Emerging antibiotic resistance of Pseudomonas aeruginosa isolated from various drinking water sources of Rewa city (M.P)

T.Leelanath1*, K.Vasundhara2
1J.J.College of Arts and Science, Bharathidasan University, Pudukkottai, Tamilnadu , (INDIA)
2Hindu college, Department of Biotechnology, Pudukkottai, Tamilnadu , (INDIA)

E-mail: leelanath7@gmail.com, vasu_6k@yahoo.co.in

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ABSTRACT

In the present study, seven water samples from various drinking water sources situated in rewa city were collected in the months of Sept. 2006 to June 2007. In which the three water samples showed the presence of pathogenic bacteria Pseudomonas aeruginosa, where as single strain of pseudomonas aeruginosa was isolated and identified from each of the three water samples thus a total three Pseudomonas aeruginosa, strains were observed for their antimicrobial sensitivity using various antibiotics viz., Amikacin, Benzylpenicillin, Cefotaxime, Chloramphenicol, Gentamicin, Streptomycin and Tetracycline. Antibiogram of these three strains of Pseudomonas aeruginosa, showed that all the strains were found sensitive to chloramphenicol, and Streptomycin, were as equal percentage of strains were observed both sensitive and resistance to Benzylpenicillin and Cofotaxine, but 65.6% strains were found also resistance to Gentamicin. Thus high incidence of bacterial resistance to antibiotics was seen in drinking water.

INTRODUCTION

With increasing environmental pollution it is absolutely necessary to ascertain the potability of water before used for human consumption. water is one of the major carrier of several diseases of bacteriological organs and hence careful assessment of bacteriological origins and hence careful assessment of bacteriological quality of water is most essential. Intestinal micro-organisms from warm blooded animals including man enter river streams and large bodies of water contributing to the pollution of the environment. Among these intestinal microbes are the coliforms. Pathogenic forms may be in evidence but the numbers and the types will vary with the geographic area, the state of community health, the nature and degree of sewage treatment and physiological state of the organis[ms][11].

The incidence of Pseudomonas aeruginosa in human faecal specimens was determined by Sutter et al.[36]. About twelve percent of the healthy adults or employees in medical or dental school discharged the organisms in number up to 10 g-1 of faeces. It appeared persistently in some individual but only transiently in others. Bondey[60] recovered Pseudomonas aeruginosa from sewage and polluted fresh water and sea water then sufficiently large numbers of thermo tolerant faecal coliforms were present. More recently this view was sustained by Drake[16], Hoadly[20], Cabelli, Kennedy and Levin[7] and Jawed[22], these workers had observed a higher incidence of this organism in heavily polluted water than in water in which the level of pollution was relatively low.

Sewage polluted water is often a common source
of disease in man and animals\cite{12}. Several diseases from water borne pathogens out breaks are due to the presence of drug resistant enteric pathogens carrying “R” factors which which results in deaths due to failure of patients to respond to treat ment with antibiotics\cite{2,18}. The distribution of antibiotic resistant bacteria in aquatic environment mainly in surface water has been investigated\cite{25,19} and the significance of polluted water as route for the spreading of the antibiotic resistance in the environment has been realized.

During recent years, the distribution of antibiotic resistant strains of Enterobacteriaceae in aquatic has been studied in different parts of the world\cite{19,5,26}. Only few reports are available on the antibiotic resistance among Pseudomonas aeruginosa strains isolated from various drinking water sources in India. Therefore, the present study was undertaken to see the antibiotic resistance of Pseudomonas aeruginosa from drinking water sources of Rewa city in Madhya Pradesh.

**MATERIALS AND METHODS**

The seven drinking water samples were collected from different places such as S1-Khanna Chowk, S2-Bus Stand, S3-Tatahati, S4- Hospital Chowk, S6-Municipal Water and S7-University Campus. The kind of water sources were tube wells except Municipal tap water (S6).

Isolation of Pseudomonas aeruginosa was done by the method described by Pandya et al., (1975). The confirmation of P.aeruginosa was done by the Oxdias test and other biochemical tests described by Cappucienno et al.,\cite{8} and the strains were maintained in the nutrient agar medium with 8% dettol.

