NOTE

# UV Spectrophotometric Determination of Tolterodine Tartarate and Cefepime

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UV spectrophometric methods have been developed for the determination of tolterodine tartarate and cefepime in pure and pharmaceutical formulations. These methods obey Beer's law limits in the concentration range of 10–90 and 5–40 µg/mL, exhibiting maximum absorption at 280 and 240 nm respectively. These methods are extended to pharmaceutical preparations and there is no interference from any common pharmaceutical additives and diluents. The methods have been statistically evaluated and are found to be precise and accurate.

Key Words: Spectrophotometric determination, Tolterodine tartarate, Cefepime.

Tolterodine L-tartrate[1, 2] (TLD) is a tertiary antimuscarinic agent. It is claimed for greater selechierty towards the muscarinic receptors of the bladder. Due to the bladder selectivity, shows better tolerability in managing winary frequency and urgency and incontinence in detrusor instability. The chemical name is (R)-N,N-disopropryl-3-2(2-hydroxy-5-methylphenyl)-3-phenylpropanamine L-hydrogen tartrate. The empirical formula is $C_{26}H_3NO_7$ and its molecular weight is 475.6. Cefepime hydrochloride is a semi-synthetic, broad spectrum, cephalosporin antibiotic for parenteral administruction. The chemical name is 1-[[(6R, 7R)-7-[2-(2-amino-4-thiazolyl)-glyoxyamido]-2-carboxy-8-oxo-5-thia-1-azabicyclo [4.2.0] oct-2-en-3-yl]methyl]-1-methylpyrrolidinium chloride, 7^2-(z)-(o-methyloxime), monohydrocloride, monohydrate. Cefepine hydrochloride is a white to pale yellow powder with a molecular formula of $C_{19}H_{25}ClN_6O_5S_2HClH_2O$ and a molecular weight of 571.5. It is highly soluble in water. No methods are reported for the determination of TLD and a few methods have been reported for CFM[3–5]. The present investigation has been undertaken to develop a UV spectrophotometric method for the determination of TLD and CFM.
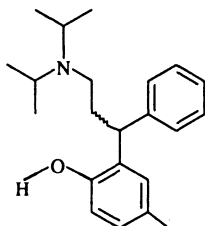
Chemical Structure of Tolterodine
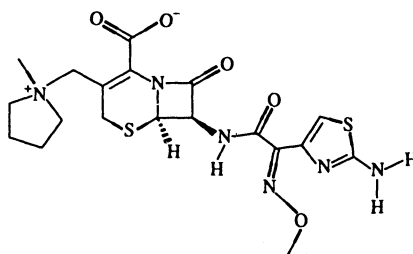
Chemical Structure of CEFEPIME

All the chemicals used were of analytical grade. Spectral and absorbance measurements were made on Systronics UV-Visible spectrophotometer-117 with 10 mm matched quartz cells.

Preparation of standard solutions: Accurately weighed 100 mg of TLD or CEF and dissolved in 100 mL of distilled water to obtain 1 mg/mL stock solution. The stock solution was further diluted with distilled water to obtain a working standard of 200 µg/mL for TLD or 100 µg/mL for CEF.

Preparation of sample solutions: An accurately weighed amount of capsule powder (TLD) or injection powder (CEF) equivalent to 100 mg was dissolved in 100 mL of distilled water and filtered. This solution was further diluted with distilled water so as to obtain a concentration of 200 µg/mL for TLD or 100 µg/mL for CEF.

Proposed method for TLD and CEF: Aliquots of solution 0.5–2.5 mL (200 µg/mL for TLD or 100 µg/mL for CEF) were transferred into a series of 10 mL volumetric flasks and the volume was brought up to 10 mL with distilled water. The absorbance was measured at 280 nm for TLD and 240 nm for CEF against a reagent blank. The amount of TLD or CEF present in the sample solution was computed from its calibration curve.

The Beer's law limits, Sandell's sensitivity, molar extinction coefficient, per cent relative standard deviation (calculated from the eight measurements containing 3/4th of the amount of the upper Beer's law limits), regression equation, correlation coefficients, % range of error (0.05 and 0.01 confidence limits) obtained are shown in Table-1.

TABLE-1
OPTICAL CHARACTERISTICS AND PRECISION OF
THE PROPOSED METHODS

Parameter		TLD	CFM
λ_{max} (nm)		280	240
Beer's law limit (µg/mL)		10–90	5–40
Molar absorptivity (L mol^{-1} cm^{-1})		2.4969×10^3	9.096×10^3
Sandell's sensitivity (µg cm^{-2}/0.001 absorbance unit)		0.1904	0.0527
Regression equation (Y = a + bC)	Slope (b)	6.89×10^{-3}	1.886×10^{-3}
	Intercept (a)	-1.28×10^{-2}	4.26×10^{-5}
Correlation coefficient (r)		0.9985	0.9999
Relative standard deviation (%)*		0.3110	0.299
%Range of error (Confidence limits)*	0.05 level	0.26	0.249
	0.01 level	0.3847	0.3698

*Average of eight determinations

.To evaluate the validity and reproducibility of the methods, known amounts of pure drug were added to previously pharmaceutical preparations and the mixtures were analyzed by the proposed methods and the results are presented in Table-2. Interference studies revealed that the common excipients and other additives usually present in dosage form did not interfere in the proposed methods.

TABLE-2

ESTIMATION OF TLD AND CFM IN PHARMACEUTICAL FORMULATIONS

Sample	Labeled amount (mg)	Amount found (mg) in proposed method	Recovery (%)*
Tolterodine Tartarate			
· Capsules I	2	1.98	99.00
Capsules II	2	2.01	100.50
Cefepime			
Injection I	500	500.12	100.02
Injection II	500	500.45	100.09

* Recovery amount is the average of five determinations

In conclusion the proposed methods are most economic, simple, sensitive and accurate and can be used for the determination of TLD and CFM in bulk as well as in its pharmaceutical preparations.

ACKNOWLEDGMENTS

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