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RP-HPLC ESTIMATION OF TADALAFIL IN TABLET DOSAGE FORM

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ABSTRACT

A simple, specific, accurate and precise method, reverse phase high performance liquid chromatography was developed for estimation of tadalafil in tablet dosage form. For HPLC method, Hi-Qsil C18-10 column in isocratic mode with mobile phase containing acetonirtile; acetate buffer pH (2.8) in ratio of 45 : 55 v/v was used. The flow rate was 1 mL/min and effluent was monitored at 283 nm. Retention time was found to be 4.46 ± 0.03 minutes. Method was validated in terms of linearity, accuracy and precision. Results of the analysis show that the method can be used for the estimation of tadalafil in tablet dosage form.

Key words: RP-HPLC, Tadalafil.

INTRODUCTION

Tadalafil is used to treat erectile dysfunction in men and it is a selective inhibitor of cyclic guanosine monophosphate (cGMP) and specific phosphodiesterase type 5 (PDE 5)[1-4] Chemically, tadalafil is pyrazino [1', 2': 1,6] pyrido [3,4-b] indole-1, 4-dione, 6-(1,3-benzodioxon–5-yl)–2,3,6,7,12,12a-hexahydro- methyl- (6R, 12aR). [5] It is not official in any of the pharmacopoeia. Literature survey reveals that capillary electrophoresis [6], UV spectroscopic[7] and HPLC-EIMS[8] methods are reported for estimation of tadalafil in bulk drug and blood plasma. The aim of the present work is to develop a new, rapid, accurate and precise method for the estimation of tadalafil in bulk and in tablet formulation

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EXPERIMENTAL

Pure tadalafil drug was obtained from Macleods Pharmaceuticals Pvt. Ltd. as a gift sample. HPLC grade acetonitrile and sodium acetate (anhydrous) was purchased from Thomas Baker, Mumbai and S.D. Fine Chem., Mumbai, respectively. Double distilled glass water was used throughout the study.

The HPLC system consisted of Jasco Model PU 980, intelligent HPLC pump with, a fixed wavelength detector (Model PU975, intelligent HPLC detector) and 7725i Rheodine injection system with 20 μL capacity external loop. The column used was Hi-Qsil C18-10 size 4.6 mm x 250 mm No-00J00008, manufactured by KYA_TI, JAPAN. The software used was Borwine, version 2.55. Afcoset-ER-120 Electronic balance was used for weighing.

Different mobile phases were tested in order to find the best composition for determination of tadalafil. The optimum composition of mobile phase was found to be acetonitrile: acetate buffer pH 2.8 in ratio of 55 : 45 v/v. The flow rate was set to 1 mL / minute. Mobile phase and sample solutions were filtered through 0.45 μm membrane filter. All determinations were carried out at room temperature.

Standard stock solution was prepared by dissolving100 mg of tadalafil in 100 mL of mobile phase to get a concentration of 1000 μg/mL. Suitably diluted stock solution was scanned in UV region (200-400 nm) in order to determine the detection wavelength. UV-spectra of drug show that 283 nm is the suitable wavelength for detection of drug. Standard solutions were prepared by suitably diluting stock solution with mobile phase, to get a concentration range of 10-250 μg/mL of drug. 20 μL standard solution was injected in triplicate four times for each concentration and chromatograms were recorded. The peak areas were plotted against the corresponding concentrations to obtain a calibration curve.

To determine the content of tadalafil in pharmaceutical formulation, 20 tablets of each brand were weighed accurately, they were finely powdered and powder equivalent to 50 mg of tadalafil was weighed accurately. The powder was transferred to a 50 mL volumetric flask containing 25 mL of mobile phase; the solution was sonicated for 20 min. and diluted up to the mark with mobile phase, the resulting solution was filtered through Whatman filter paper No. 41. Filtrate obtained was used as sample stock solution. Three different brands were tested and sample solutions were prepared in similar manner. For HPLC system, the above stock solution was further diluted to get a sample concentration in range of 10-250 μg/mL. 20 μL of each sample solution was injected to HPLC under the

conditions described above. The peak areas of sample were measured at 283 nm and the concentration of the drug was determined by using linear regression equation.

HPLC method was optimized with a view to develop a simple and accurate method for estimation of drug in its tablet formulation and in bulk drug . Pure drug was injected and run in different solvent systems. It was found that acetonitrile : acetate buffer pH 2.8 in the ratio of 55 : 45 v/v gave an acceptable retention time (t_R = 4.46 min) at flow rate of 1.0 mL/min. To check the interference of other tablet ingredients on proposed method, recovery experiments were carried out by standard addition method. A known quantity of pure drug was added in preanalyzed sample solution and the amount of drug found was calculated.