**Antimicrobial sensitivity of Pseudomonas aeruginosa**

Antibiotic disks: Antibiotic disks of seven antibiotics with following potency used Amikacin (30µg), Benzylpencillin (10µg), Cefotaxime (30µg), Chloramphenicol (30µg), Gentamicin (10 µg), Streptomycin (10µg), Tetracycline (30µg) of each 6 mm. disk.

The antibiotic susceptibility patterns of isolated strains were determined by disk diffusion method\cite{31}. After overnight incubation period the zone diameter were measured. The results were then interpreted ac-

**RESULTS**

Present study deals with antimicrobial sensitivity of various antibiotics against isolated Pseudomonas aeruginosa. Only three drinking water samples of S1, S2, S4, have given positive results for the presence of Pseudomonas aeruginosa and were subjected to antimicrobial sensitivity test against seven antibiotics. Antibiogram of P.aeruginosa water isolates is shown in TABLE 1 and percentage of sensitivity, partial resistance and resistance response shown in TABLE 2.

All the strains of Pseudomonas aeruginosa tested were resistance to Benzylpenicillin and Cefotaxime, among aminoglycosides 66.66% strains was found resistance to Gentamicin. In the case of other antibiotics 33.33% isolated strains were found partial resistance and showed resistance to Amikacin and Tetracycline. But all the strains were found sensitive to Chloramphenicol and streptomycin.

**DISCUSSION**

Multiple drug resistance of P.aeruginosa strains have been reported to β-lactum (Benzylpencillin) anti-
biotics as observed in present study was also been re-
ported earlier by S.Jain,[21]. In the same way the strains
were found resistance to Tetracycline in present study
were also highly resistance reported earlier by chandler
and Krishnapalli et al.,[10]. Resistance to β-lactum antii-
biotics due to R-factors impart in the organism, the
capacity of producing β-lactamase and induce some cell
wall changes which result in making them resistant[37].
Among aminoglycosides 66.6% strains were found re-
sistance to Gentamicin in present study. But majority of
strains were found sensitive in other workers[21,13,10]
observation. S.Jain[21], reported that 96.8% strains were
found sensitive to Amikacin, however in present study
the strains observed resistance. Resistant to aminoglyco-
side antibiotics were due to their enzymatic inactivation[28].
Dutta et al.,[15] have reported that 83.3% to 95% strains
were found resistance against Chloramphenicol.
But in the Present study all the strains were found sen-
sitive. Celma, Monro and Vezquez[9] described the sen-
tivity to chloramphenicol due to the inhibition of pro-
tein synthesis process.
Majority of strains resistant to widely used amino
glycosides likes Kanamycin and Streptomycin[4,37,14,23].
But in the present study all the strains were observed
sensitive to streptomycin sensitivity to streptomycin due
to the inhibition of protein synthesis[33].
Wide spread use of antibiotics with out professional
could be one reasons in favoring the increased inci-
dence of drug resistance bacteria in water[17]. Studies
of Kelch and Lee et al.[24] suggest that water treatment
could play selection process causing an increase in an-
tibiotic resistance of bacteria in drinking water.
The incidences of antibiotic resistant strains vary
significantly in water. No obvious connection with the
water source or level of contamination has been re-
ported. The incidence of resistance strains was found
high in untreated domestic sewage and brakish water
and lake water which were also found in ground water
in present study.
The studies of Alkhar river (Baghdad) and various
other studies show higher resistance in pollution indica-
tor bacteria for Ampicillin, as Ampicillin is known to
be common in sample of untreated sewage[30]. How-
ever it was shown the clinical isolates of bacteria
Paeuriginosa and E.coli in Baghdad[1]. Simlar results also
observed with Benzylpenicilline but Paeuriginosa strains
were isolated from contaminated ground water.
It is well known that misuse of antibiotics is a major
factor affecting the emergence of antibiotic resistance
in bacteria[17].

**CONCLUSION**

This study may explain the emergency of antibiotic(s) resistant pollution indicator bacteria in the
river water and underground water system.

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