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The resistance pattern of *Escherichia coli* to Ciprofloxacin in a tertiary care hospital

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ABSTRACT

To study the resistance pattern of Escherichia coli to Ciprofloxacin. Culture and sensitivity reports enrolling 464 number of patients over a period of one year was studied at Bhaskar Medical College. Cases which were culture positive for Escherichia coli were identified and their resistance pattern to ciprofloxacin was assessed. Out of 44 strains of Escherichia coli which were isolated 31 were resistant to ciprofloxacin and 13strains were sensitive to ciprofloxacin. Escherichia coli is more resistant to ciprofloxacin than other drugs like Levofloxacin, Nitrofurantoin, Amikacin, Gentamicin.

Keywords: Escherichia coli, Resistance, Ciprofloxacin

INTRODUCTION

Ciprofloxacin, a fluoroquinolone, is a potent, broad-spectrum anti-bacterial agent. It rapidly blocks bacterial deoxyribonucleic acid (DNA) replication by inhibiting DNA gyrase, an essential prokaryotic enzyme that catalyzes chromosomal DNA supercoiling. Molecular genetic appraoaches have been used to study the interaction of 4-quinolones with DNA gyrase from quinolone-sensitive strains and from uropathogenic quinolone-resistant clinical isolates of Escherichia coli. An important mutational locus in the gyrase A gene that confers resistance to ciprofloxacin and other quinolones has been identified[1].

Bacterial resistance is a growing therapeutic menace, both in the community and as well as in the hospitals, involving most of the antibiotics, which include fluoroquinolones. Ciprofloxacin is a broad-spectrum antibiotic which is active against variety of Gram-positive and Gram-negative bacteria. It belongs to the fluroquinolone class of antibiotics[2].

More recently, two types of plasmid mediated resistance have been described. The first type utilizes Qnr proteins, which protect DNA gyrase from the fluoroquinolones. The second type is a variant of an aminoglycoside acetyltransferase capable of modifying ciprofloxacin. Both mechanisms confer low level resistance that may facilitate the point mutations that confer high level resistance[3]. This study was undertaken to know the prevalence rate of ciprofloxacin in our hospital.

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MATERIALS AND METHODS

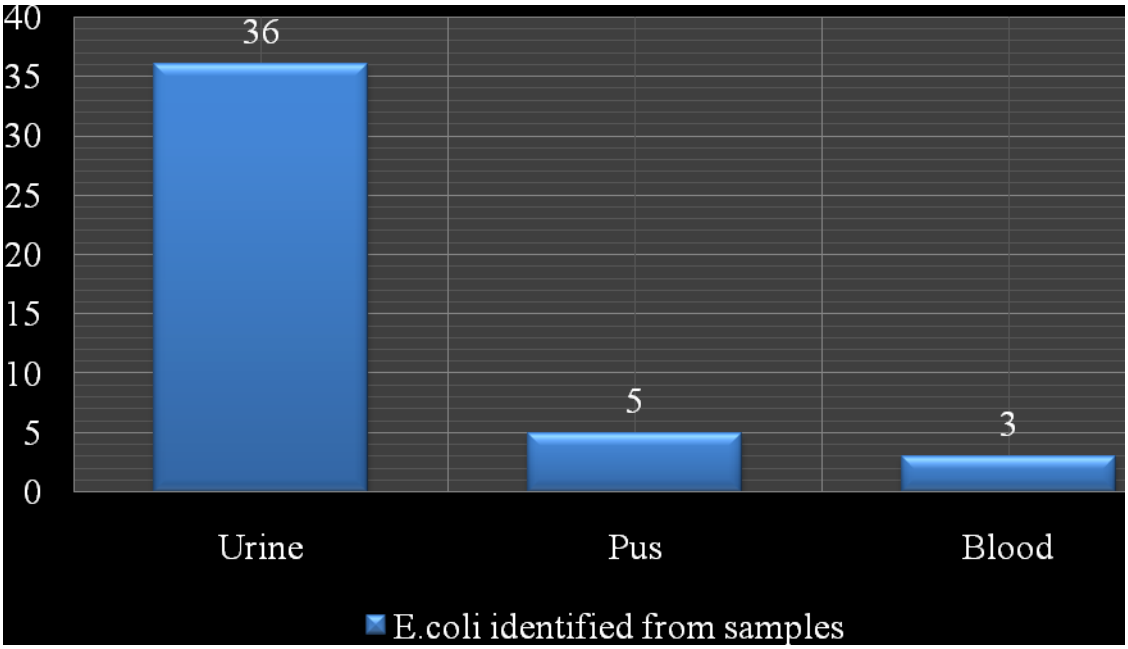
The study was conducted for a duration of one year from March 2011 to February 2012 at Bhaskar Medical College, India. A total number of 464 patients were included in the study. The urine, pus or blood samples of these patients were collected. The urine and pus samples on reaching the laboratory were inoculated on Mac conkey agar, Blood agar, and Nutrient agar to isolate the organisms.

