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Development and validation of spectrophotometric methods for the estimation of mefloquine hydrochloride in bulk and tablet dosage form

S. Meena[1*] and S. M. Sandhya[2]

[1]*Department of Pharmaceutical Analysis, K.M. College of Pharmacy, Uthangudi, Madurai, Tamilnadu, India*
[2]*Department of Pharmaceutical Analysis, Devaki Amma Memorial College of Pharmacy Chelembra, Malappuram, Kerala, India*

ABSTRACT

Two new simple, selective, sensitive and economical methods (A and B) have been developed for the analysis of mefloquine hydrochloride in pure and pharmaceutical dosage form. The methods were based on ion-pair complexation between drug and dyes like metanil yellow and bromophenol blue at an optimum pH 2.8. The colored chromogens were measured at 410 nm (λmax) for method A and 415 nm (λmax) for method B. Calibration curve was linear in the range of 3 – 15 µg/ml for method A and 5 – 40 µg/ml for method B. Different analytical performance parameters such as linearity, precision and accuracy were determined. The proposed methods were validated and successfully applied for analysis of bulk and tablet dosage forms.

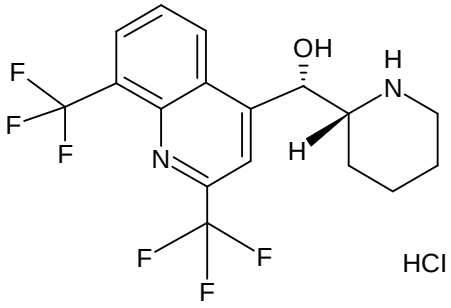
Keywords: Mefloquine hydrochloride, metanil yellow, bromophenol blue, ion-pair colorimetry, validation.

INTRODUCTION

Mefloquine hydrochloride (MEFQ) chemically known as (±) Erythro-α-(2-piperidyl)-2, 8-bis (trifluoromethyl)-4-quinoline methanol hydrochloride is a blood schizontizide and induces morphological change in the intraerythrocytic parasite. It is actively taken up even by chloroquine resistant *P. Falciparum* and like chloroquine it raises intravesicular pH. It appears to bind to haeme and form a complex which leads to disruption of parasite membrane. It is effective as single oral dosage against multidrug resistant malaria in man [1, 2].

Literature survey reveals a few analytical methods for mefloquine hydrochloride in tablet dosage form and biological fluids. It includes HPLC and other hyphenated techniques [3-20]. In present investigation an attempt has been made to develop two new simple, sensitive, selective and economical methods (A and B). The drug in its protonated state forms a complex with an anionic species (acidic dye) to form an ion pair complex, which can be extracted into organic solvents such as chloroform, benzene, dichloromethane. Thus by using a pairing agent, a colored complex is produced and compound can thus be measured spectrophotometrically. In method A, metanil yellow is used and in method B, bromophenol blue is used. Mefloquine hydrochloride was found to give yellow colored chromogen with metanil yellow and bromophenol blue at 410 nm and 415 nm respectively.

Fig. 1 Structure of mefloquine hydrochloride



MATERIALS AND METHODS

A shimadzu model EZ301 double beam UV-visible spectrophotometer with a pair of 1 cm matched quartz cells was used to measure absorbance of the resulting solutions. Mefloquine hydrochloride was gifted by Zydus Cadila, Ahmadabad, India. The commercial tablets of mefloquine hydrochloride were purchased from a local pharmacy. All the chemicals used were of analytical grade.

Optimization of parameters

The optimum dye concentration, dye volume, pH and buffer capacities were selected on the basis of their ability to give maximum absorbance, as shown in Table-1

Table 1: Optimization of parameters

Method	Dye concentration	Dye volume	pH	Buffer capacity
Method A (Metanil Yellow)	0.025 % w/v	2 ml	2.8	2 ml
Method B (Bromophenol blue)	0.05 % w/v	2 ml	2.8	2 ml

Preparation of standard stock solution

A stock solution of drug was prepared by dissolving 50 mg of MEFQ in 50 ml of chloroform to obtain a concentration of 1000 µg/ml.

Working standard solution

Various aliquots of solution of MEFQ were suitably diluted with chloroform to give a concentration of 3 – 15 µg/ml for method A and 5 – 40 µg/ml for method B. These solutions were added into different separating funnels followed by addition of 2.0 ml of buffer (pH 2.8)

and 2.0 ml of dye solution (0.025 % w/v) in case of method A. For method B, 2.0 ml of buffer (pH 2.8) and 2.0 ml of dye solution (0.05 % w/v) were added. The yellow color developed was measured at 410 nm for method A and 415 nm for method B. The linearity of MEFQ with ion pair reagent was constructed. The optical characteristics are shown in Table-2.

Preparation of sample solution and formulation analysis

Twenty tablets were weighed accurately and average weight of the tablet was determined. The tablets were powdered and weight to 50 mg was accurately weighed and transferred to 50 ml volumetric flask. The content of tablet was extracted with chloroform, followed by addition of 2.0 ml of buffer (pH 2.8) and 2.0 ml of dye solution. The chloroform layer was collected and filtering through whatmann filter paper. The filtrate was suitably diluted with chloroform to give a concentration of 6 µg/ml for method A and 20 µg/ml for method B. The absorbances of these solutions were measured at 410 and 415 nm respectively. The procedure was repeated five times for each brand.

