Simple UV spectrophotometric assay of Mefenamic acid

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Abstract—

Mefenamic acid belongs to non-steroidal antiinflammatory drugs (NSAID).. It is being used widely for the treatment of analgesia. It is also used as antirheumatic and antipyretic drug. Our aim of study is to develop a efficient least time consuming and simple spectrophotometric method for the assay of mefenamic acid. Comparision of assay of three different brands of mefenamic acid (mefnac,ponstan,dolar) available in public medical store of Karachi, Pakistan has also been done. The assay is based on the ultraviolet UV absorbance maxima at about 288nm wavelength of mefenamic acid, water is used as solvent. A sample of drug was dissolved in water to produce a solution containing mefenamic acid. Similarly, a sample of ground tablets of different brand were dissolved in water and various dilutions were made. The absorbance of sample preparation was measured at 288nm against the solvent blank and the assay was determined by comparing with the absorbance of available brand. Our results reveals that among all the three brands of mefenamic acid (mefnac,ponstan,dolar) rosulin and rovista shows highest percentage assay 107.5%. xplended and rosubar shows percent assay of 106.25% and 103.75% while rovactor shows lowest value for percentage assay 98.75%.

Keywords— mefenamic acid, assay, UV spectrophotometry

INTRODUCTION

Mefenamic acid is an anthranilic acid derivative. It is a non-steroidal antiinflammatory drug (NSAID). It has short plasma half-life that is 2 hours. It is used as antirheumatic , antipyretic analgesic, for the treatment of dental pain,headache, postpartum and postoperative pain, osteoarthritis and dysmenorrheal. The usual orall dose is 500 mg thrice a day. Mefenamic acid absorbs from gastrointestinal tract. Peak plasma concentrations of mefnamic acid occurs after 2 to 4 h of ingestion. Most of the NSAIDS belongs to class 2 category of biopharmaceutical classification system (BCS), since they are inherently highly permeable through biological membranes. However, it shows low water solubility. Extent and rate of absorption or extent of bioavailability for such hydrophobic or lipophillic drugs are controlled by rate of dissolution in gastrointestinal (GI)fluids[1]. The therapeutic use of mefenamic acid and others results from their inhibitory action on both cyclooxygenase (COX) enzymes and subsequent interference with the arachidonic pathway metabolites. On contrary, mefenamic acids such as flufenamic acid, meclofenamic acid, niflumic acid, 3′-5-dichlorodiphenylamine-2-carboxylic acid(DCDPC) and tolfenamic acid have also been described to modulate a variety of ion channels and enzymes [2] The nonsterodial anit-inflammatory drug (NSAID), mefenamic acid [2-(2, 3-dimethylphenylamino)]benzoic acid rarely shows but sometimes serious idiosyncratic nephro and hepatotoxicity.[3] A proposed mechanism for the development of these toxicities suggests that MFA is metabolized to chemically-reactive metabolites that become covalently bound to tissue proteins leading to adverse immunological responses .[4]

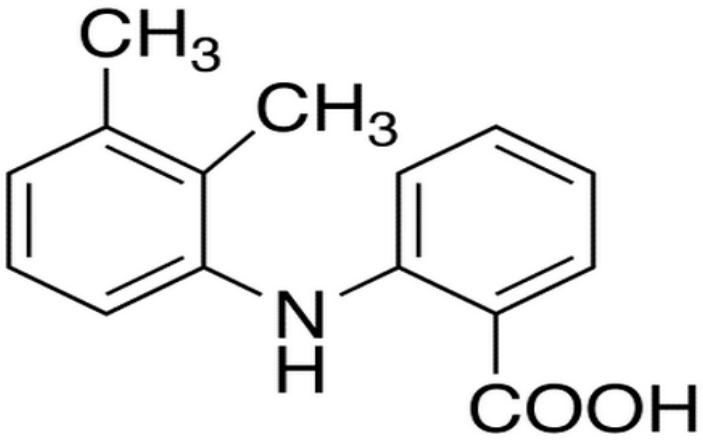

Fig-1 structure of mefenamic acid

II.EXPERIMENTAL

UV visible 1601 Shimadzu double beam spectrophotometer was used to measurement of spectra. The solvent used for the assay was water.

Wavelength Selection

About 100 ppm of mefenamic acid solution was accurately prepared in water . This solutions were scanned in the 200-400 nm UV region. The wavelength maxima (λmax) was observed at 288 nm and this wavelength was adopted for absorbance measurement.

Standard Stock solution

Accurately weighed 10 mg of mefenamic acid standard was transferred to a volumetric flask and add sufficient water to produce 100 ml.

Sample Preparation

The three different brands (mefnac,ponstan,dolar) were purchased from different medical store located in Karachi,Pakistan. All tablets of each brand have same batch number and were labeled to conatin mefenamic acid 10mg per tablet. All the five brands have 5 year shelf life.

