An HPLC method development for simultaneous determination of metoprolol, propranolol and phenol red: application in perfusion studies

H. Tabatabayi1,*, P. Zakeri-Milani2, H. Valizade2, Y. Azarmi2, M. Barzegar Jalali2, H. Tajerzadeh2

1Students Research Committee, Faculty of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran
2Department of Pharmaceutics, Faculty of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran

Background and Aims: Single-pass intestinal perfusion technique (SPIP) is the most used classic technique employed in the study of intestinal absorption of compounds in which a non-absorbable marker such as phenol red is used to correct the water flux.

Methods: A simple and rapid reversed-phase high performance liquid chromatographic method with UV detection at 227 nm was developed for simultaneous quantitation of propranolol and metoprolol along with phenol red for in-situ permeability studies. The mobile phase was a mixture of 55% methanol, 45% of 0.05 M KH2PO4 aqueous solution (adjusted to pH 6) and 0.2% (v/v) triethylamine. Analysis was run at a flow rate of 1 ml/min with a 9 min run time.

Results: The calibration curves were linear for all three compounds (r > 0.999) across the concentration range of 7.5-125 µg/ml with a limit of detection of 4.24, 2.18 and 8.57 ng/ml and limit of quantification of 14, 7.2 and 28.3 ng/ml for metoprolol, propranolol and phenol red respectively. The coefficient of variation for intra-assay and inter-assay precision was less than 8% and the accuracy was between 93.6-107%.

Conclusions: Using the SPIP technique and the suggested HPLC method for sample analysis, the mean values of 0.49 e-4 (±0.19) cm/sec and 0.32 e-4 (± 0.09) cm/sec were obtained for propranolol and metoprolol intestinal permeability coefficients respectively.

Keywords: Propranolol; Metoprolol; Phenol red; Liquid chromatography; Permeability