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Review Article

Forensic detection and identification of Gemifloxacin in autopsy tissue

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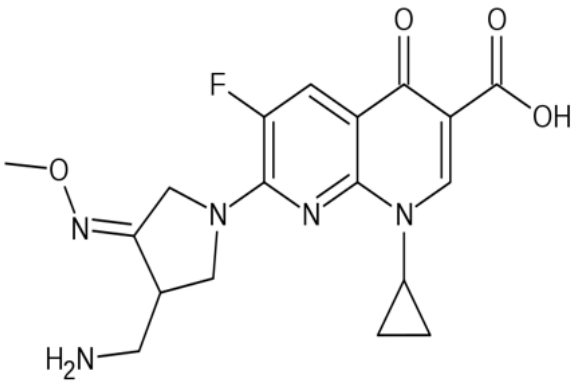
ABSTRACT

The thin layer chromatographic method and some colour tests have been described for the detection and identification of residual Gemifloxacin antibiotic in autopsy tissue by TLC and colour tests. The proposed TLC solvent system and colour tests successfully applied for detection and identification of Gemifloxacin antibiotic in spiked autopsy tissue at regional forensic science laboratory Gwalior M.P.

1. Introduction

Gemifloxacin is a new synthetic third generation fluorinated quinolone antibacterial used in the treatment of severe systematic infections as bronchitis pneumonia as it has a broad spectrum activity against many pathogenic gram negative and positive bacteria including many of the so called atypical respiratory pathogens. It overcomes the microbial resistance against common classes of antibiotics, which is increasingly important global problem as it is a significant phenomenon in terms of its clinical and economic impact. Gemifloxacin is 7 [3-(aminomethyl)-4-(methoxy imino)-1-pyrrolidinyl]-1-cyclo propyl-6-fluoro-1,4-dihydro-4oxo-1,8-naphthyridine-3-carboxylic acid.[1] Gemifloxacin may cause side effects diarrhea, nausea, stomach pain, vomiting, headache. Gemifloxacin inhibits DNA gyrase and DNA topoisomerase. Gemifloxacin forms a ternary complex with gyrase and topoisomerase IV, which blocks DNA replication, thus resulting in DNA release, chromosomal disruption and cell death. It rapidly absorbed from the GI tract; absolute bioavailability: About 71%, widely distributed into body tissues including bronchial mucosa and lungs. 55-73% bound to plasma proteins. Limited hepatic metabolism. Elimination half-life: 7 hr, excretes as unchanged drug and metabolites in the faeces and urine.



The literature survey reveals that few analytical methods for this drug are reported which include HPLC methods for determination of Gemifloxacin in pharmaceutical preparations,[2,3] present study highlights detection and identification of Gamifloxacin antibiotic in spiked autopsy tissue by TLC and colour tests.

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Table 2: Rf Value of Gemifloxacin in different solvent systems

S.No	Solvent System	Rf Value
1.	Chloroform :Methanol (9:1)	0.3
2.	Ethyl acetate: Methanol: Ammonia (17:2:1)	0.05
3.	Methanol: Ammonia (100:1.5)	0.1
4.	Cyclohexane: Toluene: Diethyl amine (15:3:2)	No Run
5.	Toluene: Chloroform (3:1)	0.5
6.	Chloroform: Acetone (3:1)	0.1
7.	Methanol (100%)	0.25
8.	Chloroform: Ethylacetate: Methanol (50:45:5)	0.075
9.	Dichloroethane: Methanol: Water (95:5:0.2)	0.45
10.	n Butanol: Acetone: Ethanol: Water (60:20:20:1.5)	0.14

2. Materials and Methods

(1) Distilled water. (2) Gemifloxacin as the mesylate salt.(3) Gemifloxacin intact standard solution (100 μg/ml) in distilled water was prepared. (4) Spiked autopsy tissue like stomach, pieces of small intestine, liver, spleen, kidney, lung and brain. Piece of skin and soft tissue from injection site.

2.1. Colour tests

Various colour tests were performed on Gemifloxacin and developed colours are given in followingTable 1.

Table 1: Color reactions with Gemifloxacin drug:

S.No	Compound	Color
1.	Potassium di chromate + Sulphuric acid	Colorless
2.	Potassium per manganate	Florescent Yellow
3.	Ferric chloride	Reddish
4.	Nitric acid	Light Pink
5.	Copper sulphate + Sodium hydroxide	Light Green
6.	Dragondroffs reagent	Milky Orange
7.	Ferrous sulphate	Orange
8.	Acetyl vanilline + Sulphuric acid	Sea Green
9.	Sulphuric acid	Purplish Florescent in UV
10.	Potassium ferrocyanide	Olive Green

2.2. TLC method

A standard glass TLC plates was coated with slurry of silica gel G in water to a uniform thickness of 0.25 mm. Heating in an oven at 110^{o}C for about one hour activated the plate. Aliquots equivalent to 100 μg of Gemifloxacin were applied in spot form to a TLC plate of silica gel (20$\times$20 cm, 0.5 mm) with 20μl alcoholic extract of autopsy tissue. The plate was developed to 10 cm after 2 hours of saturation of chamber. The spray reagent $KMnO_4$ was applied which developed yellow colour againt white background off the TLC plate. The Rf value of Gemifloxacin in different solvent systems are given in following Table 2.

3. Results and Discussion

Gemifloxacin contains imino, carbonyl and carboxylic acid groups in its structure, so it is susceptible to hydrolysis. The present preliminary study describes simple, fast and economical TLC method, colour tests for detection and identification of residual Gemifloxacin antibiotic applying different solvent systems in routine forensic toxicological analysis.

4. Conclusion

The proposed colour reactions and TLC method are simple, rapid, accurate and precise and can be used in detection and identification of residual Gemifloxacin in autopsy tissue.

5. Conflicts of interest

All contributing authors declare no conflicts of interest.

6. Source of Funding

None.

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