Title: A Highly Sensitive HPTLC Method for Estimation of Oxcarbazepine in Two Binary Mixtures With Two Metabolically Related Antiepileptic Drugs: Application to Pharmaceutical and Biological Samples

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A simple and sensitive high performance thin-layer chromatographic method (HPTLC) was developed and validated for the analysis of two binary mixtures of antiepileptic drugs. The first mixture consists of eslicarbazepine acetate (ESL) and oxcarbazepine (OXC). The second one consists of carbamazepine (CBZ) and OXC. These drugs have intercalated metabolic pathways, which was the prime reason for the development of the proposed analytical methodology for their determination. The two mixtures were separated on pre-coated silica gel HPTLC plates G60 F254 utilizing a mixture of n-hexane: methylene chloride: ethanol: glacial acetic acid in the ratio (50:40:10:0.1 v/v/v/v) as a mobile phase. The first mixture was detected at 217 nm, while the second one was detected at 265 nm. The achieved sensitivity is very high as reflected by the limit of detection values ranging from 5.03 to 12.60 ng/spot for the studied drugs. The developed method is the first HPTLC method for separation of these drugs in their dosage forms and
in human plasma. Good recovery results were obtained from pharmaceutical tablets in the range from 97.75 to 100.40% without any interference from co-formulated excipients. In addition, high recovery results from plasma samples after utilizing salting out assisted liquid-liquid extraction technique (SALLE) were obtained, which ranges from 88.17 to 101.95%, ensuring the efficiency of the proposed approach. Furthermore, the developed method was successfully applied to detect CBZ clearly in real patients' plasma without any interference from matrix components.

**Keywords:**
Oxcarbazepine, Eslicarbazepine acetate, Carbamazepine, High performance thin layer chromatography, Salting out assisted liquid-liquid extraction, Plasma analysis.