



Investigation of pathogenic Kor River bacteria in different seasons in dehydration conditions

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Research Article

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Abstract

Kor River is one of the most important waterways of Fars province in point view of economics and agriculture. Due to water intake from this river for agriculture, domestic uses, industry, and environmental aspects bacteriology of its along its rout is very important. In this study pathogenic bacteriology of the river was conducted and the results were statistically analyzed. The research started Bahman 1385 (February, 2006) for one year. Fecal and coliform bacteria were determined at the outfall of the point sources pollution. Fecal bacteria after Petrochemical complex plant, Sivand and Kor rivers connection and Band-e Amir were also determined. The results showed 8.7%, 8.1% and 6.8% for the mentioned points, respectively. For other outfalls fecal bacteria were 5.6% and 6.2%. Proteus bacteria were only detected exactly after Petrochemical complex plant. Coliform bacteria were determined at the Sivand connection and Band-e Amir which were 6.7% and 5.6% respectively. Salmonella bacteria were determined at the sampling site before and after Petrochemical complex plant, before Sivand and Kor junction, Ban-e Amir, Jounety Bridge, and Faize Abad Band. The results showed that these intestinal pathogenic bacteria are distributed in the Kor river route due to industries and domestic wastewaters.

Keywords: Kor River, Fars Province, Biological pollution, fecal coliform, Iran

Introduction

Due to the important in the human life the contamination of it could cause catastrophic problems in the communities (1).

These diseases are caused by pathogenic bacteria, viruses, protozoa, and worms (2, 3). The water bodies such as rivers, open channels and dam sites especially in drought situations are the sites for distribution of these illnesses pathogens and vectors; also these open water bodies are the habitats for different pathogens such as snails, fish, aquatic plants, and vectors like mosquitoes and other insects. These microbes could cause in the human beings different catastrophic epidemic illnesses such as typhoid fever, dysenteries, Para typhoid, Vibrio, and also poliomyelitis in infants (4, 5, and 6).

Kor River is originated from northern part of Fars province by connections of tributaries with different sizes in the mountains of the area and then winds through the region with 285 km and reaches the east south of the basin to Bakhtegan Lake (**Fig. 1**). In the places the domestic wastewater of the rural area are connected to the river. Marvdasht city was water which is designed for more than 100,000 capita for nonpoint source pollution from rice, wheat corn and sugar beat agricultural farms also connected to the river and cause more contamination of it. The discharge from industrial sites such as meat processing Co., Chemical Fertilizer plant, Petrochemical plant, Leather Co., Sugar Co., Flour and Biscuit Can production Co, are all together as much as 56 m³/d, and contribute BOD's load of the Kor River. These industrial are equal to 80000 capita BOD load (1). There fine, protection of this water body is important for sustainable/agriculture are objectives of this study were determination of the pathogenic Bacteria of the Kor River and the occurrence of them in the river water on volume basis. (MPN) based on statistical analysis of the data.

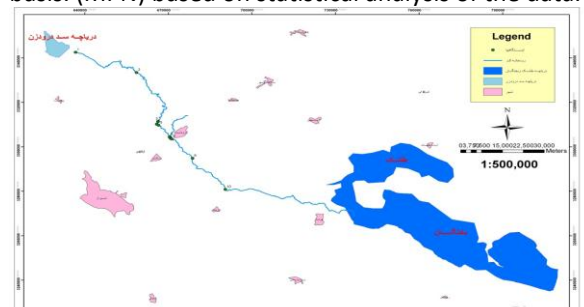


Fig. 1. Situation of the Kor River and its route in the Fars Province.



Material and Method

Crab water sample were taken from ten stations along the Kor River (**Table 1**). The water samples were taken from water surface, half of the depth and near the bottom in 3 replicates for one year (1, 11, 85 to 1, 11, 86) monthly. The distance between the stations is not equal and the sites were chosen according to the pollution loads. The samples were same in sterile flask of 125 ml and 4C coliform determination were according to standard methods of Bacteriological Manuals.

