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A diverse analytical approach for the estimation of Lornoxicam and Thiocolchicoside: A short review

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Abstract : There are many kinds of literatures were available for thiocolchicoside and lornoxicam in tablets and capsules formulation by different analytical methods such as fluorimetry, RP-HPLC, and UV, etc. Hence, this article brings a cumulative and communicative presentation of available analytical research works and was presented as a review of analytical methods for the determination of lornoxicam and thiocolchicoside in bulk and its dosage form. In this article, we summarized the available analytical methods reported so far in and around the world. The methods include UV-VIS spectrometry, HPLC, HPTLC, Stability-indicating methods with their utility for determination of thiocolchicoside and lornoxicam in biological matrices, bulk material, and different pharmaceutical formulations.
Key Words : Lornoxicam, Thiocolchicoside, Analytical work, RP-HPLC, UV.

Introduction

Thiocolchicoside[1,2]

Thiocolchicoside (THC) is an antispasmodic (centrally acting Non-benzodiazepine muscle relaxant) drug. Chemically it is N-[3-(β-D-glucopyranosyloxy)-1,2-dimethoxy-10(methylthio)-9-oxo-5,6,7,9-tetrahydrobenzo [*a*] heptalen-7-yl] acetamide[1]. (Fig-1) It acts as a competitive GABA receptor and glycine receptor antagonist with similar potency. Also, recent study states that it is also has a powerful convulsant activity and should not be used in seizer prone individuals.

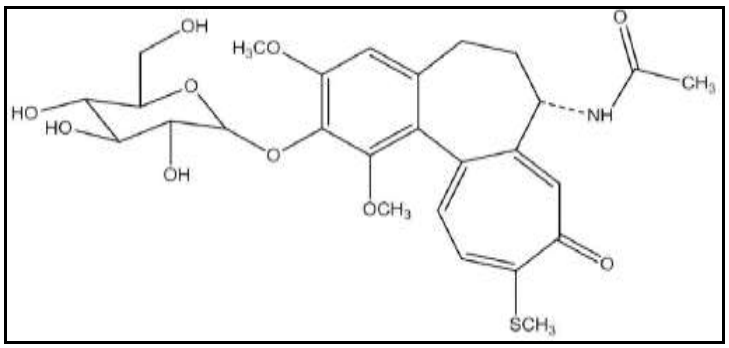

Fig.1: Thiocolchicoside

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Thiocolchicoside is metabolized so rapidly after oral administration, it is broken down in the body to produce the metabolite the a glycone, 3- desmethylthiocolchicine and appear in plasma and it could damage the cells and therefore producing toxicity in the embryo, neoplastic changes and fertility reduction in males therefore, recommended oral dose should not exceed 7 days and intra muscular dose duration should not exceed 5 days. Thiocolchicoside has been thought to act as GABA –AR receptor agonist that induces depression of the central nervous system and in turn myorelaxation**.**

Lornoxicam

Lornoxicam (LOR), molecular formula is C13H10ClN3O4S2, molecular weight: 371.8 g/mol and the IUPAC name is 6- chloro- 4- hydroxy- 2- methyl- N- 2- pyridinyl- 2 H-thieno-[2, 3- e] -1, 2- thiazine- 3- carboxamide 1, 1-dioxide; (Fig. 2) is a novel non-steroidal anti-inflammatory drug (NSAID) of the oxicam class (as piroxicam, meloxicam and tenoxicam) with analgesic, anti-inflammatory and antipyretic properties[1]. It works by blocking the action of cyclo-oxygenase which is responsible for the production of prostaglandin in the body. Lornoxicam has relatively a short plasma half-life of 3-5 hours. LOR is eliminated following biotransformation to 5'- hydroxyl –lornoxicam, which does undergo enterohepatic recirculation. Glucoconjugated metabolites are excreted in urine and faecal matter with a half-life about 11 hours.

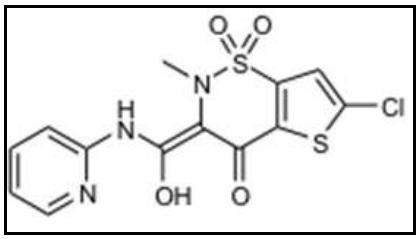

Fig.2: Lornoxicam

Analytical Methods

HPLC Methods[3-9]

So far, approx. about seven methods were reported for the determination of lornoxicam and thiocolchicoside in a combined dosage forms by using this method. Table 1 shows the summary of the reported HPLC methods indicating the study aim, mobile phase used, λ_{max} , linearity, LOD and LOQ, etc. for the determination of LOR and, THIO in its dosage form.

