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NOTE

UV-Spectrophotometric Estimation of Venlafaxine Hydrochloride

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A simple, accurate and convenient UV-spectrophotometric method has been developed for the determination of venlafaxine hydrochloride as pure and in its pharmaceutical formulations. In the proposed method venlafaxine hydrochloride showed maximum absorbance at 226 nm in acetonitrile and water in a ratio of 20:80. The method followed Beer's Lambert law in the concentration range of 2-20 μg/mL.

Key Words: Venlafaxine hydrochloride, Desmethyl venlafaxine, Antidepressant, Double beam spectrophotometer.

Venlafaxine hydrochloride is (R/S) [1-{(2-dimethyl amino)-1-(4-methoxy phenyl)-ethyl}cyclohexanol hydrochloride]. It is a second-generation antidepressant chiral drug administered as racemic mixture. Venlafaxine hydrochloride has a neuropharmacologic profile distinct from that of existing antidepressants including tricyclic compounds. It imparts antidepressant effects by inhibiting the neuronal uptake of norepinephrine, serotonin and dopamine and lacks the adverse side effect profile of tricyclic antidepressants. Venlafaxine hydrochloride is well absorbed in humans and undergoes extensive metabolism in the liver and has several metabolites, one of which is biologically active. Venlafaxine hydrochloride is extensively metabolized to O-desmethyl venlafaxine, a major metabolite with an activity profile similar to that of venlafaxine hydrochloride. The molecular weight of the venlafaxine hydrochloride is 313.78 and the pKa is *ca.* 9.4. Different methods have been reported in literature for monitoring plasma levels of venlafaxine hydrochloride and O-desmethyl venlafaxine[1-9]. The analytical method reported requires laborious extraction procedure like liquid-liquid extraction or solid-phase extraction (SPE) involving drying and reconstitution, long run time and high quantification limit. It is necessary, therefore, to develop a simple, specific, rapid and sensitive analytical method for the quantification of the venlafaxine hydrochloride and its active metabolite O-desmethyl venlafaxine. Literature reveals that numerous HPLC methods are there for the quantification of venlafaxine hydrochloride in biological fluids in bulk drug and in the final formulation[10-17]. Work regarding synthesis and formulation development of venlafaxine hydrochloride also had been done in huge amount[18-20] but there is a lack in the field of quantification of venlafaxine hydrochloride by UV spectroscopy[21-23].

All the chemicals used were of analytical grade. Venlafaxine hydrochloride was supplied by Torrent Pharmaceuticals, Ahmedabad as gift sample. Acetone (SD Fine

chemicals) was procured from local agency. Venlafaxine hydrochloride commercial tablets were purchased from local market.

Methods: Spectral absorbance measurements were made on systronics spectrophotometer-2101 double beam spectrophotometer with 10 mm matched quartz cells. 20 mg of venlafaxine hydrochloride was accurately weighed and dissolved in 5 mL of acetone in a volumetric flask. The final volume was made up with diluent to get a final concentration of 200 µg/mL. This stock solution was used to prepare various working standard solutions of drugs. Dilutions of stock solution of venlafaxine hydrochloride ranging from 0.1-1.0 mL were transferred into a series of 10 mL volumetric flasks and final volume was brought to 10 mL with diluent. The absorbance was measured at 226 nm against the reagent blank solution. The same method was applied for the commercial tablets. Ten tablets of venlafaxine hydrochloride were taken and finely powdered by trituration. A powder equivalent to 25 mg of drug was weighed accurately and transferred into a 100 mL volumetric flask. 5 mL of acetone was added and finally made up to 100 mL with diluent. This was filtered and the absorbance was recorded at 226 nm. The drug content in the sample was then calculated. A simple, accurate and convenient method is required for the estimation of venlafaxine hydrochloride in routine quality control testing in small-scale industry and in research laboratory. The present method was developed with this objective. To calculate the validity and reproducibility of the method, known amount of the pure drug was added to the previously analyzed formulation and the formulation analyzed by the proposed method.

A simple, sensitive method has been developed for the determination of venlafaxine hydrochloride in the tablet dosage form. The method involves the wavelength maxima at 226 nm. The method found very specific for the venlafaxine hydrochloride, as there was no interference observed because of any non-drug material in the formulation. Optical characteristics and precision data shown in Table-1. The method is linear over the concentration range of 2-20 µg/mL with

TABLE-1
OPTICAL CHARACTERISTICS AND PRECISION DATA

Parameters	Values
Absorbance maxima (λ_{max})	226
Beer's law limit (µg/mL)	2-20
Molar absorptivity (L mol^{-1} cm^{-1})	1.574×10^4
Sandell's sensitivity (µg/cm-0.001 absorbance units)	1.7480
Correlation coefficient	0.9998
Regression equation (y = mx+c)	
Slope (m)	0.1658
Intercept	0.1276
Limit of detection (µg/mL)	0.8
Limit of quantification (µg/mL)	2.0
Percentage range of errors	
Confidence limits	±0.9993
0.05 confidence limits	±0.7634

correlation coefficient 0.99. Sandell's sensitivity was found to be 0.17; the limit of detection and limit of quantification was found 0.8 and 2 μg/mL, respectively. Percentage assay of venlafaxine hydrochloride and percentage recovery for the marketed formulations, indicate that the method is precise and accurate (Table-2).

TABLE-2
ASSAY OF VENLAFAXINE HYDROCHLORIDE IN PHARMACEUTICAL FORMULATIONS

Formulation	Labeled amount (mg/tablet)	Amount found (mg)	Amount added (mg)	Amount found (mg)	Recovery (%)
Tablet-I	25	24.92	1.5	1.49	99.2
Tablet-II	25	24.87	1.5	1.51	100.6

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