Assessment of Microbiological quality by coliform estimation in drinking water sources of Mathura region

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A total of 100 water samples from various sources of drinking water namely municipal tap water (n = 20), packaged drinking water of different brands (n = 20), underground water (hand pump and submersible water) (n = 40) and stored water (Public places like hospitals, railway station & bus stand etc.)(n = 20) were collected from different areas of Mathura, Uttar Pradesh and estimation of coliform bacilli was carried out in a water supply by multiple tube technique. Of 100 water samples, 20 had no coliforms, whereas remaining 80 (80%) had coliforms ranging from 1 to >1600/100 ml of water. Most of the positive samples had coliform count ranging between 1-10 (21%), < 50 (18%) and > 1600 (28%). Only 13 (13%) of the samples had coliform count ranging between 50-1600. The poor microbial quality of drinking water samples, as revealed in this study is a matter of public health concern.

Keywords: Assessment, Microbiological quality, Drinking water, Coliform, Mathura

INTRODUCTION:

The importance of good drinking water in maintaining health was recognised early in human history, with water storage and treatment mentioned in historical records dating back to at least several hundreds years B.C.. Pathogens which are likely to be spread through water are members of *Enterobacteriaceae* and *Vibrionaceae*. But some other bacteria are *Salmonella spp., E.coli, Vibrio cholerae, Aeromonas spp*. are also transmitted through water (Gugnani, 1999). Microbiological indicators have been used to determine or indicate the safety of water for drinking. Bacteria of coliform group are considered the primary indicators of faecal contamination and most frequently applied. (Raina *et al.,* 1999). Estimation of coliforms helps in determining the faecal contamination of water and probably the presence of intestinal pathogens.

MATERIALS AND METHODS:

A total of 100 water samples from various sources of drinking water namely municipal tap water (n = 20), packaged drinking water of different brands (n = 20), underground water (hand pump & submersible water) (n = 40) and stored water (Public places like hospitals, railway station & bus stand etc.) (n = 20) were collected from different areas of Mathura, Uttar Pradesh and processing for coliform estimation was done by method of Cruickshank *et al.*, 1975.

RESULTS AND DISCUSSION:

Of 100 water samples from different drinking water sources, the 20 samples were found negative for total coliforms (MPN/100 ml), whereas remaining 80(80%) had coliforms ranging from 1 to ≥1600/100ml of water (table-1). Most of the positive samples had coliform count ranging between 1-10(21%), <50 (18%) and >1600(28%). Only 13(13%) of the samples had coliforms count ranging between 50-1600. Source wise results showed that in tap water source, out of 20, only 6(30%) did not reveal coliforms. In stored water, 18(90%) of 20 samples had coliform count of > 1600/100ml water and only one sample was negative for coliforms. In stored water 20% samples were found negative for total coliforms and 9(22.5%) had coliform count of >1600/100ml. Only packaged drinking water source was found good source having 12(60%) of 20 samples negative for total coliforms. Similar findings for different drinking water sources like unsatisfactory microbiological quality

for drinking water was reported by Lippy and Waltrip, 1984, Craun, 1985, Rahman *et al.,* 1996, for packaged drinking water by Hunter and Burge, 1987, Ogan, 1992, Dainik Jagran News Paper, 2002, in stored water sources (water coolers) 18 of 120 samples (15%) was observed by Joshi ,N., 2007. Water samples was also found unsatisfactory quality in all sources similar to present study by Abraha, 2000.

Table-.1 Total coliforms (MPN/100ml) in drinking water samples from different sources (%).