Table 1 Summary of reported HPLC methods

Study aim	Mobile phase	Column	Detec -tion	λmax	Flow rate (ml/min)	LOD (µg/ml)	LOQ	Ref
Simultaneous estimation of LOR and THC	Methanol: water (5:95v/v)	Altina C18(4.6X150mm,5µ)	PDA	285nm	1ml/min	LOR-0.17 THC-0.085	LOR-0.56 THC-0.28	3
Method development for LOR and THC in tablet dosage forms	Methanol: water (65:35v/v)	Sunfire C18(4.6X250mm,5µ)	-	295nm	1ml/min	-	-	4
Simultaneous determination of LOR and THC in tablet dosage form	Buffer: methanol (45:55v/v)	Intersil ODS 3V C18(250X4.6mm)	UV	290nm	1.5ml/min	LOR-0.8 THC-0.8	LOR-024 THC-0.235	5
Stability indicating method for the simultaneous estimation of LOR and THC in tablets	Methanol: water (45:55v/v)	RP-C18	UV	382nm	1ml/min	-	-	6
Method development and validation of LOR and THC	Acetonitrile: phosphate buffer (gradient ratio)	Hypersil BDS C-18 column (4.6 x 250 mm, 5µ)	PDA	382nm	1ml/min	LOR-0.27 THC-0.40	LOR-0.84 THC-0.123	7
Development and validation of PDA method for the simultaneous determination of LOR and THC	Methanol: THF: Acetate buffer (60:10:30V/V/V)	Waters Symmetry(250mmx15 0)	-	-	0.75ml/min	-	-	8
Stability indicating method development for LOR and THC	Ammonium acetate: Methanol (50:50)	RP-18 Column	PDA	282nm	1ml/min	-	-	9

UV-VIS Spectrophotometry[10]

One method was reported for the estimation of lornoxicam and thiocolchicoside in combined dosage form. In this method the absorption maximum was exhibited at λ_{max} at 285 nm and obeyed linearity in 4-20 µg/ml. Table 2 shows the summary of reported UV method.

Table 2 Summary of reported UV method

Wave length	Method	Linearity	LOD	LOQ	REF
285nm	AUC	4-20µg/ml-THC 4-20µg/ml-LOR	THC-0.0330µg/ml LOR-0.3588 µg/ml	THC-0.1002 µg/ml LOR-1.0875 µg/ml	10

Stability Indicating HPTLC Method

Atul R Bendale et al[11]., carried out a stability indicating analysis on HPTLC plates precoated with silicagel GF254 Precoated on aluminium sheet (10cm x10cm) of 0.20 mm layer thickness as stationary phase and chloroform : hexane: methanol : glacial acetic acid (2:3.5: 2.5: 0.2v/v/v/v). Detection was carried out densitometrically at 286nm (absorbance mode) where LOR and THC have significance absorbance. The retardation factor (Rf) values were found to be 0.17±0.01 for LOR and 0.75±0.01 for THC. Peak purity was found to be 0.988 and 0.997 respectively for LOR and THC.

Madhusmitha et al[12]., achieved the separation of the active compounds from pharmaceutical dosage form by using methanol: chloroform: water (9.6:0.2:0.2 v/v/v) system as the mobile phase and there is no immiscibility issues were found. The densitometric scanning was carried out at 377 nm. The R_f values (± SD) were found to be 0.84 ± 0.05 for LOR and 0.58 ± 0.05 for THC. The range of linearity was found as 60–360 ng/band with correlation coefficients r^2 = 0.998 for LOR and 30–180 ng/band with correlation coefficients r^2 = 0.999 for THC were obtained from this literature. The percentage recovery for both the analytes was in the range of 98.7–101.2 %.

Bio analytical Methods

Pankaj kumar et al[13]., developed a simultaneous estimation of THC and LOR in human plasma and in pharmaceutical dosage forms. This method involves a simple protein precipitation procedure and the compounds were separated by using phosphate buffer and acetonitrile (70:30) in isocratic flow with 1ml/min on phenomenex luna C18 column (5µm, 250mmX4.60mm i.d) with PDA detector at 295nm. LOD was 33.27ng/ml for THC and 66.2 ng/ml for LOR in human plasma. The LLOQ (lower limit of quantification) of THC and LOR in plasma was 100.32 and 200.48ng/ml respectively. This assay was suitable for use in pharmacokinetic studies and routine plasma monitoring.

Conclusion

The present review epitomizes numerous analytical methods applied for the determination of THC and LOR. A great number of studies including UV-VIS spectrophotometer, HPLC, HPTLC etc., were reported for the analysis of LOR and THC in bulk and its combined pharmaceutical formulations as well as plasma. It has been found that UV spectrophotometer and chromatography with UV detection is the most studied for the detection of THC and LOR in bulk as well as pharmaceutical dosage forms.

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