



Detection and Isolation of Antimicrobial Resistant *E. coli* from Fresh Water Sources

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Abstract:

E. coli is a best known coliform and an important indicator of faecal contamination because it is normal constituents of the intestinal flora of human and animals. In most cases coliform do not causes illness. *E. coli* commonly found in fresh water sources like lake, river, dam, swimming pool. Studies were conducted to determine antimicrobial resistance pattern. Total 235 isolates of *E. coli* was isolated from fresh water of river, dam and well. a Isolation and identification of *E. coli* was done by using Membrane Filter Technique, Enriched Media, Selective Media, and Biochemical Tests and confirmed by Standard Identification Methods. Antimicrobial susceptibility testing was done by the Kirby- Buyers disc diffusion method using Ceftazidime, Ciprofloxacin, Cefotaxime, Nalidixic acid, Nitrofurantoin, Norfloxacin, Ofloxacin, Ampicillin, Tetracycline, Gentamycin, Kanamycin, Co-trimoxazole, Streptomycin. The antibiotic to which resistance was demonstrated most frequently were Nalidixic acid, Norfloxacin, Chloramphenicol and Amikacin and rest of the antibiotics found to be sensitive to *E. coli*. Isolates from river, dam and well shows more similar pattern and the level of Nalidixic acid resistance were higher in river isolates. Highest level of Multiple Drug Resistance of *E. coli* was observed in river. The fact that the isolate from river water enhances the risk of contamination to dam water, pond water and wells near river side and dam side with antimicrobial resistance bacteria.

Key words:

Antimicrobial susceptibility test, *Escherichia coli*, Multiple Drug Resistance.

Introduction:

Waterborne diseases are not unknown to us. Every day millions of humans and animals are suffering from waterborne diseases. Waterborne disease in both epidemic and endemic forms continues to occur in both developed and less developed countries. Concern for waterborne disease is dominated by pathogens transmitted by the faecal-oral route and by drinking water. Over 2 million deaths occurs every year only because of diarrhoea illness, and in diarrhoea illness, diarrhoea causes due to *E. coli* is most common and this is because *E. coli* is ubiquitous in nature and are normal inhabitant of GIT of almost all animals and humans *E. coli* have been consistently identified as the second most important cause of children diarrhoea next to rotavirus. *Escherichia coli*, a normal inhabitant of the gastrointestinal tract of warm-blooded animals, is used as an indicator of water quality. *E. coli* infection may lead to hemorrhagic colitis, haemolytic, uremic, syndrome on death. In India and some other countries, surface waters





from rivers, lakes, and ponds are processed by alum treatment, filtration, and chlorination to be used as drinking water. Some recent studies found multi antimicrobial resistant *E. coli* isolates positive for virulence determinants for EHEC in surface waters that are being used as raw water to supply drinking water (Hamner *et al.*, 2007; Ram and Shanker 2005; Ram *et al.*, 2007) ⁽³⁾.

Multiple antimicrobial resistances in pathogens are another challenging and emerging problem world over. Indiscriminate and unwarranted use of antimicrobial agents in food animal production led to the emergence of multidrug resistant bacteria. Phenotypic expression of antimicrobial resistance is most widely accepted method, however studies on detection of drug resistant genes in microbes is limited. Most of the antimicrobial agents used for growth and promotion in animals are mainly active against gram-positive bacteria, whereas those used in clinical therapy are broad spectrum drugs mainly active against gram-negative bacteria, such as Salmonella and *E. coli*. Human may obtain antimicrobial resistant *E. coli* or resistance genes of animal origin directly via contact with animals, food of animal origin or the environment which may lead to bacterial infection with limited therapeutic options and an increased risk of treatment failure.

EHEC strains are of particular significance being zoonotic in nature and animals especially cattle are reservoirs. Drinking water sources Viz. River, lake, ponds; wells could get contaminated from such pathogenic Escherichia coli.

