World Academy of Science, Engineering and Technology
International Journal of Animal and Veterinary Sciences
Vol:8, No:12, 2014

Determination of Marbofloxacin in Pig Plasma Using LC-MS/MS and Its Application to the Pharmacokinetic Studies

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Abstract : Introduction: A fast, easy and sensitive detection method was developed and validated by liquid chromatography tandem mass spectrometry for the determination of marbofloxacin in pig plasma which was further applied to study the pharmacokinetics of marbofloxacin. Materials and Methods: The plasma sample (500 µL) was mixed with 1.5 ml of 0.1% formic acid in MeCN to precipitate plasma proteins. After shaking for 20 min, The mixture was centrifuged at 5,000 × g for 30 min. It was dried under a nitrogen flow at 50℃. 500 µL aliquot of the sample was injected into the LC-MS/MS system. Chromatographic analysis was carried out mobile phase gradient consisting 0.1% formic acid in D.W. (A) and 0.1% formic acid in MeCN (B) with C18 reverse phase column. Mass spectrometry was performed using the positive ion mode and the selected ion monitoring (MRM). Results and Conclusions: The method validation was performed in the sample matrix. Good linearities (R2>0.999) were observed and the quantified average recoveries of marbofloxacin were 87 - 92% at level of 10 ng g-1 -100 ng g-1. The percent of coefficient of variation (CV) for the described method was less than 10 % over the range of concentrations studied. The limits of detection (LOD) and quantification (LOQ) were 2 and 5 ng g-1, respectively. This method has also been applied successfully to pharmacokinetic analysis of marbofloxacin after intravenous (IV), intramuscular (IM) and oral administration (PO). The mean peak plasma concentration (Cmax) was 2,597 ng g-1at 0.25 h, 2,587 ng g-1at 0.44 h and 2,355 ng g-1at 1.58 h for IV, IM and PO, respectively. The area under the plasma concentration-time curve (AUC0–t) was 24.8, 29.0 and 25.2 h µg/mL for IV, IM and PO, respectively. The elimination half-life (T1/2) was 8.6, 13.1 and 9.5 for IV, IM and PO, respectively. Bioavailability (F) of the marbofloxacin in pig was 117 and 101 % for IM and PO, respectively. Based on these result, marbofloxacin does not have any obstacles as therapeutics to develop the oral formulations such as tablets and capsules.

Keywords : marbofloxacin, LC-MS/MS, pharmacokinetics, chromatographic
Conference Title : ICASVM 2014 : International Conference on Animal Science and Veterinary Medicine
Conference Location : Penang, Malaysia
Conference Dates : December 16-17, 2014