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VISIBLE SPECTROPHOTOMETRIC DETERMINATION OF ITOPRIDE HYDROCHLORIDE IN PHARMACEUTICAL FORMULATIONS

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ABSTRACT

A simple, sensitive, precise, accurate reliable and reproducible spectrophotometric method has been developed for the determination of itopride hydrochloride in pharmaceutical formulations**.** This method is based on the formation of colored species on binding of itopride hydrochloride with sodium carbonate, NaOH followed by F/C to produce blue colored chromogen (λ_{max} at 520 nm). Results of analysis were validated statistically and by recovery studies. This method is successfully employed for the determination of itopride hydrochloride in various pharmaceutical preparations.

Key words: Itopride hydrochloride, Visible spectrophotometric determination, Molar abosrptivity, Assay.

INTRODUCTION

Itopride hydrochloride (ITH) is N- [[4-(2-dimethylaminoethoxy) phenyl] methyl]-3,4-dimethoxybenzamide hydrochloride is a gastrointestinal tract stimulant and one of the most recent drugs in this category. It increases acetylcholine concentration by inhibiting dopamine D2 receptor and acetylcholine esterase. Higher acetylcholine increases G1 peristalsis, increases the lower esophageal sphincter pressure, stimulates gastric motility, accelerates gastric emptying and improves gastro-duodenal coordination. The present investigation is aimed to provide a simple and sensitive method for the analysis of the drug, which could be effectively utilized by small and large-scale industries involved in manufacturing of the drug to assess quality control.

Only a few HPLC[1-8,12] methods, three spectrophotometric[9-11] methods, one

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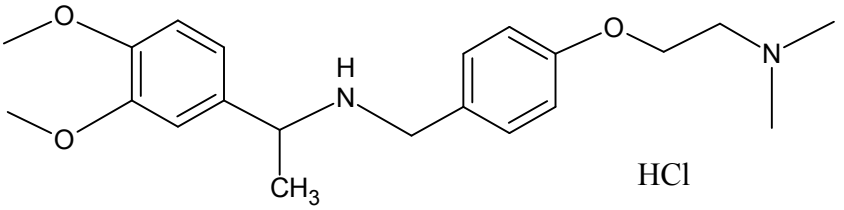
chromatographic method [13] and one HPTLC[14] procedure appeared in the literature for the determination of ITH in bulk and pharmaceutical formulations.



Structure of itopride hydrochloride

EXPERIMENTAL

Materials and methods

Instrumentation

After due calibration of the instrument, spectral and absorbance measurements are made with Systronics UV – Visible double beam spectrophotometer Model 2201.

Reagents

All the chemicals used were of analytical grade. All the solutions were freshly prepared with double distilled water. Freshly prepared solutions were always used for analysis. In the proposed method aqueous solutions of sodium carbonate, NaOH and F/C[15-17] reagent were used.

Standard and sample solution of itopride hydrochloride

About 100 mg of itopride hydrochloride (formulation) was accurately weighed on a digital single pan balance and dissolved in 100 mL of water in a volumetric flask to prepare a solution that has a concentration equal to 1 mg/mL for standard solution and further dilutions are made with the same solvent (500 µg/mL) for this method.

Assay Procedure

Method

Aliquots of 1-5 mL of standard itopride hydrochloride[1-13] solution (100 µg/mL) were transferred to a series of 10 mL graduated tubes. To each tube 1 mL of sodium carbonate solution was added followed by 0.5 mL of NaOH solution and 0.5 mL F/C[15 -17] reagent. After addition of various components, the reaction mixture was allowed to stand at

room temperature for 10 min. The absorbance of the blue colored chromogen was measured at 520 nm against the reagent blank. The amount of itopride hydrochloride was computed form the calibration curve. The absorption spetrum of itopride showing λ_{max} at 520 nm is represented in Fig.1. The Beers laws plot of itopride hydrochloride is shown in Fig. 2.

RESULTS AND DISCUSSION

The results of analysis were validated through systematic statistical analysis and these are tabulated in Tables 1 and 2 Specific parameters such as absorption maxima and Beer's law limits are represented graphically (Fig.1 and 2)

Table 1. Optical characteristics, precision and accuracy of itopride hydrochloride

Parameters	Proposed method
λ_{max} (nm)	520
Beer's law limit (µg/mL)	1-5
Sandell's sensitivity (µg/cm^2/0.001 abs. unit)	0.167364
Molar absorptivity (litre.mole^{-1}.cm^{-1})	0.2359 x 10^4
Correlation coefficient (r)	0.9998
Regression equation (Y)*	
Slope (a)	0.024
Intercept (b)	0.000648
% RSD**	0.91
% Range of errors (95% confidence limits)	
0.05 Significance level	± 0.760
0.01 Significance level	± 1.125

* Y= a + bx, where'Y'is the absorbance and x is the concentration of itopride hydrochloride in µg/mL

