

# Analysis of Bacteriological Parameters of Public-Water Supply In Daryapur And Anjangaon Tahshil And Calculate Percentage Of Contaminated Water in 2017-18

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**Abstract-** A total of 3028 drinking water samples have been amassed aseptically in sterilized field from different public water resources in Daryapur and Anjangaon tahshil. Over a period of twelve month April 2017 to March 2018. Most probable number (MPN) check turned into completed to locate the coliforms in consuming water samples. The MPN number became very high ( $\geq 180$ ) of fantastic water samples. And evaluate the odds of contamination in every month for the duration of take a look at and calculate the percentages of infection of water pattern.

**Key Words:** Drinking water sample, MPN count, Coliforms, Public.

## INTRODUCTION

Water is one of the maximum essential and plentiful compounds of the atmosphere. All living organisms on the earth need water for their survival and boom. The safety of drinking water is an ongoing concern within the global village. Traditionally, the safety of potable water supplies has been controlled by disinfection, usually by chlorination and coliform population estimates. However, it has been reported that coliform-free potable water may not necessarily be free of pathogens [1]. Although water is vital for life, it also serves as the commonest route of transmission of a number of infectious diseases. Thus, water quality must be ensured before drinking and the water we drink must be safe. Safe drinking water is defined as water with microbial, chemical and physical characteristics that meet WHO guidelines of national standards on drinking water quality [2]. The use of these unsanitary sources helps to explain why 90% of human infections in less developed countries are caused by water borne diseases [3]. But due to increased human population, industrialization, use of fertilizers in the agriculture and man-made activity it is highly polluted with different harmful contaminants. Therefore it is necessary that the quality of drinking water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. It is difficult to understand the biological phenomenon fully because the chemistry of water reveals much about the metabolism of the ecosystem and explain the general hydro relationship [4].

The micro-organisms in water are capable of causing various diseases like typhoid, cholera, diarrhea, dysentery, hepatitis etc. According to WHO [5], unsafe water supply is a major problem and fecal contamination of water sources and treated water is a persistent problem worldwide. Globally, 1.1 billion people rely on unsafe drinking water sources from lakes, rivers and open wells. The majority of these are in Asia (20%) and Sub-Saharan Africa (42%) [6-7]. Nearly 90% of diarrheal-related deaths have been attributed to unsafe or inadequate water supplies and sanitation (WHO, 2004) conditions affecting a large part of the world's population [8]. An estimated 1.1 billion persons (one sixth of the world's population) lack access to clean water and 2.6 billion to adequate sanitation [9-8]. Water also supports all forms of life and affects our health, lifestyle, and economic well being [10]. Good Quality of Drinking water is very necessary for improving the life of people and to prevent from diseases [11].

Total coliforms (TC) were used as an indicator of drinking water since the early 1900s and are commonly used in testing waste water. However, new research has shown that total coliforms are not useful as an indicator of fecal contamination in drinking water, and they have no sanitary or public health significance [12]. Originally, total coliforms included four groups of bacteria: *Escherichia*, *Klebsiella*, *Enterobacter* and *Citrobacter*. These four groups are found in the feces of warm-blooded animals, including humans.

However, recent scientific evidence has shown that total coliforms actually include a much broader group of bacteria than the four original groups. In fact, to date there are now 19 recognized groups of bacteria that fall under total coliforms, of which only ten of these groups have actually been associated with feces [13].

This paper essentially focused on Calculate percentage of bacteriological analysis of portable water resources from Shahanoor Dam in Anjangaon tahshil, Amravati district, Maharashtra

## MATERIALS AND METHODS

### Examine region

Shahanoor dam (8 km): this dam is constructed using soil and has a hydroelectricity era task and water deliver undertaking for nearly 156 villages and a pair of cities based totally on gravitation with out the usage of energy. the dam is placed inside the north of the town in the degrees of satpuda. but local and popular name is " Shahanoor lake / Shahanoor talav ". Shahanoor dam become constructed as parts of irrigation initiatives by means of the authorities of Maharashtra in the year 1990. it is built on and impounds Shahanoor river. nearest city to dam is Anjangaon surji in Amravati district of Maharashtra. the dam is an earth fill dam. the purpose of the dam is irrigation, consuming / water deliver, hydroelectric the duration of dam is 828 m (2716.54 ft), while the peak of the dam above lowest basis is 57.81 m (189.6653 toes). the task has ogee form of spillway. period of the spillway is 63 m (206.693 ft). the spillway has radial sort of spillway gates. the dam's catchment area is 13.919 thousand hectares. maximum / gross storage potential is 47.85 mcm. live storage capability is 46.04 mcm sample analysis.

In the present study, 200ml water samples had been amassed from authorities hand pump, water cooler and mjp tap assets of shahanoor dam i.e. water tank, and tap water connection, once in a month for a length of twelve months from april 2017 to march 2018, in white glass bottles, which had been formerly rinsed with distilled water and sterilized in oven at the temperature of one hundred sixty °c for 45 min. at the gathering factor, the bins have been rinsed thrice with the sample water before being used to accumulate the samples. the accumulated samples have been placed in a thermocol box. the temperature within the field turned into maintained at 4°C by means of the use of ice packs. labeled and transported to the laboratory for bacteriological evaluation.

### Bacteriological analysis:

Bacteriological analysis of drinking water by MPN method.

To identify the bacteria present in the drinking water sample. To enumerate the number of bacteria present in the drinking water by MPN method. Color change is absent in those receiving an inoculum of water without indicator bacteria. The media receiving one or more indicator bacteria show growth and a characteristic color change. In this method, measured volumes of water are added to a series of tube containing a liquid indicator growth medium. Most probable number (MPN) analysis is a statistical method based on the random dispersion of microorganisms per volume in a given sample.

