ANTIBIOTIC RESISTANCE OF ENTERIC BACTERIA ISOLATED FROM SOUTH-WESTERN ISTANBUL COAST (TURKEY)

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Abstract

The aim of this study was to evaluate the impact of an urban effluent on the antibiotic resistance of enteric bacteria. A total of 72 strains were isolated from five different sampling stations of south-western Istanbul coast during the year of 2008. Among the isolates, 55,6% were *Escherichia coli*, 29,2% *Enterococcus fecalis*, 6,9 %, *Proteus* spp., 5,6% *Klebsiella* spp., 2,7 % *Pseudomonas* spp. Strains of enteric bacteria were selected for antibiotic susceptibility testing. The antibiotic resistance tests resulted in bacteria being the most resistant against Ampicilin (100%) and the most sensitive against Imipenem (0%) and Amikacine (7,6%). The results reveal that study area faces bacteriological pollution and existing pollution level in this area is above the criterion specified for aquaculture, fishery and recreational activity.

Keywords: Antibiotics, Bacteria, Sewage Pollution

Introduction

The quality of water is of vital importance to the society. If a bacterial pathogen is able to develop or acquire resistance to an antibiotic, then this substance becomes useless in the treatment of infectious disease caused by this pathogen [1,2]. The aim of this study was to evaluate the impact of an urban effluent on the antibiotic resistance of enteric bacteria isolated from surface water of south-western Istanbul coast, Turkey.

Materials and Methods

The enteric bacteria were isolated using the MPN Method from five different sampling stations of south-western Istanbul coast on a monthly basis during the year of 2008 (Figure 1). A total of 72 strains were isolated and strains of enteric bacteria were selected for antibiotic susceptibility testing. The minimum inhibition concentration was determined by the disk diffusion method in Mueller-Hinton medium in accordance with the Clinical and Laboratory Standards Institute (CLSI) guidelines. Ten antimicrobial agents were selected as representatives of important classes of antimicrobials: ampicillin (AM), 10 µg; amoxicillin-clavulanic acid (AMC), 10µg; tetracycline (TE), 30 µg; chloramphenicol (CM), 30 µg; nalidixic acid (NA), 30 µg; amikacin (AC), 30 µg; streptomycin (SM), 10 µg; imipenem (I), 10 µg; ceftazidime (CAZ), 10 µg; trimethoprim-sulfamethoxazole (CO^{25}), 25 µg. The results were separately interpreted, using the breakpoints from the CLSI guidelines for the family *Enterobacteriaceae* and non-fermenters [3,4,5,6].

Fig. 1. Sampling stations of south-western Istanbul coast [7]

Results and Discussion

In this study, 72 isolated strains were 55,6% *Escherichia coli*, 29,2% *Enterococcus fecalis*, 6,9 % *Proteus* spp., 5,6% *Klebsiella* spp., 2,7 % *Pseudomonas* spp. The results of the antibiotic sensitivity test were interpreted and are presented as the antibiotic resistance pattern of the bacterial isolates among sampling stations. It can be seen in Table 1. When comparing the antibiotic resistance level between sampling stations, highest resistance to antibiotics was determined in the first and third stations because those stations have drainage water that contains high concentration of fecal coliforms. Also indirect influences of bacterial pollution and negative environmental conditions may be assumed to be related to antibiotic-resistant strains. The antibiotic resistance tests show bacteria being the most resistant against Ampicilin (100%) and the most sensitive to Imipenem (0%) and Amikacine (7,6%). As detecting the antibiotic susceptibility profiles of the isolates, it would be possible to design a general classification of the isolates and beside this, the risk factors of the resistant strains in stations were determined. The results show that existing pollution in this area is above the given criteria's for aquaculture, fisheries and recreational activity.

	RESISTANCE TO ANTIBIOTICS (%)											
Bacterial groups	**Station**	**Isolates**	CM^{30}	AC^{30}	SM^{10}	CO^{25}	NA^{30}	AMC^{30}	TE^{30}	AM^{10}	CAZ^{30}	I^{10}
Escherichia coli	1	9	0	0	11	22,2	36,3	67	44,4	100	22,2	0
Enterococcus faecalis	1	5	20	0	40	20	80	80	20	100	40	0
Klebsiella spp.	1	1	0	0	100	0	0	100	0	100	0	0
Proteus spp.	1	1	0	0	100	100	0	100	0	100	100	0
TOTAL	**1**	**16**	**6,25**	**0**	**31,25**	**25**	**50**	**75**	**31,25**	**100**	**31,25**	**0**
Escherichia coli	2	8	25	12,5	25	25	37,5	62,5	37,5	100	12,5	0
Enterococcus faecalis	2	4	25	0	25	25	50	75	50	100	25	0
Proteus spp.	2	1	0	0	100	100	100	100	0	100	100	0
TOTAL	**2**	**13**	**23**	**7,6**	**30**	**30**	**46,1**	**69,2**	**30,7**	**100**	**23**	**0**
Escherichia coli	3	8	0	0	12,5	50	25	62,5	62,5	100	12,5	0
Enterococcus faecalis	3	4	25	0	25	25	50	75	100	100	25	0
Proteus spp.	3	1	0	0	0	0	0	0	100	100	100	0
Pseudomonas spp.	3	1	100	0	100	0	0	100	100	100	0	0
Klebsiella spp.	3	1	0	0	0	0	0	0	0	100	0	0
TOTAL	**3**	**15**	**13**	**0**	**20**	**33**	**26**	**60**	**73**	**100**	**20**	**0**
Escherichia coli	4	7	0	0	28,5	28,5	71,4	28,5	14,2	100	14,2	0
Enterococcus faecalis	4	3	0	0	33	33	100	67	33	100	0	0
Proteus spp.	4	1	0	0	100	0	100	100	0	100	0	0
Pseudomonas spp.	4	1	0	0	0	0	0	0	0	100	0	0
Klebsiella spp.	4	1	100	0	100	100	100	100	100	100	100	0
TOTAL	**4**	**13**	**7**	**0**	**38,4**	**30,7**	**77**	**46,1**	**23**	**100**	**15,3**	**0**
Escherichia coli	5	8	25	0	50	37,5	37,5	37,5	75	100	25	0
Enterococcus faecalis	5	5	40	0	60	20	60	80	60	100	0	0
Proteus spp.	5	1	0	0	0	0	0	0	0	100	100	0
Klebsiella spp.	5	1	0	0	0	0	0	0	0	0	100	0
TOTAL	**5**	**15**	**26,6**	**0**	**46,6**	**26,6**	**40**	**46,6**	**60**	**100**	**20**	**0**

Fig. 2. Antibiotic resistances levels of isolated bacteria

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