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# Simultaneous determination of metaclopramide and paracetamol by area under curve spectrophotometric method in combined tablet dosage form

**Neha A Jain* NP Dudane and RT Lohiya**

S.K.B College of Pharmacy, New Kamptee, Nagpur,M.S, India.

## ABSTRACT

The method for the simultaneous determination of Metaclopramide and Paracetamol by spectroscopy has been developed. The simple, accurate and precise method includes Area under the Curve (AUC) method. From a solvent effect studies and the spectral behaviors of Metaclopramide and Paracetamol, Milli-Q Water (DDW) was selected as solvent. Metaclopramide show maximum absorbance at 273 nm and Paracetamol shows maximum absorbance at 243 nm. The linearity range lies between 4-16mg/mL for Metaclopramide & Paracetamol at their respective wavelengths For the AUC method, the wavelength ranges between 268-278 nm and 238-248 nm were selected with reference to the absorbance curves plotted between the wavelengths of 200-400 nm. This method allows rapid analysis of two drug combination. The results of analysis were validated statistically and by recovery studies by following ICH method validation guideline. Tablet containing both drugs was assayed using the methods developed, showing a good accuracy and precision.

**Keywords**: Spectroscopy; Metaclopramide; Paracetamol; Area Under Curve Method;

***Corresponding author***

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## INTRODUCTION

Metaclopramide (MET) is 4-amino-5-chloro N-(2-diethyalaminoethyal)-2-methoxy benzamide. It finds its use as antiemetic. Paracetamol (PAR) is chemically N-(4-hydroxyphenyl) acetamide. It is used mainly as antipyretic.

The aim of this work is to develop a simple, rapid, accurate, reproducible & selective and low cost method for the simultaneous determination of MET and PAR by Area under Curve Spectrophotometric Method. For the individual determination of MET and PAR the methods were available such as Area under Curve, Dual Wavelength and Simultaneous Spectrophotometer Methods, but for the combination of both the drugs the method was available which was Estimation of MET and PAR by simultaneous equation and dual wavelength method. Hence this method was developed and validated for determination of MET and PAR in tablets. The proposed method was applied in pharmaceutical formulations.

## MATERIALS AND METHODS

### Experimental Instruments

SHIMADZU double beam UV-visible spectrophotometer (model 1700) with 1 cm matched quartz cuvettes were used for all absorbance measurements. Shimadzu AUX220 balance was used for weighing the samples**.** All the chemicals used were of AR grade. Milli-Q water and Whatmann filter paper (no.41) were used throughout the experimental work .

### Reagents

All chemicals and reagents used were of analytical grade. Pure drug sample of MET and PAR were kindly supplied as a gift sample by Alkem Research Lab. Taloja Mumbai, India. It was used without further purification. Tablets were purchased from local market; METOPAR containing MET 5 mg and PAR 500 mg. Tablet used for analysis were manufactured by cosme farma laboratories limited, karnataka.

### Preparation of Standard Stock Solutions and Sample Solutions:

Stock solution of 100 mg/ml of both the drugs ware prepared separately in milli-Q water. For verification of Beer`s Law, a series of diluted solutions of MET and PAR ranging from 4-16µg/mL (series A) and 4-16 µg/ml (series B), respectively were prepared and mixture of both the drugs in (series C) in same concentration range were prepared.

Twenty tablets were weighed accurately and a quantity of tablet powder equivalent to 5 mg of MET was weighed and dissolved in the 80 mL of milli-Q water with ultrasonication for 15 min and solution was filtered through What man paper No. 41 into a 100 mL volumetric flask. Filter paper was washed with milli-Q water, adding washings to the volumetric flask and volume

was made up to the mark with milli-Q water. The solution was suitably diluted further to get required final concentration 4µg mL-16 µg mL of both the drugs.

**Method**

**Area under curve method**

For the simultaneous determination using the area under the curve method, suitable dilutions of 4-16 µg/ml of the standard stock solutions (100 µg/ml) of both the drugs were prepared separately. The solution of drugs ware scanned in the range of 200-400 nm. For Area under Curve method, the sampling wavelength ranges selected for estimation of MET and PAR are 278-268nm (λ1-λ2) and 248-238 nm (λ3-λ4) respectively. Mixed standard were prepared and their Area under the Curve were measured at the selected wavelength ranges. These were used to construct following equations which were used to calculate the concentration of two drugs in mixed standard and the sample solution.

$$A1 = 395.6\ C_{MET} + 149.59\ C_{PAR} \quad \text{.....(1) at 278-268 nm.}$$
$$A2 = 231.19\ C_{MET} + 673.97\ C_{PAR} \quad \text{..... .(2) at 248-238 nm.}$$

Where,

395.6 and 231.19 are absorptivity values of MET at (λ1-λ2) and (λ3-λ4) respectively.
149.59 and 673.97 are absorptivity values of PAR at (λ1-λ2) and (λ3-λ4) respectively.
A1 and A2 are absorbances of mixed standard at (λ1-λ2) and (λ3-λ4) respectively.
$C_{MET}$ and $C_{PAR}$ are the concentrations in g/L.

