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Research Article

## Enumeration of Total and Faecal Coli form Bacteria in Water, Kapildhara, Kavanai Tirth

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### Abstract:

Kumbh Mela happens in Nasik city after every 12 Years, but before AD 1770 Kumbh Mela use to be organized in Kapil dhara tirth, Kavnai which is situated 50 Km from Nasik in Igatpuri Taluka. After AD 1770 the Peshwas shifted the kumbh mela to Nasik and Trimbakeshwar. To Assess the present water state of tirth in the month June 2013, Total coli form (TC) and faecal coli form (FC) bacteria were analyzed from ten samples which was collected from Kapildhara tirth, Kavanai. Total solids (TS), Total Dissolved solids (TDS), Residual chlorine and pH of water samples were also determined. For bacteriological analysis inductively membrane filtration (MF) method was used for total coli form (TC) as well as faecal (FC) coli form bacteria. All samples were found contaminated with total coli form (TC) and faecal coli form (FC) and the counts were higher than the maximum microbial contaminant level (MMCL) established by World Health Organization (WHO). It was observed that pH was within the limits of WHO standard (6.5-8.5). The residual chlorine was rarely detected in any sample of water. Bacteriologically the water quality of the water was found to not good.

**Keywords:** Bacteria, Coli form, Contamination, Escherichia coli, Water quality

### 1.0 Introduction:

Total Coli form Bacteria is a classification of numerous different bacteria of the Coli form Group. These organisms are very common and are found in large quantities in the soil down to about forty-fifty feet. Most of the Coli form bacteria are harmless to humans, and some even aid in our digestion of plant materials. Faecal Coli form bacteria flourish in the digestive tracts of mammals, (including humans). Some of these mutated organisms may cause diarrhea, nausea, vomiting, and in the very old, very young and the immuno-suppressed, may even cause death. Sources of Total and Faecal Coli form in groundwater can include: Agricultural runoff Effluent from septic systems or sewage discharges, Infiltration of domestic or wild animal fecal matter.

### 1.1.0 Study Area:

Kavanai, a small settlement at the foot of the fort of the same name in Igatpuri taluka lying 16 km. North of Igatpuri, the historic fort of Kavanai which is said to have been built by the Moghals. It was ceded to the Peshva by the Nizam under the terms of the treaty concluded after the battle of Udgir (1760). At the foot of the hill is the seat of sage Kapila and Kapildhara tirtha. There is a ruined temple of Kamai Devi as below shown in photo. A small pond close-by the temple holds water throughout the year. Many people come to the kapildhara and drink its water as a 'tirth' considering it as fresh and pure water, but now a days it is contaminated by many human activities and is not good water for drinking, it may cause many diseases, a small attempt has been made to analyze the water of tirth. The data would be a useful tool for creating awareness amongst the residents and visitors of the place.



Fig. 1: Kamai Devi mandir

**2.0 Materials and Methods:**

**2.1 Sample Collection:**

Ten samples were collected. Samples were collected in sterilized screw cap 500-ml white glass flasks, after a flow time of 5 min to eliminate any contaminant present. In order to neutralize the residual free chlorine, 10% solution sodium thiosulfate was added in sterile bottles after collection. Samples were placed in ice boxes and brought to laboratory.

Water pH and residual chlorine were determined at the time of collection using pH meter and residual chlorine was. Microbiological samples were analyzed within 4 h of collection by membrane filtration method to determine the total coli form per 100 ml at 37°C and faecal coli form at 44°C on eosine methylene blue (EMB) agar for 24 h. Colonies were counted and all distinct colony types were transferred from EMB agar to trypticase soya agar (TSA) plates. Isolated colonies from TSA plates were subjected to Gram-staining and oxidase test. All the colonies tested were Gram-negative and oxidase negative rods.

Table 1: Determination of PH and Residual Chlorine

Parameters				
Sr.No	pH	Residual Chlorine	TDS	TS
Unit	---	mg/lit	mg/lit	mg/lit
1	6.2	0.01	308	400
2	6.8	0.01	450	502
3	7.5	0	209	303
4	7.2	0.01	204	301
5	6.2	0	245	260
6	6.1	0.01	502	510
7	7.9	0.01	300	320
8	6.2	0	290	360
9	6.8	0	350	383
10	7.4	0	401	425
	68.3	0.05	3259	3764
Average	6.83	0.005	325.9	376.4
Max	7.9	0.01	502	510
Min	6.1	0	204	260
WHO limit	6.5-8.5	0.2-0.5	500	-----

**Table 2:** Determinations of Total coli form and faecal coli form bacteria

Sr.No	Total coli form (log <sub>10</sub> cfu/100 ml)	Faecal coli form (log <sub>10</sub> cfu/100 ml)
1	3	1.8
2	3.7	1.9
3	4	1.5
4	3.8	2
5	3.2	2.5
6	4	2.3
7	3.9	2.5
8	3.7	2.1
9	3.8	2.2
10	3.9	2.2
<b>Min</b>	<b>3</b>	<b>1.5</b>
<b>Max</b>	<b>4</b>	<b>2.5</b>
<b>Average</b>	<b>3.7</b>	<b>2.1</b>



**Fig. 2:** Kavnai

### 3.0 Result and Discussion:

The pH of all the ten samples was found to be within the limits of WHO guidelines for drinking water, i.e., pH 6.5-8.5 (Table 1). TDS and TS are within limits and the residual chlorine was not detected in all samples collected from the pond of Kapildhara tirth. The results of the quantitative and qualitative bacteriological analyses the water samples collected from different site is summarized in Table 2. The total and faecal coli form bacteria were detected in all samples (100%) of drinking water of Kapildhara tirth. Total coli form counts ranged from log<sub>10</sub> 3.0-3.9 cfu/100 ml, and faecal coli form (Escherichia coli) count ranged from log<sub>10</sub> 1.5-2.5 cfu/100 ml.

### 4.0 Conclusion:

The present study is clearly indicates that the source of water of kapildhara kavanai tirth is polluted to the great extent due to various human activities like bathing and Agricultural runoff. The presence of any such contaminants in water may pose serious health hazard. Visitors need to aware about it. Drinking of such polluted water need to minimize till it purifies at certain extent. Minimizing human activities which cause pollution may help in keeping the clean water of kapildhara kavanai tirth.

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