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Gas chromatographic determination of venlafaxine hydrochloride from tablet

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ABSTRACT

A simple, fast, specific and precise method was developed for the quantitative determination of drug venlafaxine hydrochloride from a tablet by gas chromatographic method. For development of method HP-5 capillary column (15meter length, 0.53mm i.d., and 1.5 u film thicknesses) was used. Nitrogen gas was used as carrier gas with flow rate 10 psi, and oven temperature programming was used with split type injector. Experiments were carried out using flame ionization detector. The retention time of venlafaxine hydrochloride and 2, 3, 4-Trimethoxy benzoic acid is 4.5 min and 3.0 min respectively. Linearity is in the range of 2 mg/ml to 7 mg/ml (r^2=0.9998). The percentage recovery obtained is 99.84%. The proposed method is useful for estimation of venlafaxine hydrochloride in its tablet form.

KEYWORDS

Venlafaxin hydrochloride;
Gas Chromatography
Antidepressant Drug.

INTRODUCTION

Venlafaxine hydrochloride is antidepressant. It is chemically (±)-1-[2-(Dimethylamino)-1-(4-methoxyphenyl) ethyl] Cyclohexanol hydrochloride. Analysis method for this drug is not included in any pharmacopoeia. Various methods has been reported for estimation of this antidepressant drug from whole blood by GC[1], from plasma and urine by HPLC[2], from human plasma by HPLC[3], from pharmaceutical formulations by HPLC[4], from urine by GC-MS[5] and identification method by HPTLC[6,7]. A survey of literature reveals that HPLC/MS methods[8-12] were reported for the determination of venlafaxine and its application to drug quality control studies. Recently the estimation venlafaxine has been carried out using UV spectrophtomeric method for commercial dosage form are reported[13]

Recently in our laboratory gas chromatographic methods were developed for quantitative determination of ambroxol hydrochloride[14] and celecoxib[15] from pharmaceutical formulation. The literature survey reveals that very few methods are available for estimation of venlafaxine hydrochloride from pharmaceutical formulations and has some limitations. Method reported in this communication using gas chromatography is a simple, fast, accurate and precise for quantitative determination of venlafaxine hydrochloride from tablet.

EXPERIMENTAL

Reagents: Dichloromethane, sodium hydroxide, anhydrous sodium sulphate, 2, 3, 4-Trimethoxy ben-

zoic acid and methanol supplied by Unichem Laboratories India Ltd. Deionized water used from two-bed portable deionizer make WTC model No CA 7'. Perkin Elmer makes model Clarus 500 Gas Chromatographic equipment was used to carry out proposed work.

Venlafaxine hydrochloride (Pure reference standard) Solution A: 1414.5 mg of pure reference standard of venlafaxine hydrochloride (99.80%) was weighed accurately and transferred in to a beaker containing 20.0 ml water. pH of this solution was adjusted to 11.5 with 1.0 N sodium hydroxide. Then this solution was transferred to separatory funnel and was extracted three times with 20.0 ml of dichloromethane. The organic layer was collected carefully and dried by using anhydrous sodium sulfate. The organic layer was transferred to 50.0 ml volumetric flask. This solution was diluted to 50.0 ml with dichloromethane in standard volumetric flask. (Solution A).

Reference standard solution: 1250 mg of 2, 3, 4-Trimethoxy benzoic acid (Internal standard-TMBA) was weighed accurately and transferred to 50.0 ml of volumetric flask. It was diluted up to the mark with methanol (Solution B). 5.0 ml of solution A and 5.0 ml of solution B were transferred to 25.0 ml of volumetric flask and diluted up to the mark with methanol (reference standard solution).

Sample solution: 10 Tablets (75 mg/tablet) were weighed accurately and finely powdered. The powder equivalent to 125.0 mg of venlafaxine hydrochloride was taken into beaker containing 50.0 ml of water. pH of this solution was adjusted to 11.5 with 1.0 N sodium hydroxide. This solution was then extracted three times with 10.0 ml of dichloromethane. The organic layer was dried using anhydrous sodium sulfate. Then it was transferred to 25.0 ml volumetric flask. To this organic layer 5.0 ml of stock internal standard solution B was added and then diluted up to the mark with dichloromethane.

Working standard solution: Aliquots of standard stock solution were taken into the 25.0 ml volumetric flask and 5.0 ml internal standard stock solution B was added in it. This solution was diluted up to the mark with methanol to such a level that final concentration of venlafaxine hydrochloride was in the range of 2.0 to 7.0 mg /ml.