**Recovery Studies**

Validation of the proposed methods was carried out for its accuracy, precision, specificity and ruggedness according to ICH guidelines. Recovery studies were carried out at four different levels by adding the pure drug (2, 4, 6, 8, mg respectively) to previously analysed tablet powder sample within the range of linearity for both the drugs. From the amount of drug found, percentage recovery was calculated and linearity range also analysed at different percentage.

Solution stability: The solutions were found to be stable in milli-Q Water up to 12 hrs. Hence it does not showed any stability problems in milli-Q Water. Thus their %RSD were found to be <1.6

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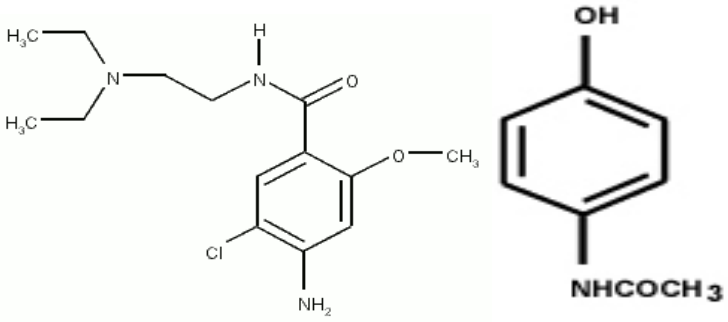
## RESULTS AND DISCUSSION

### Analytical features

Simple, precise and accurate Area under curve were developed for the simultaneous estimation of MET and PAR in combined dosage form.

For This Method Beer's law obeyed in the concentration range of 4-16 µg/mL for MET and 4-16 µg/mL for PAR,respectively. Results of recovery studies are shown in Table 2. For MET, the recovery study results ranged from 98.56% to 99.03 % with % RSD values ranging from 0.6% to 0.7 %. For PAR, the recovery results ranged from 98.50 % to 99.51 %, with % RSD values ranging from 0.414 % to 0.787 %. The accuracy and reproducibility is evident from the data as results are close to 100 % and standard deviation is low. Thus all the methods can be applied in the routine analysis of the Metaclopramide and Paracetamol.




Metaclopramide paracatamol

**Fig.I The chemical structures of Metaclopramide and Paracetamol**

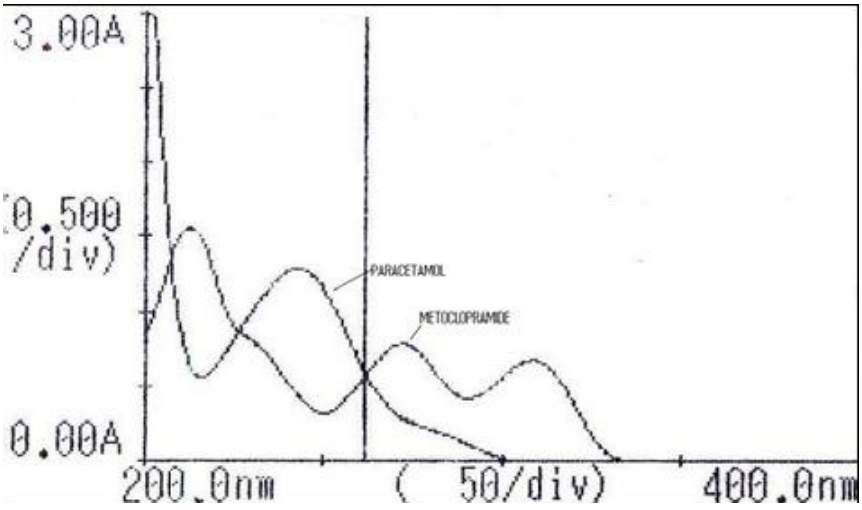



**Figure II: Overlain spectra & Area under the curve of Metaclopramide and Paracetamol**

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**TABLE I: Optical Characteristic of Proposed method**

| Parameter | Method A (AUC) | |
|---|---|---|
| | **Metaclopramide** | **Paracetamol** |
| λ (nm) | 278 – 268 | 248 - 238 |
| Beer's law limit (µg/mL) | 4 - 16 | 4 - 16 |
| Regression Equation (y = mx + c) Intercept(c) - - | -0.211 | 11.75 |
| Slope (m) - - | 0.275 | 0.301 |
| Correlation Coefficient - - | 0.998 | 0.996 |
| Accuracy (%Recovery) | 99.05 | 101.22 |
| Precision | | |
| Repeatability | 0.48 | 0.64 |
| Interday | 99.3% | 98.93% |
| Intraday | 100.4% | 99.4% |
| Analyst | 101.29% | 99.07% |

## CONCLUSION

The validated spectrophotometric method employed here proved to be simple, economical, precise and accurate. Thus, this method can be used as IPQC test and for routine simultaneous determination of MET and PAR in tablet dosage form.

## ACKNOWLEGEMENT

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