Although most of the studies has been done on pathogenic Escherichia coli in various drinking water, but due to pollution, our modern eating habitats, new food and modern drugs many microbes get mutate and some get adapted to it and Escherichia coli is not exceptional to this. That's why now it is necessary to study entitled

Material and methods:

Sampling of water from Well, river and dam .Isolation and identification of *E. coli* from different water samples. It was done by using Membrane Filter Technique, Enriched Media, Selective Media, and Biochemical Tests like IMViC, Lactose, Sucrose, Maltose, galactose, and morphological tests like motility and staining. All tests were confirmed by Standard Identification Methods. Antimicrobial susceptibility testing was done by using the Kirby-Buyers disc diffusion method using Octadisc Cefotaxime, Ciprofloxacin, Cefotaxime, Nalidixic acid, Nitrofurantoin, Norfloxacin, Ofloxacin, Chloramphenicol, Ampicillin, Tetracycline, Gentamycin, Kanamycin, Co-trimoxazole, Amikacin, Streptomycin. The isolates are refer to 16s r RNA sequencing.



Result and discussion:

Total 235 isolates of *E. coli* was isolated from water of Wells, river and dam. The antibiotic to which resistance was demonstrated most frequently were Nalidixic acid, Norfloxacin, Chloramphenicol and Amikacin and rest of the antibiotics Cefotaxime, Ciprofloxacin, Cefotaxime, Nalidixic acid, Nitrofurantoin, Norfloxacin, Ofloxacin, Ampicillin, Tetracycline, Gentamycin, Kanamycin, Co-trimoxazole, Streptomycin found to be sensitive to *E. coli*. Isolates from river and dam shows more similar pattern and the level of Nalidixic acid resistance were higher in river isolates.

Out of 235 isolates 90 isolates found to be resistant and 145 isolates found to be sensitive. Out of total 90 resistant isolates nalidixic acid resistant shown by 30 isolates, norfloxacin resistant shown by 28 isolates, chloramphenicol resistance shown by 12 isolates and Amikacin resistance shown by 20 isolates. All 145 isolates found to be sensitive for antimicrobial resistance.

Highest level of Multiple Drug Resistance of *E. coli* was observed in river.

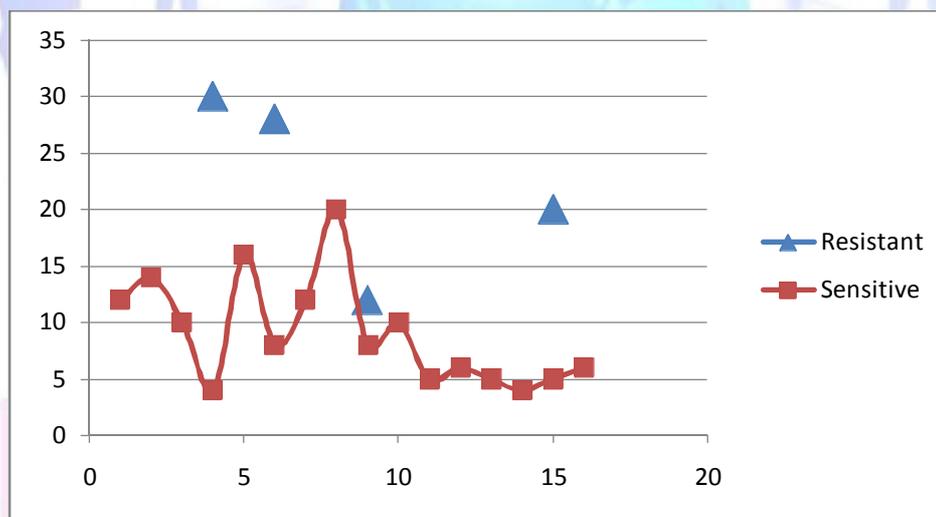


Figure 1: Triangle dots shows number of resistant isolated and square shows number of sensitive isolates.

Conclusion:

The fact that, the isolate from river water, enhances the risk of contamination to dam water, pond water and well water with antimicrobial resistance bacteria. This study suggest that the effectiveness of Nalidixic acid, Norfloxacin, and Amikacin should be improved or required next generations of these antibiotics.



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