** For six replicates.

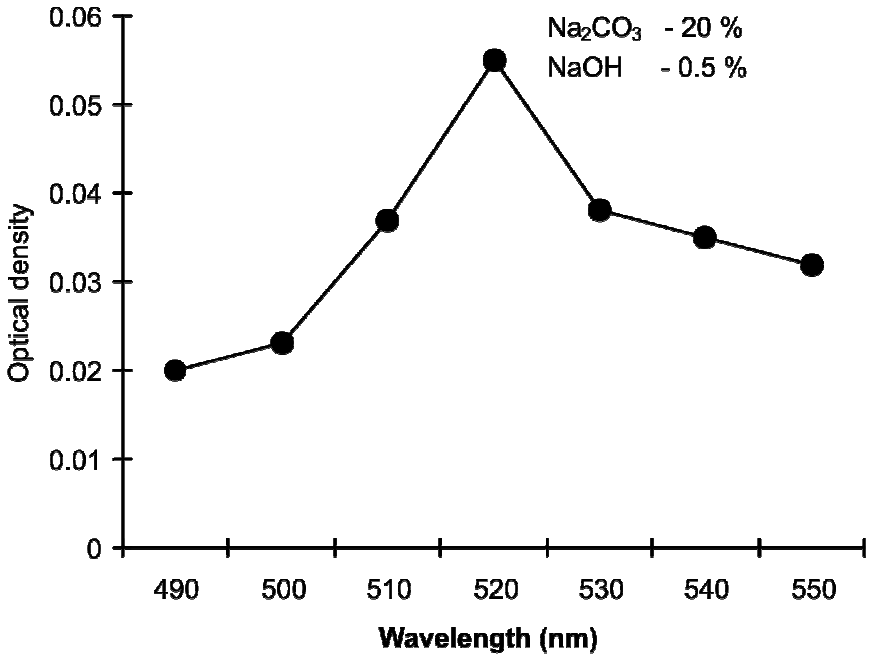


Fig. 1: Absorption spectrum of itopride hydrochloride

Table 2. Estimation of itopride hydrochloride in pharmaceutical formulations

Formulations	Labeled amount mg/vial	% Recovery by proposed method
Tablet 1	50	99.09
Tablet 2	50	99.18
Tablet 3	50	99.27
Tablet 4	50	100.1

The proposed method is based on reduction of the drug by phosphomolybdic, phosphotungstic acid present in Folin-ciocaltaeu reagent (F/C) [15-17] in alkaline medium. The drug itopride hydrochloride undergoes initial reduction with F/C reagent in alkaline medium and then forms a blue colored chromogen after 10-15 min of addition of sodium hydroxide**.** The results of analysis indicating various parameters was obtained by

systematic statistical analysis The optical characteristics such as absorption maxima, Beer's law limits, molar absorptivity and Sandell's sensitivity for this method are presented in Table 1. The regression analysis using the method of least squares was made for the slope (a), intercept (b) and correlation coefficient (r) obtained from different concentrations and results are summarized in Table 1. The precision and accuracy were found by analyzing six replicate samples containing known amounts of the drug and the results are summarized in Table 1.

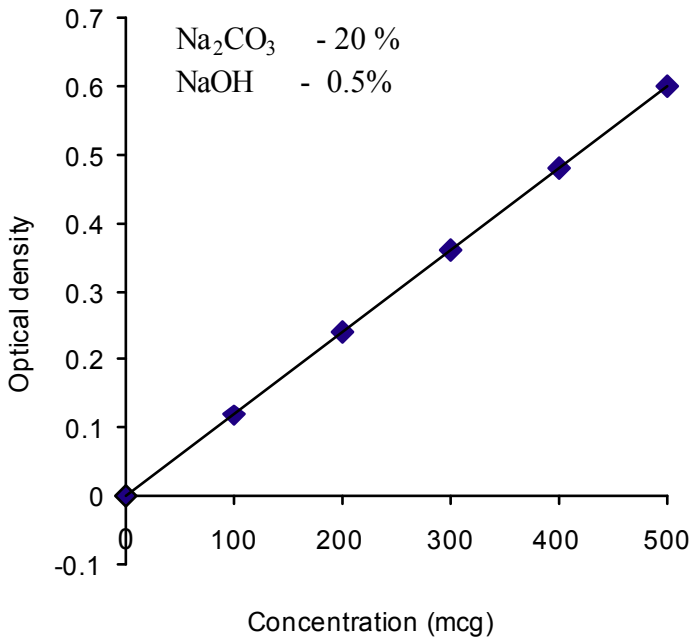


Fig. 2: Beer's law plot for itopride hydrochloride

The accuracy of this method in the case of formulations was thoroughly studied by recovery experiments and the results are presented in Table 2. An additional check on the accuracy of this method was analyzed by adding known amounts of pure drug to pre-analyzed formulations

The results of recovery experiments and percent recovery values are listed in Table 2. Recovery experiments indicated the absence of interferences from the commonly encountered pharmaceutical additives and excipients. Thus, the proposed method is simple and sensitive with reasonable precision and accuracy and can be used as a standard method for the routine determination of itopride hydrochloride in quality control analysis.

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