The inoculated Blood agar and Nutrient agar plates were incubated aerobically at 37 C for 24 hours. After overnight incubation at 37 degrees C the Blood agar and Macconkey agar plates were examined for evidence of growth. The colony characters were studied , smears were stained by Grams'stain and examined under the 100X objective. The bacterial species then isolated were identified by morphology, cultural characteristics and biochemical reactions according to the standard techniques .The Gram negative bacilli identified were tested for motility by hanging drop and then they were subjected to biochemical and sugar fermentation tests .The tests were read after incubation at 37 degrees C at the end of 24 hrs and 48 hrs. Gram Negative lactose fermenting bacilli were classified on the basis of motility, fermentation of sugars, indole production, methyl-red reaction, and Voges --Proskauer test and utilisation of citrate in to Escherichia coli , Klebsiella.

Escherichia coli produced pink, smooth, irregular colonies on Macconkey agar

Klebsiella species produced pink, smooth and mucoid colonies.

44 strains of Escherichia coli were obtained comprising of 36 from urine samples, 5 from pus , and 3 from blood culture. The blood samples were inoculated in brain heart infusion broth.



SENSITIVITY TESTS:-
The sensitivity pattern was tested using Kirby Bauer disk diffusion method. The antibiotics used were amikacin, Ciprofloxacin, Levofloxacin, Nitrofurantoin, Gentamicin, Norfloxacin, Ofloxacin, Cefotaxime, Trimethoprim, Cefixime.

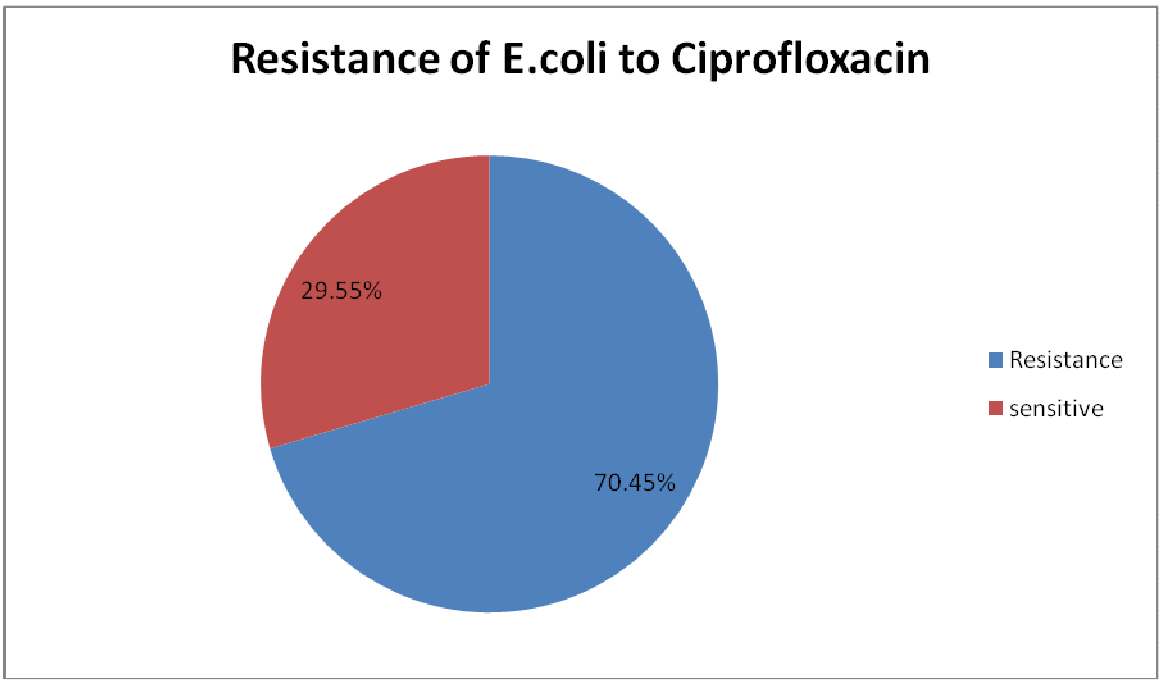
RESULTS

A total of 464 patients were included in the study. The Positive cultures for Escherichia coli were 44. Out of the 44 strains of Escherichia coli isolated 31strains were resistant to ciprofloxacin, 13 strains were found to be sensitive to ciprofloxacin.

DISCUSSION

Ciprofloxacin is effective in a broad range of infections. Because of wide-spectrum bactericidal activity, oral efficacy and good tolerability, it is being extensively employed for empirical therapy of many infections[1]. The prevalence of ciprofloxacin resistance in our study is 70.45%. The resistance to ciprofloxacin may be because, fluoroquinolones are more preferred in the empirical treatment for UTI because of their excellent activity against the pathogens which are commonly encountered in UTI[4]. This emphasizes the importance of the reassessment of the antibiotics which are used in the empirical treatment.

Resistance to quinolones develops during therapy via mutations in the bacterial chromosomal genes encoding DNA gyrase or topoisomerase IV or by active transport of the drug out of the bacteria. Resistance has increased after the introduction of fluoroquinolones especially in Pseudomonas and Staphylococci[5].



CONCLUSION

The present study indicates emerging ciprofloxacin resistance to Escherichia coli. The widespread use, and more often the misuse of antimicrobial drugs has led to a general rise in the emergence of resistant bacteria, particularly to ciprofloxacin. This study aims to reduce the number of inappropriate prescriptions and to improve the quality of ciprofloxacin prescriptions by doing it only after culture and sensitivity report.

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