Method validation

The method is validated and following parameters were evaluated. Accuracy of the method was checked by recovery studies. Precision of the method was studied by inter-day and intra-day analysis of multiple samplings of homogenous sample and expressed as percentage RSD. The results were tabulated in Table-2.

Recovery studies

To the pre analyzed solution of formulation, a known quantity of standard solution was added, mixed well and proceeded as assay. Percentage recovery was calculated as shown in Table-3.

RESULTS AND DISCUSSION

Table 2: Optical Characteristics and Validation data for Mefloquine hydrochloride

PARMETERS		METHOD A	METHOD B
Absorption maxima (nm)		410	415
Beer's law limit (µg/ml)		3-15	5-40
Regression equation	Slope	0.0567	0.02
	Intercept	0.0033	0.0026
Regression coefficient (r^2)		0.9997	0.9993
Sandell's sensitivity (µg/cm^2/0.001A.U)		0.0176	0.05
*Precision	Repeatability (% RSD)	0.67	1.33
	Inter-day (% RSD)	0.85	1.02
	Intra-day (% RSD)	0.72	0.89
	Analyst (% RSD)	0.66	0.54
*Formulation analysis	Brand I (% label claim)	99.64	101.23
	Brand II (% label claim)	99.32	100.87

**Average of five determinations*

Under experimental conditions described, calibration curve, assay of tablets, recovery studies and precision studies were performed. The accuracy of the proposed methods was proved by performing the recovery studies in the commercially available formulations. The precision and repeatability of the methods were checked and the results were satisfactory. The optical characteristics such as Beer's law limit, regression coefficient and Sandell's sensitivity were

given in Table-2. The analysis of the results shows that the presence of excipients in tablet formulation did not interfere with the final determination of active component. The amount of drug found in formulation is well agreed with label claim.

Table 3: Data for recovery study

Method	Amount added (mg)	*Amount recovered (mg)	*Recovery (%)	Average Recovery (%)	RSD (%)
Method A	5	4.98	99.6	99.1	0.291
	10	9.86	98..6		
Method B	5	4.95	99	99.3	0.245
	10	9.92	99.6		

**Average of three determinations*

CONCLUSION

The validated ion pair spectrophotometric methods employed here proved to be simple, fast, accurate, precise and sensitive. The proposed methods can be applied for routine analysis in quality control laboratories.

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REFERENCES

[1] KD Tripathi. Essentials of Medical Pharmacology, 5th ed., Jaypee publications, **2004**; pp. 747-748.
[2] Richard A Harvey; Pamela C Champe; Riebard D Howland; Mary J Mecek. Lippicott's Illustrated Reviews, Pharmacology, Indian ed., BI publications, **2006**; pp. 421.
[3] CS Lai; NK Nair; SM Mansor. *J. Chromatogr. B. Analyt Technol. Biomed Life Sci*, **2007,** 857, 308-314.
[4] CS Lai; NK Nair; SM Mansor; PL Olliaro; V Navaratnam. *Acta Tropica*, **2003,** 87, 371-375.
[5] DL Mount; LC Patchen; PC Churchill. *J. Chromtrogr*, **1990,** 527, 51-58.
[6] AB Rao; RSR Murthy. *J. Pharm. Biomed. Anal*, **2002,** 27, 959-965.
[7] Chankvetadze; N Burjanadze; G Blaschke. *J. Pharm. Biomed. Anal*, **2003,** 32 41-49.
[8] JM Neal; WN Howald; KL Kunze; RF Lawrence; WF Trage. *J. Chromatogr. B*, **1994,** 661(2), 263-269.
[9] F Gimenez; R Farinotti; A Thuillier. *J. Chromatogr. B*, **1990**, 599, 339-346.
[10] MC Gaudiano; E Antoniella; P Bertocchi; L Valvo. **2006**, 42, 132-135.
[11] MD Green; Y Bergqrist; DL Mount; S Corbett; MJD Souza. *J. Chromatogr*, **1999**, 727, 159-165.
[12] Y Bergqvist; JA Kabbani; B Krysen. *J. Chromatogr*, **1993**, 615, 297-302.
[13] A Guenzi; G Cappelletti; A Scala; M Zanetti. *J. Chromatogr*, **1989**, 494, 219-230.
[14] IM Kapetanovic; JD Digiovanni; J Bartosevich; V Melendez. *J. Chromatogr*, **1983**, 277, 209-215.
[15] L Wallen; O Ericsson; I Wikstrom; U Hellgren. *J. Chromatogr. B*, **1994**, 655, 153-157.

[16] Y Bergqvist; JA Kabbani. *J. Chromatogr*, **1993**, 620, 217-224.
[17] E Souri; H Farsam; F Jamali. *J. Chromatogr. B. Biomed Sci. Appl*, **1997**, 700, 215-22.
[18] Y Bergqvist; M Doverskog; JA Kabbani. *J. Chromatogr*, **1994**, 652, 73-81.
[19] U Timm; E Weidekamm. *J. Chromatogr*, **1982**, 230, 107-14.
[20] DE Schwartz; UB Ranalder. *Biomed Mass Spectrom*, **1981**, 12, 589-92.