



Short Communication

Antibiotic sensitivity of common Bacterial Pathogens against selected Quinolones

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Abstract

Five different quinolones group of antibiotics viz ciprofloxacin, norfloxacin, sparfloxacin, ofloxacin, levofloxacin were tested against four different common bacterial pathogens, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Klebsiella pneumonia* isolated from clinical samples of patients from Kolhapur city of Maharashtra, India. Results indicated that all the four pathogens except *E. coli* and *Pseudomonas* found to be highly sensitive to ciprofloxacin, norfloxacin, sparfloxacin, ofloxacin, and levofloxacin. However, *Escherichia coli* found to be resistant to ofloxacin and moderately sensitive to Levofloxacin and *Pseudomonas aeruginosa* was found to be resistant to Sparfloxacin and moderately sensitive to norfloxacin and ofloxacin.

Key words: Quinolones, antibiotic sensitivity, *staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Klebsiella pneumonia*.

Introduction

Quinolones are group of synthetic broad spectrum antibiotics. The term quinolones refers to potent synthetic chemotherapeutic antibiotics¹. Quinolones prevents the bacterial DNA from unwinding and duplicating by Topoisomerase II².

Antibiotics are effective against microorganisms, but the reality is no antibiotic inhibits all microorganisms. Some microorganisms are naturally resistant, while some acquire resistance either by changing permeability, or by producing enzyme that inactivates the antibiotics or by modifying target site or by plasmid mediated resistance³.

There are many common bacterial infections such as folliculitis, boils, cellulitis, ecthyma caused by *Staphylococcus aureus*, and *Pseudomonas aeruginosa*. Hospital infection by *Staphylococcus aureus* deserves special attention because of their frequency and resistant to various antibiotics and chemotherapeutic agents. Similarly diarrhoea and gastroenteritis is caused by *Escherichia coli*. It is one of the reservoir of antibiotic resistant coliform and is a warning signal and may cause epidemics⁴. *Klebsiella pneumoniae* is a common pathogen that causes pneumonia and urinary tract infections.

Bacteria show different effect on different antibiotics, some are resistant, some are sensitive and moderately sensitive to antibiotics⁵.

The present study was carried out with an objective to determine the antimicrobial susceptibility pattern among the most common

pathogens of Kolhapur region, against selected quinolones and updating of the antibiogram against these antibiotics.

Material and Methods

Total 40 pus samples from skin infections patient were collected in a sterile container. Four clinical isolates were obtained. They were cultured on different media such as Nutrient agar, MacConkeys agar, Cetrimide agar and identified as per the standard method⁶. All the isolates were tested for antimicrobial susceptibility testing by disc diffusion method⁷ and as per the clinical and laboratory standards institute (CLSI)⁸ guidelines on Muller Hinton agar (MHA)⁹. Standard discs (Hi-media, Mumbai) used were Ciprofloxacin (CIP) -5 mcg, Norfloxacin (NX)-10mcg, Sparfloxacin (SPX)-5mcg, Ofloxacin (OFX)-5mcg, Levofloxacin (LE)-5mcg.

Inoculum preparation: A thick suspension (0.5 MacFarland standard)⁹ of all the four pathogens were prepared as per the MacFarlands turbidity standard using 0.5 ml of 0.048 barium chloride added with 99.5 ml of 0.36 N sulphuric acid. 5 ml aliquots was kept in screw cap tubes for visual comparison with that of the turbidity of suspension.

Assay plates: Flat bottom petridishes with internal diameter 150mm were used for the inoculation of organism.

Inoculation of MHA plates: A sterile swab was dipped in the broth suspension of 0.5 MacFarland standard. Excess suspension was removed by rotation of the swab against the wall of the tube. The entire surface of MHA plate was then spread uniformly.

Disc placement: The antimicrobial impregnated disks were placed with sterile forceps on the agar surface in such a way that each disk was at least 24 mm away from each other to avoid the overlapping zone of inhibition. The plates were then incubated at 37°C for 24 hours and observed for diameter of zone of inhibition.