RESULTS AND DISCUSSION

The retention time of tadalafil was found to be 4.46 min. A typical chromatogram of the drug is shown in Fig.1.

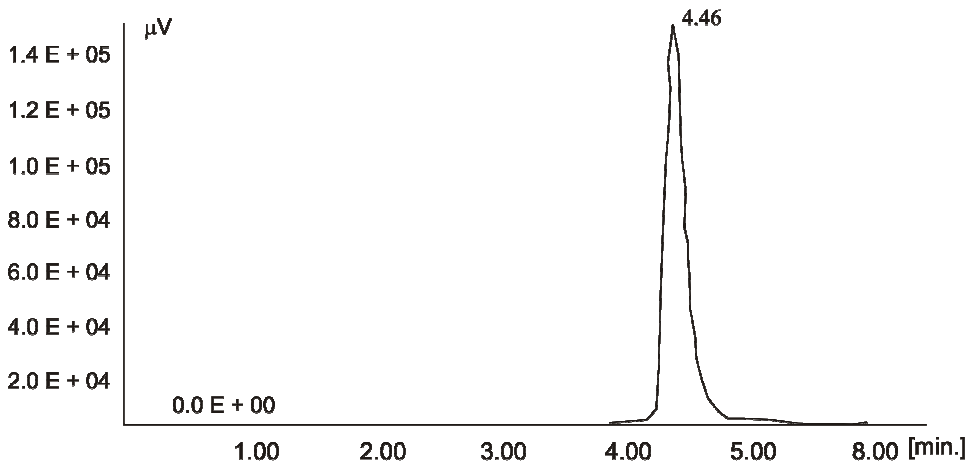

Fig. 1: Chromatogram for tadalafil showing 4.46 min as retention time

Experimental results of % content of tadalafil in tablets were expressed as % of label claimed, was found to be in good agreement with label claim, which shows that excipients dose not interfere in the analysis. Tadalafil shows a good correlation coefficient in the concentration range of 10-200 μg/mL (r^2 = 0.9993). Linearity was evaluated by determining five working standards containing 10- 200 μg/mL of drug, thrice in triplicate. The linearity of calibration curve and adherence of system to Beer's law was validated by

higher values of correlation coefficient. Accuracy of the method was calculated by recovery studies and percent recovery was calculated which is in good agreements with the labeled claim. High percentage recovery showed that the method is free from interference of the excipients used in formulations. Precision of the proposed method was determined by assaying tablets and was expressed as % RSD values. Asymmetry factor was found to be 1.56.

The results of analysis of formulation are reported in Table 1 and validation and system suitability parameters were reported in Table 2. The results of the analysis indicate that proposed method is simple, precise and accurate and it can be used for the routine analysis of the drug from formulations.

Table 1. Results of analysis of formulation

Formulation	% of label claim estimated *	% Recovery*	S.D.	S.E	%COV
Tablet 1	100.29	101.40	1.64	0.82	1.64
Tablet 2	101.56	101.83	1.45	0.77	1.43
Tablet 3	99.81	98.99	1.14	0.57	1.14

*Average of three determinations.

Table 2. Validation and system suitability parameters

Parameter	Value
Retention time (min)	4.46 ± 0.03
Linearity range	10- 200 μg/mL
Correlation coefficient	0.9993
Tailing factor	1.56
Theoretical plates	4036.49
Capacity factor	1.75
Limit of quantitation	10 μg/mL
Limit of detection	2 μg/mL

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REFERENCES

1. G. Brock, Can. J. Urol., **8(6)**, 1419 (2001).
2. H. Padmanathan and F. Giuliano, Urol. Clin. North Amer., **28(2)**, 321 (2001).
3. L. A. Sorbera, L. Martin and P. A. Lesson, Drugs Fut., **26 (1)**, 15 (2001).
4. S. Kim, S. Narayanan and J. C. Song, J. Urol., **37**, 289 (2002).
5. Anon, Tadalafil (cilis) Drug Monograph, Nov. (2003).
6. H. Y. Ali and Bdoul-Enein, Chromatographia Online Aug. 34 (2004)
7. M. Mukesh, K. Lata, T. Asha and J. Sumitra, Indian J. Pharm. Educ. Res., **41(3)**, (2007)
8. C. L. Chang and C. H. Chou, J. Chromato. B. Anal. Tech. Biomed. Life Sci., **822 (1-2)** 278 (2005).

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