

NOTE

Spectrophotometric Determination of Butorphanol Tartrate and Telmisartan in Bulk and Pharmaceutical Formulations

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Simple, sensitive and reproducible UV spectrophotometric methods have been developed for the determination of opioid analgesic and anti-hypertensive drugs, namely, butorphanol tartrate and telmisartan respectively. Both the drugs were taken in 0.1 N HCl and maximum absorbance was observed at 279 nm and 291 nm respectively. Beer's law was obeyed in the concentration of 10–50 $\mu\text{g/mL}$ for butorphanol tartrate and 2–10 $\mu\text{g/mL}$ for telmisartan. There is no interference from any common pharmaceutical excipients.

Key Words: UV Spectrophotometric methods, Butorphanol tartrate, Telmisartan.

Butorphanol tartrate (BTP) is an opioid analgesic^{1–3} and telmisartan (TMS) is a nonpeptide angiotensin II receptor antagonist, used in hypertension⁴. Chemically, BTP is 17-(cyclobutyl methyl) morphinan-3, 14-diol D-(-)-tartrate and TMS is 4'-[(1,4'-dimethyl-2'-propyl[2,6'-bi-1H-benzimidazole-1'-yl)methyl]-[1,1'-biphenyl]-2-carboxylic acid. Few HPLC and GC methods were reported for the estimation of BTP and TMS and no spectrophotometric methods have been reported for these drugs. The present investigation has been undertaken to develop a UV spectrophotometric method for the determination of BTP and TMS. BTP exhibits absorption maximum at 279 nm and Beer's law is obeyed in the concentration range 10–50 $\mu\text{g/mL}$. TMS exhibits absorption maximum at 291 nm and Beer's law is obeyed in the concentration range 2–10 $\mu\text{g/mL}$.

Spectral and absorbance measurements were made on Elico SL-159 UV-vis spectrophotometer with 10 mm matched quartz cells.

Preparation of standard solutions

About 100 mg of BTP and TMS were accurately weighed and dissolved in 100 mL of 0.1 N HCl. This solution was further diluted with 0.1 N HCl to get a working standard solution of 100 $\mu\text{g/mL}$ and 100 $\mu\text{g/mL}$ respectively.

For pharmaceutical formulations

Sample solutions (BTP and TMS) for formulations (injections⁵ or tablets) were prepared exactly in the same manner as given under the standard solutions with prior filtration before making up to volume and analyzed as described for pure samples.

Method for BTP and TMS

To a series of 10 mL volumetric flasks, aliquot samples of BTP ranging from 1–5 mL (1 mL containing 100 µg) or TMS ranging from 0.2–1 mL (1 mL containing 100 µg) were transferred. The final volume was brought to 10 mL with 0.1 N HCl. The absorbance was measured at 279 nm for BTP and 291 nm for TMS against 0.1 N HCl as blank. The amount of BTP or TMS present in the sample solution was computed from its calibration curve.

The optical characteristics such as Beer's law limits, Sandell's sensitivity, molar extinction coefficient, per cent relative standard deviation (calculated from the five measurements containing 3/4th of the amount of upper Beer's law limits for all the drugs), percentage of range of error (0.05–0.01 confidence limits) were calculated and the results are summarized in Table-1.

TABLE-1
OPTICAL CHARACTERISTICS AND PRECISION OF
THE PROPOSED METHODS

Parameters	Butorphanol tartarate	Telmisartan
λ_{\max} (nm)	279	291
Beer's law limit (µg/mL)	10–50	2–10
Sandell's sensitivity (µg/cm ² /0.001 absorbance unit)	0.0633	0.0114
Molar extinction coefficient (L/mol/cm)	7.54×10^4	2.859×10^4
(%) Relative standard deviation	0.7450	0.5230
(%) Range of error:		
0.05 confidence limits	0.6490	0.2030
0.01 confidence limits	0.2280	0.3340
Correlation coefficient	0.9999	0.9999
Regression equation (Y*):		
Slope (a)	0.0615	0.0540
Intercept (b)	0.0011	0.0018

Y* = b + aC, where "C" is concentration in µg/mL and Y is absorbance unit.

Interference studies revealed that the common excipients and other additives usually present in dosage form did not interfere in the proposed methods. The methods were applied for the analysis of the drugs in their pharmaceutical formulations. To evaluate the validity and reproducibility of the methods, known

amounts of pure drug were added to the previously analyzed pharmaceutical preparations and the mixtures were analyzed by proposed methods and the results are presented in Table-2.

TABLE-2
ESTIMATION OF BTP AND TMS IN
PHARMACEUTICAL FORMULATIONS

Sample	Labelled amount (mg)	Amount found (proposed method) (mg)	(%)Recovery
BTP tablets			
1	2	1.98	99.00
TMS capsules			
1	40	39.85	99.62
2	40	39.91	99.77

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

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