Method: Peak area ratio was recorded for venlafaxine hydrochloride and 2, 3, 4-trimethoxy benzoic acid. To study the accuracy, reproducibility and precision of the proposed method recovery experiments were carried out with fixed amount of preanalysed sample and standard stock solution at three different levels. Each level was repeated three times. The separations were carried out using Perkin Elmer Gas Chromatograph. It is equipped with split injection port and Flame ionization detector.

Chromatographic conditions

Column	:	HP-5 (15 m x 0.53 mm x 1.5 u)
Carrier gas	:	Nitrogen
Carrier pressure	:	10 psi
Injector Temperature	:	280° C
Detector Temperature	:	280° C
Attenuation	:	8; Range: 1
Split Ratio	:	5:1;
Injection volume	:	0.5 ul
Oven Temperature	:	150° C (2.0 min) @30° C/ min to 270° C (5.5 min)

RESULTS AND DISCUSSION

The results reported in TABLE 1 by the proposed method were close to the labeled claim of venlafaxine hydrochloride indicating that the method was precise and accurate. A typical chromatogram of standard solution of Venlafaxine hydrochloride and 2, 3, 4-Trimethoxy benzoic acid. Figure 1. The plot of peak area ratio versus the respective concentration was found to be linear over a range of 2 to 7 mg/ml is reported in TABLE 2, Figure 2 with coefficient of regression (r^2=0.999). The contents of Venlafaxine hydrochloride found by proposed method during the recovery studies is shown in TABLE 2. The mean recovery was 99.84%, which shows that there was no interference from excipients. The proposed method gave good resolution between Venlafaxine hydrochloride and of 2, 3, 4-Trimethoxy benzoic acid within short analysis time of 10 min. The method is very simple and rapid. So this method can be used for routine quality control analysis of venlafaxine hydrochloride.

Note

TABLE 1 : Assay results of venlafaxine hydrochloride.

Amount claimed mg/tablet	Amount found mg/tablet
75	74.66
75	74.71
75	74.74
75	74.91
75	74.45

TABLE 2 : Recovery study for spiked concentrations of standard to the pre analyzed samples

Level	Label claim mg/tablet	Amount Found %	% Recovery	Mean Recovery
Level 1	75	75.19	100.25	
Level 2	75	74.64	99.52	99.84%
Level 3	75	74.81	99.74	

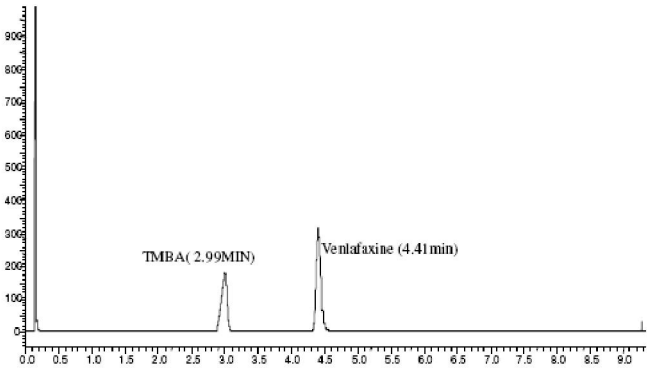

Figure 1 : Typical chromatogram of standard solution of Venlafaxine hydrochloride and 2, 3, 4-trimethoxy benzoic acid.

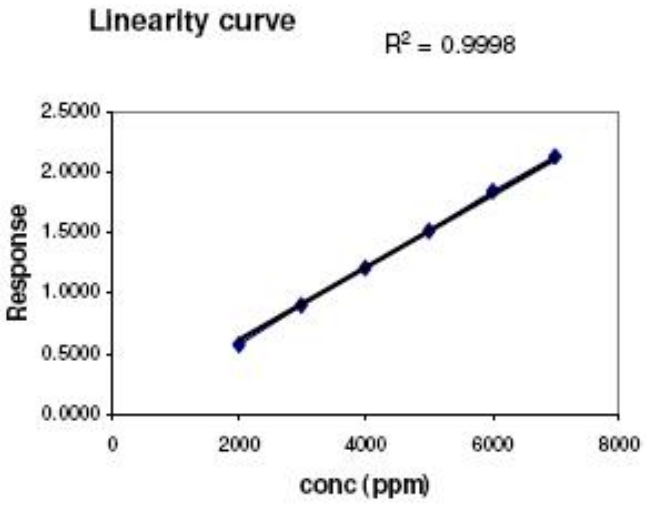

Figure 2 : The plot of peak area ratio verses the respective concentration

CONCLUSION

Proposed method is very simple, rapid and not involve use of the complicated sample preparation. It is useful in routine analysis in quality control departments at pharmaceutical industries. High percentage recovery shows that the method is free from interferences of the excipients used in the semi formulation.

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