Interpretation of results: Results were interpreted as per clinical and laboratory standards institute(CSLI) guidelines⁸.

Results and Discussion

Table 1 indicates the percentage of 40 clinical isolates from hospital samples. Table 2 indicates the antibiogram of different bacterial isolates.

Table – 1

Percentage of 40 clinical isolates from clinical samples.

S.no.	Name of the pathogen	Clinical isolates	Percentage
1	<i>Staphylococcus aureus</i>	15	37.5%
2	<i>Pseudomonas aeruginosa</i>	11	27.5%
3	<i>Escherichia coli</i>	08	20%
4	<i>Klebsiella pneumoniae</i>	06	15%

Table – 2

Antibiogram of different isolates

S.no.	Name of the pathogen	Highly sensitive	Moderately sensitive	Resistant
1	<i>Staphylococcus aureus</i>	CIP,NX, SPX,OFX, LE	-	-
2	<i>Pseudomonas aeruginosa</i>	CIP,NX,LE	OFX,	SPX
3	<i>Escherichia coli</i>	CIP,NX, SPX	LE	OFX
4	<i>Klebsiella pneumoniae</i>	CIP,NX, SPX,OFX, LE	-	-

CIP-Ciprofloxacin, NX-Norfloxacin, SPX-Sparfloxacin, OFX-Ofloxacin, LE- Levofloxacin

From table 1 and 2 it is clear that the *Staphylococcus aureus* is most predominant (37.5%) in wound infections followed by *Pseudomonas aeruginosa* (27.5%), *Escherichia coli* (20%) and *Klebsiella pneumoniae* (15%). This contradicts the reports from other countries such as China, Egypt, Israel where *Escherichia coli* is reported to be the most predominant followed by *Klebsiella pneumoniae*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*¹⁰⁻¹². It is also clear that *Staphylococcus aureus* and *Klebsiella pneumoniae* are highly

sensitive to all the five types of quinolones group antibiotics. *Escherichia coli* is resistant to ofloxacin and moderately sensitive to Levofloxacin and highly sensitive to ciprofloxacin, norfloxacin, and sparfloxacin. *Pseudomonas aeruginosa* is resistant to sparfloxacin and moderately sensitive to ofloxacin and highly sensitive to ciprofloxacin, norfloxacin, and levofloxacin. Some of the alternative synthetic compound and herbal formulations have been suggested^{13,14}. They can be used to treat *S. aureus*, *A. niger* and *A. Paraciticus*

Infections: The high rates of antimicrobial resistance reported among these bacterial pathogens^{13,14}. Some strains of *Klebsiella* and *Pseudomonas* are resistant to Ciprofloxacin however, my results indicated *Klebsiella* and *Pseudomonas* are highly sensitive to Ciprofloxacin. *Staphylococcus aureus* is highly sensitive to Ciprofloxacin as reported by¹⁵, my isolate also showed same pattern. *Staphylococcus aureus* and *Pseudomonas aeruginosa* are highly sensitive to Ofloxacin^{16,17}. My result indicated that the the *Staphylococcus aureus* organism is highly sensitive to Ofloxacin however, *Pseudomonas aeruginosa* is moderately sensitive to Ofloxacin and resistant to Sparfloxacin.

Conclusion

Amongst the four pathogens *Pseudomonas aeruginosa* and *Escherichia coli* are found to be resistant to sparfloxacin and ofloxacin respectively.

Development of resistance in *Pseudomonas aeruginosa* and *Escherichia coli* is one of the problems. This resistance may be indiscriminate and inappropriate use of antibiotics. This calls for the education of both medical and paramedical staff on the rational use of antibiotics. *Escherichia coli* is the common bacterial species found in hospital environment. Development of antibiotic resistance in enteropathogenic *Escherichia coli* is also dangerous and may lead to epidemics.

The knowledge of susceptibility testing patterns of the bacterial strains will guide the clinicians to choose appropriate and judicious antibiotics for treatment of wound infections. Updating the antibiogram will further reduce the complications of resistance.

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