COMPARATIVE ANALYSIS IN DIFFERENT BRANDS OF CIPROFLOXACIN BY HPLC AND UV/VIS SPECTROSCOPY

[1].Khalid Mehmood, [2].Umer Farooq, [1].Zara Abid , [3].Uzma Bashir and [4].Mukhtar Hussain Shah

[1].Department of Chemistry, Govt. Post Graduate Islamia College, Gujranwala

[2].Institute of chemistry, Punjab university, New Campus Lahore

[3].Institute of Agricultural Sciences, Punjab University, New Campus Lahore

[4].Department of Botany, Government College of Science, Wahdat Road, Lahore

ABSTRACT *Pharmaceutical products with different trade names having ciprofloxacin an antibiotic as an active agent were collected from the market. The products were assayed under similar conditions by applying already developed HPLC (High Pressure Liquid Chromatography) and Spectroscopy (Ultraviolet Spectroscopy) technique. Results obtained from qualification of Ciprofloxacin content of each product were compared with their label claims. Comparative analysis of these products was performed based on quantity of Ciprofloxacin.*

The observed spectra show λmax of drug at 276nm and 278nm in both observed and theoretical predictions and show good agreement with predictions. Ciprofloxacin emission peaks are found similar to literature values.

INTRODUCTION

Drug is any subatance which inhaled, inject, consumed causes physiological change in body[1]

- A drug is a substance that when put into the body can change the body work.
- In pharmacology, pharmacutical drugs is a chemical substance used to ntreat, prevent or diagnose.

Drugs obtained through extraction from medicinal plants

Antibiotics used as antibacterial drug to treat infections caused by bacteria.

- Antibiotic is defined as chemical produced by one microorganism that is capable of killing or inhibiting growth of other microorganism.[3]
- Four genera are capable of producing natural antibiotics.

➢ *Penicillium (terrestial mold)*
➢ *Cephalosporium (marine mold)*
➢ *Bacillus bacteria*
➢ *Streptomyces bacteria*

Source of Antibiotics

Following are sources of antibiotics.

1. Bacteria

The source of antibiotic is the streptomyces group e.g. *streptomycin, tetracycline gentamycin, erythromycin*.

2. Mould

Mould include filamentous fungi e.g. *penicillium from penicillium spp. Cephalosporin from cephalosporium spp*.

3. Synthetic

These antibiotic are designed chemically e.g. *chloramphenicol*.

- Antibiotics also called antibacterial Drugs and type of antimicrobial drug used in treatment and prevention of bacterial infection.[4]

They kill or inhibit growth of bacteria.

- Antibiotic are effective only against bacteria, not viruses such as commeo cold or influenza

There are several classification schemes for antibiotics which are based on:

Bacterial Spectrum

On the basis of spectrum, the antibiotics are classified into two classes.

- **Narrow Spectrum Drugs:**

Narrow spectrum drugs are effective against a limited group of microbes and cause lower toxicity to host e.g. penicillin.

Broad Spectrum Drugs :

Broad spectrum drugs are effective against microbes and tend to have higher toxicity to host.

Ciprofloxacin

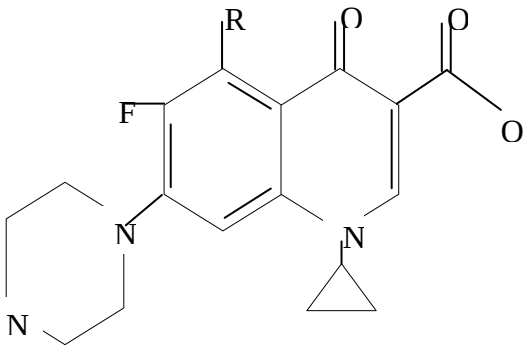
- Ciprofloxacin is as an antibiotic in a group of drugs called Fluoroquinolones.
- Introduction:
- Ciprofloxacin fight bacteria in the body.
- Ciprofloxacin is a pharmaceutical drug belongs to Fluoroquinolones group and is the fifth largest generic in total pharmaceutical product.[9]
- Ciprofloxacin are broad spectrum synthetic antibacterial agents used in treatment of several infectious diseases.
- thyroid medications.

Ciprofloxacin in Brief

- **Generic Name** Ciprofloxacin hydrochloride
- **Brand names** Cipro, ciprobay, ciproxine, ciflox
- **Therapeutic class** Antibiotic
- **Pharmacological class** Flouroquinolene, 2nd generation

Structure of Ciprofloxacin:

Ciprofloxacin is Fluoroquinolones with fluorine present at position 6 of naphthridine ring. [10]



Formula of Ciprofloxacin above has structural formula $C_{17}H_{18}FN_3O_3$ and its molar mass is 331.346g/mol.

- Ciprofloxacin hydrochloride tablets and CIPRO oral suspension are synthetic antimicrobial agents for oral administration.[11]

Systematic or IUPAC name:

Ciprofloxacin hydrochloride, is the monohydrochloride salt of ***1-cyclopropyl-6-fluoro-1-4-dihydro-4-oxa-7-3-quinoline carboxylic acid***[12]

Ciprofloxacin is faintly yellowish to light yellow crystalline substance having molecular weight 385.5.

