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Simultaneous Estimation of Lornoxicam and Paracetamol in Combined Tablet Dosage Form Using Reverse Phase High-Performance Liquid Chromatography Method

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ABSTRACT

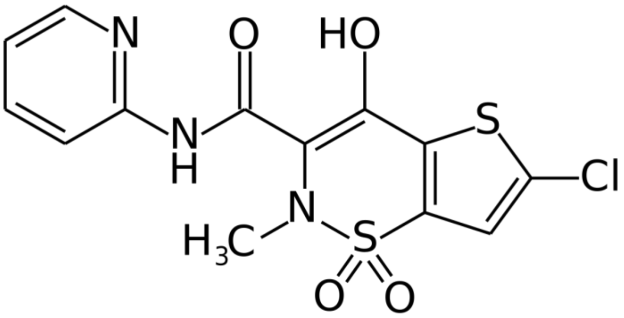
Using simple, precise, and accurate reversed-phase high-performance liquid chromatography (RP-HPLC) method, the synchronous of lornoxicam (LOR) and paracetamol (PCM) in the unite dosage form in the tablet has been established and confirmed. Acetonitrile: methanol: water is the mobile phase of the RP-HPLC method (pH adjusted with orthophosphoric acid), pH 3.8 (50:30:20 v/v/v), a diode array detector tuned to 290 nm was used to detect the signal. For LOR and PCM, chromatographic technique linearity was obtained in the concentration, ranges of 2-40 and 8–150 g/mL, respectively. In HPLC techniques, the recoveries were in the range of 99.85 0.0642 percent for LOR and 99.73 0.187 percent for PCM. Both approaches may be used to analyze the medicines in a pharmaceutical formulation regularly. The results of the analysis were statistically verified[1-2].

Key words: linearity, validation, oxicam, N-methyl Aspartate

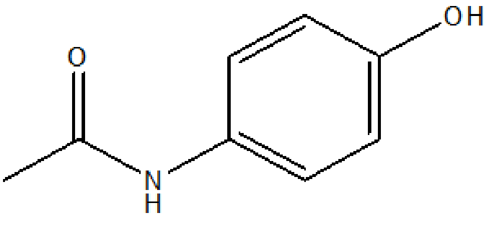
1. INTRODUCTION

Lornoxicam is a non-steroidal anti-inflammatory drug that has analgesic, anti-inflammatory, and antipyretic (fever-reducing) effects. There are two dosage forms: oral and parenteral. Lornoxicam is a monocarboxylic acid amide derived from thiophenothiazine formed by the condensation of carboxyl groups (-COOH) of 6-chloro-3-[hydroxyl (pyridin-2-yl amino) methylene]-2-methyl-2,3-dihydro-4H-thieno [2,3-e][1,2]thiazin-4-one 1,1-dioxide. Lornoxicam (chlortenoxicam) is an analgesic, anti-inflammatory, and antipyretic non-steroidal anti-inflammatory medication (NSAID) from the oxicam family. NSAID is widely used for patients presenting with low back pain. Lornoxicam is fully metabolized by cyp 2C9, with 5'-hydroxy-lornoxicam being the main metabolite, and only trace quantities of intact lornoxicam are eliminated unaltered in the urine[3-4]. The liver removes around 2/3 of the drug in the active form, while the kidneys remove 1/3. Lornoxicam, like other NSAIDs, has an anti-inflammatory and analgesic effects due to its suppression of prostaglandin and thromboxane synthesis via COX-1 and COX-2 inhibition. Prostaglandins, which mediate inflammation, pain, fever, and edema, are reduced due to this. However, like with the other NSAIDs, the specific mechanism of lornoxicam has yet to be established. N-(4-hydroxyphenyl) acetamide is the chemical name for paracetamol (PCM). The enzyme cyclooxygenase is blocked by paracetamol, which decreases prostaglandin production. Pain reliever and fever reducer paracetamol (acetaminophen) Headaches, muscular pains, arthritis, backaches, toothaches, colds, and fevers are all treated with paracetamol.

