# Potability of Water Obtained Through Boring in Karachi

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## Abstract

This study was carried out to detect the faecal contamination in water obtained from indigenously designed boring facilities. The presence of escherichia coil (major indicator of faecal contamination) was detected after performing the coliform test along with biochemical studies in 32 boring water samples out of 60 sampies collected from various localities of Karachi city. Its presence in undergrou6nd water resources definitely indicates the possible presence of water-borne pathogens (JPMA 44: 286, 1994).

## Introduction

Karachi Metropolitan area is ever increasing in terms of population growth and this expansion in human inhabited areas is mainly in the form of Karachi Abadies. Description of factors leading to this situation is beyond the scope of present study. Cumulative effect felt is that civic amenities are drastically inadequate. Supply of potable water is perhaps the most important single factor which cannot be ignored. The necessity became so acute that people resorted to switching back to wells. Subsoil water drawn as a result of boring and then installing hand or electrically operated pumps is invariably used to meet nearly all requirements of water including drinking. Present study was conducted to evaluate the quality of such water samples from microbiological standpoint of safety.

## Materials and Method

Different media and chemicals used in the study included MacConkey ‘s broth (single and double-strength), MacConkey ‘s agar, Triple sugar iron agar, Simmon-Citrate agar, Tryptone water, Clark’s medium, Ehilich’s reagent, Xylol, Methyl red reagent, Voges-Proskauer reagents A and B and sugar broths (Maltose, Mannitol, Sucrose, Lactose and Glucose).

Table. Locations and usages of the samples studied.

| Name of area | No. of samples collected | Depth ft. | Distance from sewer ft. | No. of samples | Usage |
|---|---|---|---|---|---|
| N. Nazimabad | 9 | 20-26 | 10-20 | 7 | Not for drinking |
| | | | | 2 | For drinking |
| F.B. Area | 13 | 24-40 | 17-32 | 8 | Not for drinking |
| | | | | 5 | For drinking |
| Buffer Zone | 3 | 8-30 | 3-10 | 1 | Not for drinking |
| | | | | 2 | For drinking |
| Nazimabad | 3 | 20-25 | 13-15 | 1 | Not for drinking |
| | | | | 2 | For drinking |
| Paposh Nagar | 1 | 17 | 22 | | Not for drinking |
| Ashraf Nagar | 1 | 25 | 20 | | For drinking |
| Gulshan-e-Iqbal | 5 | 10-30 | 15-25 | 3 | Not for drinking |
| | | | | 2 | For drinking |
| Malir | 13 | 32-35 | 10-15 | 5 | Not for drinking |
| | | | | 8 | For drinking |
| Mahmoodabad | 4 | 18-25 | 14-45 | 2 | Not for drinking |
| | | | | 2 | For drinking |
| Sharfabad | 2 | 25/35 | 10/17 | 1 | Not for drinking |
| | | | | 1 | For drinking |
| Yaseenabad | 1 | 35 | 10 | | Not for drinking |
| CP Berar Soc. | 1 | 27 | 8 | | For drinking |
| Shah Faisal Colony | 3 | 18-20 | 16-20 | 3 | For drinking |
| Burns Road | 1 | 16 | 20 | | For drinking |

Table indicates details of the samples studied. For collection, the tap or outlet was disinfected, water was allowed to flow for 5 minutes and was collected in the autoclaved and sterilized bottle. Bored water samples were stored at 4 OcI until analysis.

The Coliform Test[2] .

**Step 1 -** Presumptive test: In the autoclaved flask containing 100 mls of double strength MacConkey\'s broth, 100 mls of the boring water samples were inoculated. Similarly 50 mis and 10 mls of the boring water samples were inoculated in 50 mis and 10 mis of double strength MacConkey ‘s broth respectively. 1 ml of the sample was also inoculated in 9 mls of single strength MacConkey’s broth. All flasks were then incubated at 37°C for 24- 48 hours. After incubation period lactose fermentation was noted.

**Step 2 -** Confinnative test: MacConkey’s agar plates were streaked by taking a loopfull from the flasks inoculated in step 1 in which lactose fermentation was observed and incubated at 37°C for 24 hours. Next day single isolated lactose fermenting colony was streaked on another MacConkey’s agar plate in order to get the pure culture and incubated at 37°C for another 24 hours. After incubation period lactose fennenting colony was Grain-stained and motility was checked with Motility test[3].

**Step 3 -** Completed test[2]: At this stage half of the lactose fermenting colony was streaked on the nutrient agar slope and the remaining half colony was inoculated in the lactose broth. Both the tubes were incubated at 37°C for 24 hours. After incubation Gram staining was performed and the fermentation of lactose with the gas production was noted in the lactose broth.

**Step 4:** Biochemical Studies: The sugar broths including lactose, glucose, maltose, mannitol and

sucrose were incubated with the culture. Tryptone water and Clerk's medium were also inoculated. Triple sugar iron agar was also stabbed and streaked. **Simmon-** citrate agar was streaked. All of the sugar broths and tubes were incubated at 37°C for 24 hours. The results were noted and Indole test3. Methyl-red test[3] and Voges-Proskauer test[4] were carried out.

## Results

Utilizing the coliform test including presumptive, confirmative and completed tests alongwith the biochemical studies demonstrated the presence of Escherichia coli (major indicator of faecal contamination) in 32 out of 60 boring water samples. From district central 30 samples were collected and in 18 samples the presence of Escherichia coil was confirmed. Out of 29 samples which were collected from district east, 13 samples were found faecally contaminated. Only 1 sample was taken from district south which was also highly contaminated with faecal material. The presence of Escherichia coli was confirmed by Standard Biochemical tests[3,4].

## Discussion

The underground water is one of the major sources o water supply to the Karachi city5. It has been observed that deep-drilled water usually contains only few microorganisms so it requires a lesser degree of treatment because there are less chances of presence of pathogens in the ground water but the results of the present work showed that even the bored water was heavily contaminated with faecal material. This finding supports the studies done by The Water Wing of Karachi Development Authority during which they performed the bacteriological examination of the underground water resources and found heavy contamination in the subsurface water5. During the proceedings of National Conference on drinking water supply and sanitation which was held in Islamabad in November, 1981 it was suggested once again that the disposal of sewage in or near the water resources is the main factor that favours the propagation of micro-organisms6. The leakages of the sewage from sanitary sewer lines which are usually present underground if not properly handled may result in the release of waste water which remains continued for longer periods arid go into the ground where it get mixed with the sub-surface water resulting in the contamination of the underground water resources with the faecal material along with other noxious chemicals. Another important reason is in almost all areas of Karachi city we have combined sewer system, i.e.. sanitary sewer and storm sewerare carried through a common pipeline. It has been observed many times that alter a heavy storm these pipelines break due to the entrance of the bulk amount of waste water as well as storm water in the pipes. The leaking water then percolates into the earth causing the contamination of sub-surface water bodies. During the collection of the samples the distance between bored wells and first main sewer was also measured and faecal contamination was noted in almost all those samples which were taken from the bored wells located at a distance of about 10-20 feet from the main sewer. Also the depth of all the wells was found to be between 9-27 feet. This shows that nearer the distance between the bored well and the main sewer and lesser the depth of the bored well the more will be the chances of bored water to get contaminated with sewage mainly due to the leakage of sewer pipe system. The possibilities of the leakages which include lack of sanitary seals. use of faulty material, poor construction of pipes. corrosion, defective joints and faulty washers can be minimized to great extent by the use of modern equipment. early repair of the leakage and by replacing the old pipelines with new ones.

## References

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