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## Simultaneous Estimation of Rifampicin and Isoniazid in Combined Dosage Forms

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A. MANNA, I. GHOSH, SHARMISTHA DATTA, P.K. GHOSH, L.K. GHOSH AND B.K. GUPTA\*

Division of Pharmaceutics, Biopharmaceutics and Clinical Pharmacokinetics

Department of Pharmaceutical Technology

Jadavpur University, Calcutta - 700 032

**A simple spectrophotometric method for the simultaneous estimation of rifampicin and isoniazid in their combined pharmaceutical dosage form has been developed. The method does not require any extraction or isolation procedure. The method is simple, rapid, specific and reproducible. Recovery studies were also found to be satisfactory.**

Rifampicin is an antibacterial agent, chemically (12Z, 14E, 24E)-(2S, 16S, 17S, 8R, 19R, 20R, 21S, 22R, 23S)-1,2-dihydro-5,6,9,17,19,-pentahydroxy-23-methoxy-2,4,12,16,18,20,22-heptamethyl-8-(4 methylpiperazinylimiinomethyl)-1,11 dioxo-2,7-(epoxypentadeca - 1, 11, 13-trienoimino) naphtho [2,1b] furan-2-ylacetate, used in the treatment of tuberculosis<sup>1</sup>. Isoniazid, chemically isonicotylhydrazide is a tuberculostatic antibacterial agent<sup>2,3</sup>. A combination of 450 mg of rifampicin and 300 mg of isoniazid is commercially available as capsules. Although individual methods have been described for the above mentioned drugs, no method has been developed for the simultaneous estimation of these two drugs<sup>4</sup>. The present work deals with the development of a simple, rapid, reproducible method for the simultaneous estimation of rifampicin and isoniazid using spectrophotometry.

### MATERIALS AND METHODS

#### Estimation of rifampicin and isoniazid:

Standard solution of rifampicin and isoniazid were prepared in 0.01 N NaOH solution (pH 12) separately to concentrations of 150 µg/ml and 100 µg/ml respectively. They were further diluted with NaOH solution (pH12) to concentrations in the range of 2-20 µg/ml. The λ-max for rifampicin and isoniazid were found to be at 327 and 297 nm respectively. The  $E^{1\%}_{1\text{cm}}$  value for both the drugs were

obtained at both 327 and 297 nm. The  $E^{1\%}_{1\text{cm}}$  of isoniazid RS and rifampicin RS were found to be at 327 nm 189.0 and 296.33 and at 297 nm 325.75 and 199.66, respectively. The absorbance should preferably be taken 1 h after start of the experiment.

A combined capsule preparation of rifampicin and isoniazid (Rcinex, Lupin Laboratories; Isorifam, Biochem) were used as the sample. A weighed quantity of the contents of the capsule equivalent to 150 mg of rifampicin and 100 mg of isoniazid was dissolved in NaOH solution (pH 12) and filtered. The filtrate was further diluted with NaOH solution so that the concentration of rifampicin and isoniazid after final dilution was 15 µg/ml and 10 µg/ml respectively.

The sample containing both rifampicin and isoniazid was kept in the sample cell of the double beam spectrophotometer and the absorbance was recorded at both 297 and 327 nm keeping NaOH solution (pH 12) in the reference cell. The per cent of rifampicin and isoniazid is calculated using the following pair of simultaneous equations<sup>5</sup>.

$$X = 100 ((b1S2-b2S1)/(b1a2-b2a1))$$

$$Y = 100 ((a1S2-a2S1)/(a1b2-b1a2))$$

Where, X and Y are the concentration (as % w/w) of isoniazid and of rifampicin; a1, a2 represent  $E^{1\%}_{1\text{cm}}$  of isoniazid at 297 and 327 nm respectively; b1, b2 represent

\*For correspondence

**TABLE 1 : ESTIMATION AND RECOVERY STUDIES BY THE PROPOSED METHOD**

Drug	Absorbance		Amount in capsule (mg)		% of labeled claim	% Recovery
	297	327	Labelled	Amount found	Mean±s.d*	Mean±s.d*
Rcinex Isoniazid			300	291.9±1.8	97.4±1.1	99.2±0.2
	0.615	0.626	450	444.8±1.9	99.4±0.5	99.3±0.3
Rifampicin			300	298.2±0.7	99.4±0.5	99.7±0.2
	0.621	0.629	450	446.6±1.1	99.2±0.8	99.0±0.3

\* average of three readings

$E_{1\text{cm}}^{1\%}$  of rifampicin at 297 and 327 nm respectively, S1, S2 represent  $E_{1\text{cm}}^{1\%}$  of the sample at 297 and 327 nm respectively.

The results thus obtained are presented in Table no. 1.

#### Recovery Studies:

Aliquots of 15 ml of the analyzed sample were transferred to two separate 25 ml volumetric flasks. 10 ml of standard solution containing 15 µg/ml of rifampicin and 10 µg/ml of isoniazid were added to the respective flasks. The absorbance was measured at 297 nm and 327 nm against sodium hydroxide (pH 12) as blank. The per cent recovery of rifampicin and isoniazid was determined by using the following formula<sup>6</sup>.

$$\% \text{ Recovery} = \frac{\text{Amount found after addition of standard drug- Amount found in formulation}}{\text{Amount of standard drug added}} \times 100$$

The results of recovery study are also presented in Table no. 1.

#### RESULTS AND DISCUSSION

From the table it is evident that in each 3 capsules preparations of isoniazid and rifampicin, amount obtained by the proposed method is in good agreement with the labeled claimed. Further, recovery studies also gave satisfactory result which proved the validity of the method.

In recovery studies 99.2 to 99.7% of isoniazid and 99.0 to 99.3% of rifampicin were recovered satisfactorily. Hence, the proposed method can be used for routine analysis of the two drugs in their combined pharmaceutical dosage forms.

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#### REFERENCES

1. Indian Pharmacopoeia, 4th Ed., Vol.1. Controller of Publication, Delhi, 1996, 359.
2. British Pharmacopoeia, Vol 1, British Pharmacopoeia Commission, London, 1993, 580.
3. The United States Pharmacopoeia XXII, the National Formulary XVII, United States Pharmacopoeial Convention Inc., 1990, 728.
4. Sethi P.D., In Quantitative Analysis of drugs in Pharmaceutical Formulations; CBS Publishers & Distributors, Delhi, 1993, 263.
5. Beckett. A.H. and Stenlake J.B. In, Practical Pharmaceutical Chemistry, Vol-2, 3rd Ed., CBS Publishers and Distributors, 248.
6. S. Ravishankar S., Nanjan M.J., Vasudevan M., Kumar K. Sujit and Suresh and B., *The Eastern Pharmacist*, 1997, XL, 133.