Table 1. Characteristics of sampling stations

Station	Station name
1	Doroodzan dam
2	Joonaki bridge
3	Koohsabz-Sfadran road
4	After drain entrance
5	Before Petrochemical Plant
6	After petrochemical Plant
7	Old Khan bridge
8	New Khan bridge
9	Band-e-Amir
10	Band-e-Faiz Abad

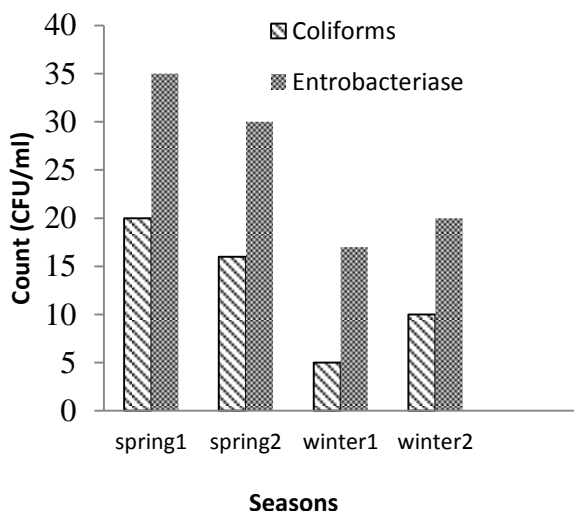


Fig 2. Comparison between count of fecal and coliform bacteria at different seasons.

Results and Discussion

A. FC, seasonal variation at different stations and depths

FC bacteria during the cause of study were determined; the results are shown in **Fig.2**. As **Fig.1** shows during spring and summer the FC bacteria were more than the other parts of the

year. The percentages of their presence were 32.71, 29.91, 16.62 and 20.56 for spring through winter respectively. **Table 2** shows presence of FC bacteria at different stations. As the data of the data shows at au stations the water of the Kor River is contaminated by these bacteria.

The FC bacteria did not have significant difference in different depths of the water depths. The presence of these bacteria was 32.30, 34.8 and 32.9 percent respectively in the surface, middle and deep parts of the Kor River. Therefore the sampling of water for determination of the FC bacteria could be any convenient depth of the water. This result will help us in saving time and experiences.

B. Coliform bacteria in different seasons, stations and sampling water depths

All the water samples in different seasons were investigated. Increase in coliform bacteria was observed in warmer seasons than the other seasons. The presence of bacteria was 38.9, 31.5, 9.3 and 20.4, for spring, summer, fall and winter, respectively. In different stations also the presence of coliform bacteria was determined. All the stations under investigation showed the presence of these bacteria. But the highest levels alone in stations 8, 9, 5 and 6 respectively. **Table 2** shows the results of the presence of the coliform, frequency and the percentage of them. The occurrences of bacteria in surface, middle and deep part of the river water profile were not statistically significant. In other words the depths of the water do not have any effect on the presence of the bacteria.

Table 2. Percent of coliform bacteria in various stations

Station	Frequency	Percent
Doroodzan dam	2	3.7
Joonaki bridge	5	9.3
Koohsabz-Sfadran road	4	7.4
After drain Entrance	4	7.4
Before Petrochemical Plant	6	11.1
After Petrochemical Plant	6	11.1
Old Khan bridge	4	7.4
New Khan bridge	10	18.5
Band-e-Amir	10	16.7
Band-e-Faiz Abad	4	7.4
Total	54	100

C. Comparisons of the fecal coliform and other coliform bacteria in different seasons

Figure 2 shows the percentage of two bacteria in all water samples. Both types of bacteria have shown more appearance in spring and summer than fall and winter. Because the water and ambient temperatures were higher than fall and winter therefore, the environmental conditions were



suitable for proper growth of these bacteria under study.

Table 3. Comparison between Percent of Coliform and fecal bacteria in various depths

Sampling Location	Bacteria		Total
	Col. †	Ent. Bact. ‡	
Surface	number	18	52
	percent	11.2	32.3
Mid	number	16	56
	percent	9.9	34.7
Bottom	number	20	53
	percent	12.4	32.9
Total	number	54	161
	percent	33.5	100

†= coliform and ‡= entrobacterise

Conclusion

In this study it was shown that in considering that the Kor River receives different domestic wastewater and sewage industrial plants' effluents it is anticipated that the river is contaminated by fecal bacteria, coliform bacteria and most importantly with pathogenic organisms. This will make the problem of infection bacterial diseases in people and create, especially in warm seasons to be more attention. Also, the importance of this research to relevant authorities in controlling water quality and pathogenic contamination of this river has been the place that has the most reviews.

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AUTHORS' CONTRIBUTIONS

Authors contributed equally to all aspects of the study.

PEER REVIEW

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.