S.No.	Sources	<1(0)	1-10	>10- <50	50-100	>100-550	>550-1600	>1600(1800)
1.	Tap water (n=20)	6(30)	4(20)	6(30)	1(5)	1(5)	1(5)	1(5)
2.	Stored water (n=20)	1(5)	-	1(5)	-	-	-	18(90)
3.	Underground water (n=40)	8(20)	10(25)	4(10)	1(2.5)	4(10)	4(10)	9(22.5)
4.	Packaged water (n=20)	5(25)	7(35)	7(35)	1(5)	-	-	-
	Total (n=100)	**20(20)**	**21(21)**	**18(18)**	**3(3)**	**5(5)**	**5(5)**	**28(28)**

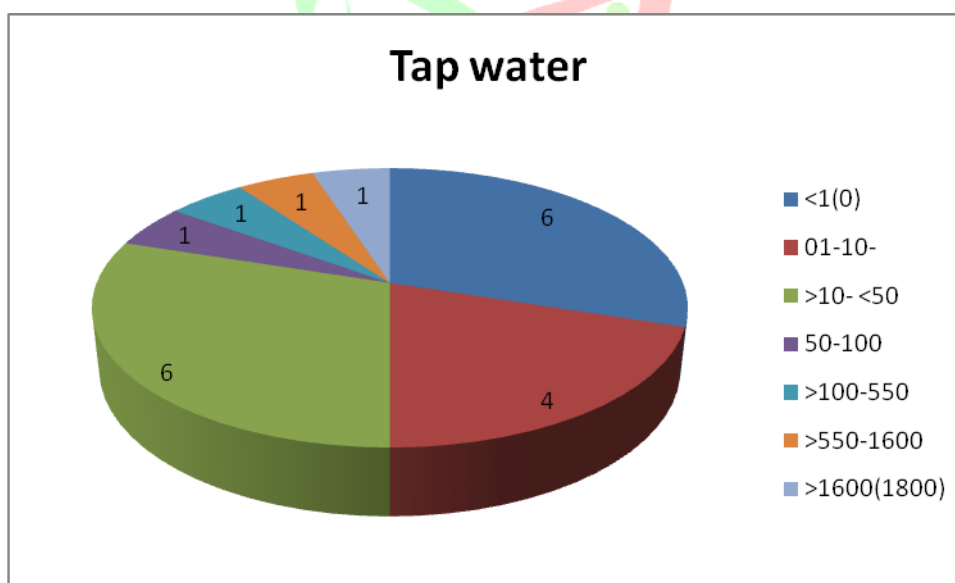**Figures in parenthesis indicate percentage**

