RP-HPLC Method for Simultaneous Estimation of Vigabatrin, GABA and Taurine in Biological Samples
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Purpose
Vigabatrin is an anti-epileptic drug indicated as first line treatment for the infantile spasms. It acts by inhibiting the gamma-aminobutyric acid (GABA) transaminase thereby increasing the inhibitory neurotransmitter GABA concentrations in brain. Vigabatrin treatment is known to cause peripheral visual field defects and retinal damage. Chronic administration of vigabatrin in rats have demonstrated these ocular events are result of GABA accumulation and depletion of taurine levels in the retinal tissues. The aim of this study was to develop and validate simultaneous reverse phase high performance liquid chromatography (RP-HPLC) method to monitor vigabatrin, GABA and taurine levels in rat plasma, brain and retinal tissues.

Methods
A RP-HPLC method has been developed and validated as per US FDA guidelines using surrogate matrix, as biological matrices free of GABA and taurine are not readily available. A simple protein precipitation method was employed for extraction of vigabatrin, GABA, taurine and gabapentin (internal standard) from rat plasma, brain and retinal tissues. The extracted samples were derivatized using naphthalene 2, 3-dicarboxyaldehyde in presence of cyanide ions for introducing fluorophore to analytes and internal standard. The chromatographic analysis was performed on a Waters HPLC system using Symmetry shield C18 column, and a gradient elution profile using methanol and 10mM potassium dihydrogen phosphate as mobile phase at a flow rate of 1.00 mL/min with a total run time of 20 min. The eluent was monitored using a fluorescence detector set at excitation and emission wavelength of 400nm and 500nm, respectively.

Results
The calibration curve was linear over a concentration range of 64.6 to 6458 ng/mL, 51.5 to 5150 ng/mL and 62.5 to 6258 ng/mL for vigabatrin, GABA and taurine, respectively with r2 ≥ 0.997 for all analytes. The intra-day precisions were in the range of 1.39-5.30, 2.71-4.08, and 3.53-8.88% for vigabatrin, GABA and taurine, respectively. The inter-day precisions were in the range of 0.27-3.46, 0.61-4.15, and 0.66-9.15% for vigabatrin, GABA and taurine, respectively.

Conclusion
A RP-HPLC method was developed and validated for simultaneous estimation of vigabatrin, GABA and taurine, all results met the acceptance criteria. This method was successfully applied for monitoring the levels of vigabatrin and its modulator effect on GABA and taurine levels in rat plasma, brain and retinal tissues.