It relieves arthritis pain but has little action on the inflammation of joints and edema. Acetaminophen is a para-aminophenol derivative with analgesic and antipyretic properties. Although the exact method by which acetaminophen works is uncertain, it has several effects that are believed to increase the pain threshold by inhibiting the nitric oxide (NO) pathway. Nitric oxide (NO) is mediated by several neurotransmitter receptors, including N-methyl aspartate (NMDA) and P substance. The antipyretic effect may be due to the inhibition of the production and release of prostaglandins in the central nervous system and the effect of the prostaglandin-mediated pre-hypothalamic heat regulation area. Peroxide levels increase in inflammatory conditions, counteracting the sedative effects of paracetamol. Therefore, paracetamol has only a slight anti-inflammatory effect. Figure 1 depicts the chemical structure of LOR and PCM[5]. Literature review shows that there are a variety of analytical methods that can be used to determine LOR in biological fluids, pharmaceutical preparations, and bulk (Ibrahim cetin et al. 2009; Patil R. et al. 2007; Starek M. et al. 2009), including high-performance liquid phase, liquid chromatography (HPLC), simple ultraviolet spectrophotometry, etc. (Ibrahim cetin et al., 2009; Patil R. et al., 2007; Starek M and visible light spectrophotometry. Similarly, several analytical techniques for determining PCM levels in biological fluids, preparations of pharmaceuticals, and bulk have been published (Ghada M. et al. 2009; Godse VP. et al. 2009; Nikam D. Wait. 2008). This article presents a simple, precise Reverse-phase high-performance liquid chromatography (RP-HPLC) technique for the synchronous measurement of LOR and PCM on composite tablets[6].



Lornoxicam



Paracetamol

Fig. 1 Chemical structures of LOR and PCM

2. MATERIAL AND METHODS

2.1. Drugs and chemicals

Merck supplied acetonitrile and methanol (Mumbai, India).For the HPLC technique, all other reagents were HPLC grade.Glenmark pharmaceutical company supplied free samples of LOR and PCM (Mumbai, India).LOROX-P was the pharmacological dose type utilized in this investigation.A pill containing 8 mg and 500 mg of LOR and PCM, respectively. Glenmark Pharmaceuticals Ltd, India respectively manufacture them.

2.2 Instruments

The chromatographic determination was performed using an HPLC system that included an LC 10 ATVP pump with diode array detector (Shimadzu, Japan), a Luna C18 (4.6 mm id) column, and class M10A software. The sample was injected using a Rheodyne (Rohnert Park, CA) injector with a 20-liter loop[7].

2.3 Method: RP- HPLC method

A mobile phase (50:30:20 v/v/v) consists of acetonitrile, methanol, and water.; filtered through a 0.2 m membrane filter, degassed, and sonicated) was employed at a 1.0 mL/min flow rate at 290 nm (Prasanna R. et al. 2009).

a) Standard stock solutions: Standard stock solutions were created by dissolving medications in the mobile phase separately to obtain a concentration of 100g/mL.

b) Preparation of calibration curve: Using standard stock solutions, prepare appropriate aliquots of LOR and PCM at 2, 3, 4, 5, 6 g/mL and 8, 12, 16, 20, 24 g/mL. The chromatogram is obtained after each solution is injected. The retention time of LOR and PCM is determined to be 2.6 and 4.44 minutes, respectively. Record the peak area of LOR and PCM, and draw a calibration curve for each drug as a graph of the before shipping between peak area and concentration.

c) Tablet formulation testing procedure: Take 20 commercially available tablets, calculate average weight, and crush to a fine powder. In a 50 ml volumetric flask, use the mobile phase to dissolve the powder equivalent to 10 mg of PCM (corresponding to the amount of LOR). Using Whatman # 41 filter paper, transfer the supernatant to a 100 ml volumetric flask. Then, using the mobile phase, dilute 10 ml of the above solution to 100 ml. Measure the area of the peak after injecting the sample solution. Top of Form

A representative chromatogram is given in Fig. 2.

