLC method [22] for simultaneous determination of atorvastatin, fenfibrate and their degradation products in tablets has also been reported. Atorvastatin has been determined along with its metabolites using LC/MS in biological matrices [23,24], HPLC-UV methods have also been reported for the determination of atorvastatin alone in biological matrices [25,26].