Dosages of Ciprofloxacin for treatment of various infections:

Table I

Infection	Dose	Usual Duration
Urinary tract	250mg	3 days
Chronic bacterial prostatitis	500mg	28 days
Lower respiratory tract	500mg	7-14 days
Skin	500mg	7-14 days
Bones and joints	500mg	4 to 6 weeks
Infectious diarrhea	500mg	5 to 7 days
Typhoid fever	500mg	10 days
Severe bone and joints infection	750mg	≥4 to 6 weeks

Suitable Equipments / Apparatus

UV Spectrophotometer
HPLC machine
Analytical balance
Magnetic stirrer
Graduated pipettes 5ml, 10ml
Graduated cylinder
Test tubes
Beaker 100 ml

List of Chemicals

Distilled water
Water HPLC Grade
Acetonitrile
Orthophosphoric acid
Trimethylamine

PROCEDURE

Sample Preparation

Weigh and powder 20 tablets. Take powder 208mg equivalent to 100mg Ciprofloxacin in 100ml volumetric flask and make volume upto 100ml with 0.01M HCl. Shake well and filter. Take 1ml of filterate and make volume upto 100ml with 0.01M HCl

Standard Solution:

Weigh exactly 117.6mg standard Ciprofloxacin HCL equivalent to 100mg Ciprofloxacin powder in 100ml volumetric flask and make volume up to 100ml with 0.01M HCl.Take 1ml of aliquot and make volume up to 100ml with 0.01M HCl.Check both sample and standard preparation at 276nm.

Material used for Qualitative Analysis

Ciprofloxacin was estimated from following four Brands

1.QUINOFLOX (250mg)
Batch No 15605
Reg No 015930
Manf Date 04/2015
Expiry date 03/2018

2.CIPROCIL (250mg)
Batch No AH67
Reg No 018123
Manf Date 2/2016
Expiry date 1/2019

3.CIPLET (250mg)
Batch No 197
Reg No 044461
Manf Date 10/2015
Expiry date 10/2018

4.CIPROSHINE (2500mg)
Batch No 1315
Reg No 057616
Manf Date 06/2015
Expiry date 06/2017

RESULTS

Different brands of CIPROFLOXACIN (tablet) available in market were analysed for Comparative analysis by using HPLC and UV. Visible spectrophotometer technique.

The name of brands are:

1. **Ciprofloxacin**
2. **Ciproshine**
3. **Ciplet**
4. **Quinoflox**
5. **Ciprocil**

By comparing the percentages of active ingredient (Ciprofloxacin HCl) obtained via the HPLC and UV. Visible spectrometer, results have been summed up in table II given below.

Table II

Sr. No	*Brands Name*	*Comparisons of percentage of active (DP) in brands*	
		HPLC	**UV. Vis.**
1	CIPROFLOXACIN 250mg Tablet	100.8%	100.3%
2	CIPLET 250mg Tablet	100.8%	100.3%
3	CIPROSHINE 250mg Tablet	100.8%	100.3%
4	QUINOFLOX 250mg Tablet	100.8%	100.3%
5	CIPROCIL250mg Tablet	100.8%	100.3%

DISCUSSION

So, it is concluded that Ciprofloxacin contains maximum average amount Ciprofloxacin HCl salt e .g 100.8% via HPLC and 100.3% via UV. Visible spectrometer, which proves the accuracy and precision of UV. Visible spectrometer. The entire sample contain amount of Ciprofloxacin HCl within the limit (90-110%) which represent the effectiveness of the drug.

ACKNOWLEDGMENT

The authors are thankful to administration of BATALA pharmaceuticals to facilitate the research work.

REFERENCES

1. *Clauson, K. A., et al. (2008). "Scope, completeness, and accuracy of drug information in Wikipedia." Annals of Pharmacotherapy **42**(12): 1814-1821.*
2. *Gerald, M. C. (1974). Pharmacology: An introduction to drugs, Prentice Hall.*
3. *Walsh, C. (2003). Antibiotics, American Society of Microbiology*
4. *Espinosa-Mansilla, A., et al. (2005). "HPLC determination of enoxacin, ciprofloxacin, norfloxacin and ofloxacin with photoinduced fluorimetric (PIF) detection and multiemission scanning: application to urine and serum." Journal of Chromatography B **822**(1): 185-193.*
5. *Abdelrazeq, A., et al. (2005). "Rifaximin-ciprofloxacin combination therapy effective in chronic active refractory pouchitis." Colorectal Disease **7**(2): 182-186.*
6. *Allon, M., et al. (1990). "Acute renal failure due to ciprofloxacin." Archives of internal medicine **150**(10): 2187-2189.*
7. *Attia, K. A., et al. (2016). "Stability-indicating methods for the analysis of ciprofloxacin in the presence of its acid induced degradation product: A comparative study." Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy **159**: 219-222.*
8. *Berenholz, L., et al. (2002). "Evolving resistant pseudomonas to ciprofloxacin in malignant otitis externa." The Laryngoscope **112**(9): 1619-1622.*
9. *Buchner, E. "From Wikipedia, the free encyclopedia Jump to: navigation, search" Biocatalyst" redirects here. For the use of natural catalysts in organic chemistry, see Biocatalysis."*
10. *Cheng, C., et al. (2015). "Ciprofloxacin plus erythromycin or ambroxol ameliorates endotracheal tube-associated Pseudomonas aeruginosa biofilms in a rat model." Pathology-Research and Practice **211**(12): 982-988.*
11. *Cios, A., et al. (2014). "Population pharmacokinetic analysis of ciprofloxacin in the elderly patients with lower respiratory tract infections." Experimental gerontology **57**: 107-113.*
12. *Colin, J., et al. (2003). "Corneal penetration of levofloxacin into the human aqueous humour: a comparison with ciprofloxacin." Acta Ophthalmologica Scandinavica **81**(6): 611-613.*