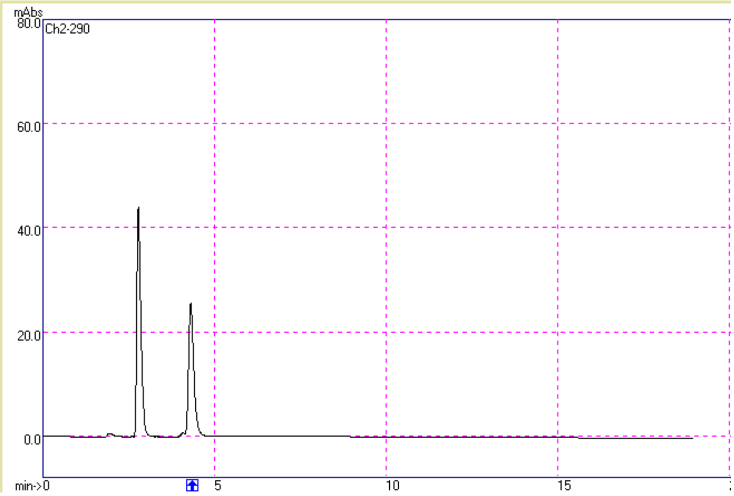


Fig. 2 Chromatogram of LOR and PCM in tablet dosage form

d) Recovery experiments were carried out to test the method's accuracy by adding a reference drug solution to a pre-analyzed sample at three distinct concentration levels: 80, 100, and 120 percent of the target concentration.

e) Precision: Three replicate readings at three concentration levels within range were used to check the method's precision, expressed as RSD values[8-10].

2.4 Statistical analysis

In Microsoft Excel 2007 can be used to determine the-means and standard deviation (SD) and relative standard deviation (RSD) and linear regression analysis.

3. RESULTS AND DISCUSSION

The chromatogram settings in LOR and PCM, RP HPLC technology are adjusted to create the best `disentanglement` and peak format. Try separate mobile phases, and transfer phases hold acetonitrile, methanol, and water (pH 3.8). Acetonitrile: methanol: water (pH -3.8) (50:30:20 v/v/v) is the best at 290 nm. It is decided when the detector is attached. Both compounds reached a response.

RP-HPLC Technology produces the LOR and PCM linear calibration curve. Table 1 summarizes linearity, accuracy, standard deviation (SD), detection (LOD), and quantitative (LOQ). Table 2 shows the appropriate system parameters for RPLPLC technology. Recommended techniques were also placed in the test in the commercially available LOR and PCM tablet assay. In the number of appropriate weighing pills, five duplicate decisions were made. Recovery (average, percentage, SD, n = 3) was determined for 99.75 percent and LOR, respectively[11-13]. The recovery rate of PCM was determined to be 99.71,0.187% (Table 3).

4. CONCLUSION

Simple, quick, accurate, precise, and sensitive RP-HPLC techniques were discovered to be proposed.

As a result, it may be utilized for regular LOR, PCM analysis in combination tablet dosage form.

5. ACKNOWLEDGEMENTS

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Table 1: Regression analysis of calibration curves of method.

Parameters	**Method**	
	LOR	**PCM**
Intercept	1778.4	17765
Slope	48869	14683
SD[c]	2719.3	4588.1
Detection limit, µg/mL	0.16	1.03
Quantitation limit, µg/mL	0.55	3.12

[a] Detection wavelength for HPLC method.

[b] y = mx + c, where y is the absorbance and x is the concentration (µg/mL).

[c] SD = standard deviation.

Table 2: System suitability parameters for RP-HPLC method.

Parameters	**LOR**	**PCM**
Calibration range, µg/mL	2-40	8-150
Theoretical plate number	4009	2311
HETP[a]	0.0073	0.0040
Tailing factor	1.52	1.86
Capacity factor (k')	0	1.78
Resolution	-	6.58

[a] HETP = Height equivalent to theoretical plate, cm

Table 3 Recovery study

%	Drug	Mean*	RSD
80	LOR	99.85 ± 0.0642	0.0006
	PCM	99.73 ± 0.187	0.0018
100	LOR	100.02 ± 0.275	0.0027
	PCM	100.42 ± 0.669	0.0066
120	LOR	100.6 ± 1.00	0.0010
	PCM	99.83 ± 0.354	0.0035

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