Fig1: Pie diagram showing number of tap water samples comes under different ranges of total coliforms.
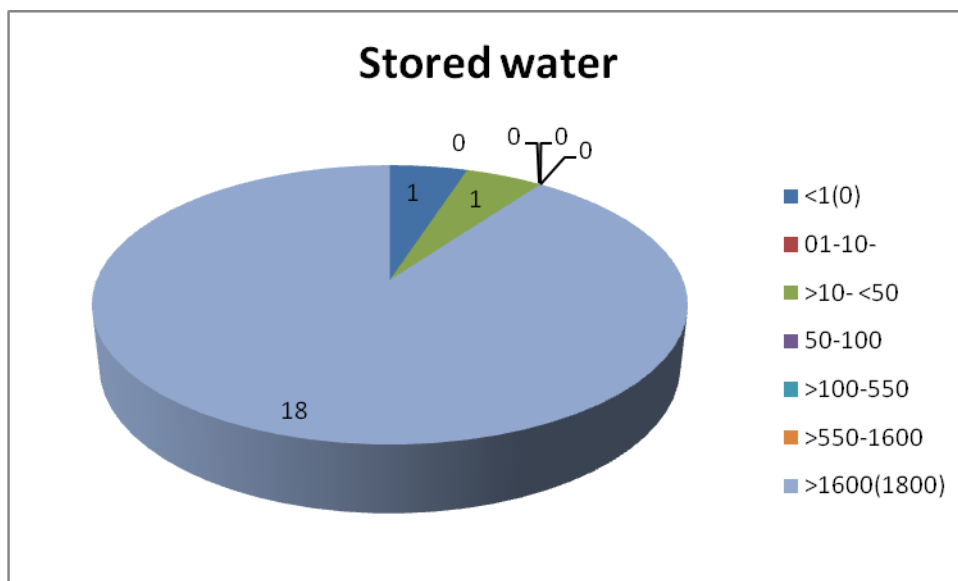
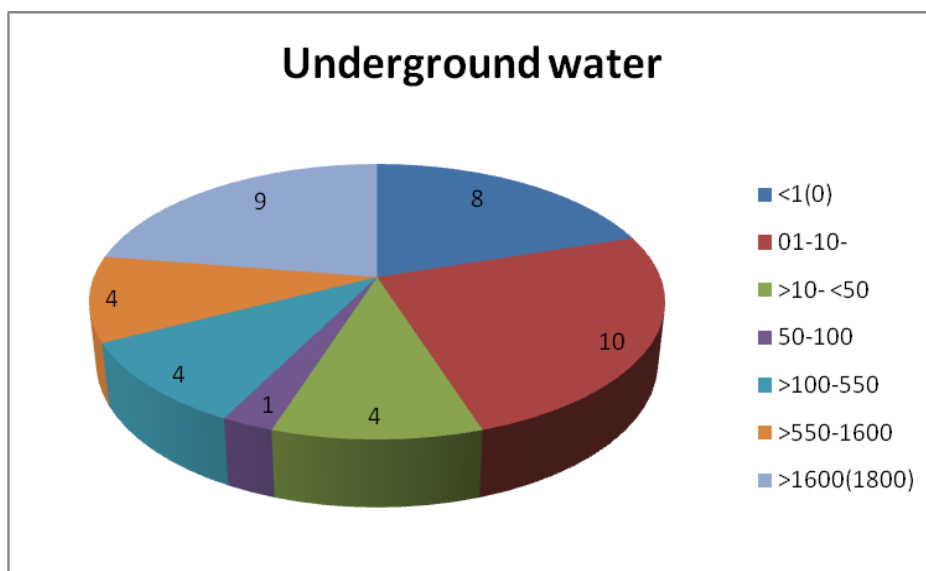**Fig2:** Pie diagram showing number of stored water samples comes under different ranges of total coliforms.

Fig3: Pie diagram showing number of underground water samples comes under different ranges of total coliforms.
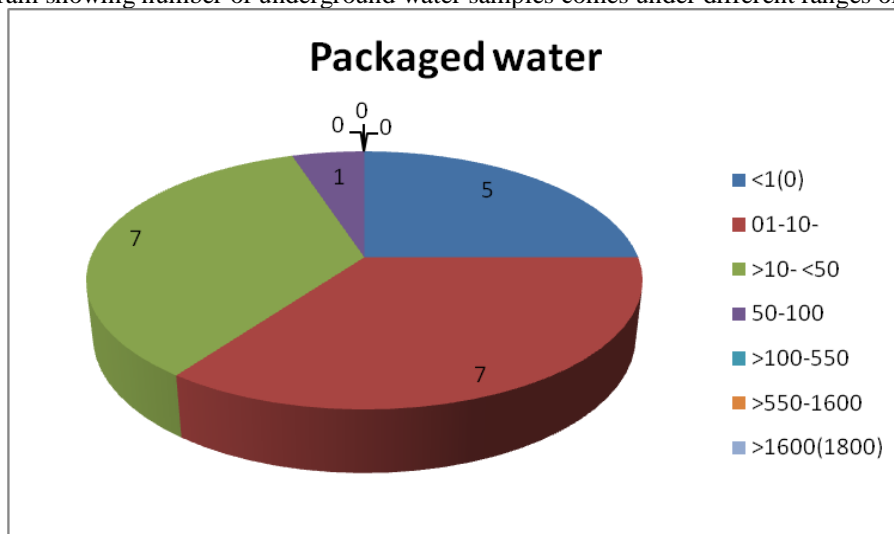

Fig4: Pie diagram showing number of packaged water samples comes under different ranges of total coliforms.

CONCLUSIONS:

The poor microbial quality of drinking water samples, as revealed in this study viz. high percentage of coliforms (95.0% in stored water) in different drinking water sources, is a matter of public health concern. Higher presence of coliforms in stored water indicates poor handling and unhygienic conditions.

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