20 tablets of three different brands (mefnac,ponstan,dolar) from the marketed sample were weighed and crushed uniformly with the help of a mortar and pestle. By calculating the average weighed sample powder equivalent to 10 mg of mefenamic acid was transferred into a volumetric flask containing 10mL water. The solutions were sonicated for about 5 min and than make up volume upto 100 ml with water.

Procedure

After preparation of standard and tablet solutions, strength of solution 100 ppm in 100 ml absorbance of the sample preparation and standard preparation in 1cm cell at the wavelength of maximum absorbance at about 288nm, using a spectrophotometer, using the blank solution. Calculate the quantity in mg, of mefenamic acid per tablet.

Results and Discussion:

The absorbance of sample preparation was measured at 288nm against the solvent blank and the assay was determined by comparing with the absorbance of available brand. Our results reveals that among all the three brands of mefenamic acid (mefnac,ponstan,dolar) ponstan shows highest percentage assay 106.470%. Mefnac shows a percent assay of 100.588% while dolar shows lowest value for percentage assay 100%.

This method is applicable for daily routine quantification of mefenamic acid. Pharmaceutical assay was carried out by using spectrophotometer on all brands of mefenamic acid (mefnac,ponstan,dolar) tablets during the study. Table-1 shows name brand and % assay of different brands. Table-2 ,3 are showing the descriptive within and between groups and shows result are highly significant with p value 0.000.

Test of hypothesis i-e ANOVA and multiple comparison of different brands of mefenamic acid (mefnac,ponstan,dolar) are given in table 3 shows highly significant difference of all brands with each other. The proposed method for the assay of commercially available mefenamic acid tablet formulation is very accurate,simple, rapid and least time consuming. It can be easily used for routine quality control QC for monitoring the assay in the API, in-process samples and tablet formulation. ANOVA shows between and within group F value 80926.009 with degree of freedom df value 2 and 12 and p value 0.00 which shows significant results.

Table 1:% assay of different brands of Mefenamic acid

Brand Name	Average wt of tablet g	Absorbance at 288nm	% assay
Mefnac	0.624	0.171	100.5882353
Ponstan	0.738	0.181	106.4705882
Dolar	0.942	0.17	100

Table 2: ANOVA

Assay

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	110.696	2	55.348	80926.009	.000
Within Groups	.008	12	.001		
Total	110.704	14			

Table 3: Multiple Comparisons

Dependent Variable: ASSAY

	(I) Brands	(J) Brands	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
LSD	Mefnac	Ponstan	-5.49435*	.01654	.000	-5.5304	-5.4583
		Dolar	.50365*	.01654	.000	.4676	.5397
	Ponstan	Mefnac	5.49435*	.01654	.000	5.4583	5.5304
		Dolar	5.99800*	.01654	.000	5.9620	6.0340
	Dolar	Mefnac	-.50365*	.01654	.000	-.5397	-.4676
		Ponstan	-5.99800*	.01654	.000	-6.0340	-5.9620

* The mean difference is significant at the 0.05 level.

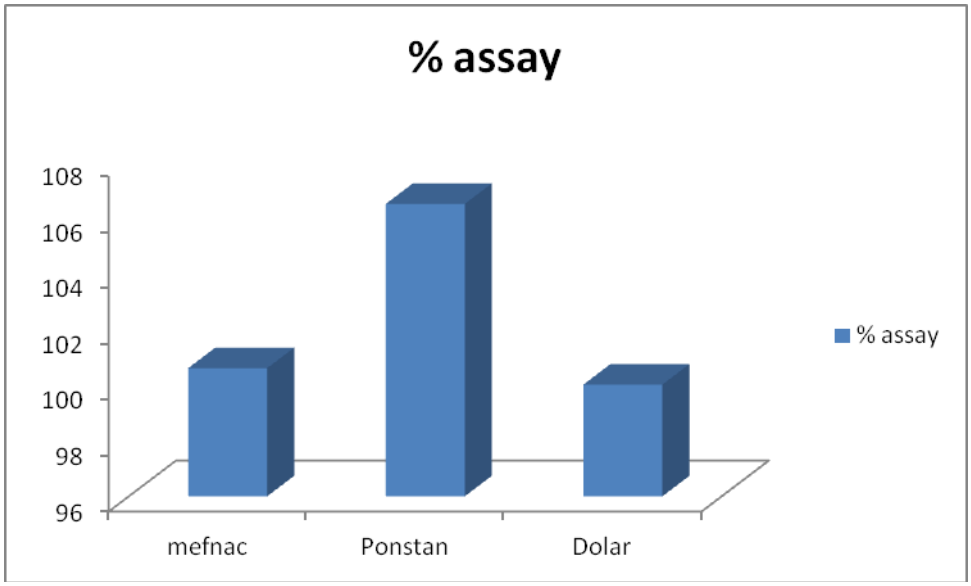

Fig-2 percent assay of different brands of mefenamic acid

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