MPN test is completed in three steps: ---- Presumptive test ---- Confirmed test ---- Completed test. from the number and distribution of positive and negative reactions, the MPN of indicator organisms.

### Presumptive test:

1. Take 1 tube of single strength (50ml) and 5 tubes of double strength (10ml) for each water sample to be tested.
2. Using a sterile pipette add 50 ml of water to the tubes containing 50 ml single strength medium.
3. Similarly add 10 ml of water to 5 tubes containing 10 ml double strength medium Incubate the tubes at 37°C for 24 hrs. If no tubes appear positive re-incubate up to 48 hrs.
4. Compare the number of tube giving positive reaction to a standard chart and record the number of bacteria present in it. the MPN of coliform in 100 ml water sample was been estimated [14].

### Confirmed Test:

1. MacConkey broth may be used for primary fermentation in presumptive test to avoid false positive results.
2. Brilliant green lactose bile broth fermentation tubes are used in confirmed test.
3. Submit all primary fermentation tubes showing any amount of gas at the end of 24 hrs incubation to the confirmed test.

4. Gently shake primary fermentation tube showing gas formation and with a sterile metal loop, transfer one loop full of medium to a fermentation tube containing brilliant green lactose bile broth.
5. Incubate the inoculated brilliant green lactose bile broth tube for  $48 \pm 3$  hrs at  $45 \pm 0.5^\circ\text{C}$ .
6. The formation of gas in any amount in the inverted vial of the brilliant green lactose bile broth fermentation tube at any time within  $48 \pm 3$  hrs constitutes a positive confirmed test.
7. If no gas is formed, it is a negative confirmed test and E.coli is absent.

### Completed Test:

Completed test is the next step following the confirmed test. It is applied to the brilliant green lactose bile broth fermentation tubes showing gas in the confirmed test.

1. Streak one on Eosin Methylene Blue (EMB) agar plates (taken in Petri dishes) from each tube of brilliant green lactose bile broth showing gas.
2. While streaking it is essential to ensure the presence of some discrete colonies separated by at least 0.5 cm from one another.
3. Insert the end of the streaking needle into the liquid in the tube to a depth of 5mm.
4. Streak the plate by bringing only the curved section of the needle in contact with the agar surface so that the latter will not be scratched or torn.
5. Incubate the Petri dishes (inverted) at  $35 \pm 0.5^\circ\text{C}$  for  $24 \pm 2$  hrs.
6. The colonies developing on endo or eosin methylene blue agar may be typical (unnuclated, with or without metallic sheen) atypical (opaque, unnuclated, mucoid, pink after incubation for 24 hrs) or negative (all others).
7. From each of these plates fish out one or two colonies and transfer to MacConkey broth fermentation tubes and to nutrient agar slants.
8. Incubate the secondary broth tubes and agar slants at  $35 \pm 0.5^\circ\text{C}$  for  $24 \pm 2$  hrs or  $48 \pm 3$  hrs and if gas is not produced in 24 hrs gram stained preparation from these agar slant cultures are made.
9. The gas formation in the secondary MacConkey broth tubes and the demonstration of gram negative non-spore forming rod shaped bacteria in agar culture may be considered a satisfactory positive completed test.
10. If after  $48 \pm 3$  hrs gas is produced in the secondary fermentation tubes and no spore of gram positive rod are found on the slant, the test may be considered as positive completed test and this demonstrates the presence of coliform organisms.

Reading the Confirmed Test -- After incubation, check the tubes for the presence of gas in the inverted tube. Record your results as before. Discard the used BGLB tubes as directed.

### Data Analysis

#### MPN Test:

Estimate the number of coli form organisms in your sample by looking up the correct combination of positive tubes and noting Most Probable Number (MPN) and the lower and upper limits of the 95 % confidence interval. If you cannot find your configuration of positive tubes in the table, you have a combination that is statistically unlikely. You can estimate your MPN value using Thomas' formula:

#### b) Thomas equation

The Thomas equation can also be used using following equation

$$\text{MPN}/100 \text{ mL} = \frac{\text{Number of Positive tubes} \times 100}{\sqrt{(\text{mL of sample in negative tubes}) \times (\text{mL of sample in all tubes})}}$$

### RESULT

During the study a total of 3028 water samples was collected from Maharashtra jivan pradhikaran tap water, Government hand pump, public bower well and public dug well of Daryapur and Anjangaon tahshil and containing villages for a period of one year i.e., during

April 2017 to March 2018 was analyzed bacteriological characteristics. For total coliforms most probable number (MPN/100ml). The bacteriological analysis of water determines the portability of water according to Indian standard [15]. Throughout the year 92.64 of samples was not contain any coliform organisms or should not be detectable in 100 ml of any two consecutive samples and no sample contains *E. coli* in 100ml. The tube and plates were incubated at 37°C for 24 to 48 hrs. Gas and turbidity in the tubes were shown the metallic sheen or pink color of colonies with dark centre on EMB agar found positive. All isolates that produced gas at 37°C, were found Gram negative, non spore forming and rod-shaped belonging to fecal coliform group. All water samples using the tryptone broth enrichment (TBe) and high temperature (37°C) incubation methods, followed by plating for isolation on EMB agar. In collecting water the maximum contamination was recorded in April -017, jully- 017, sep-017, nov-017, feb-018 contamination that is 20 out of 203, 19 out of 217, 36 out of 278, 29 out of 306 and 22 out of 242 and minimum cont contamination (which is below 8%) was recorded in May-017 and jun-017, aug-17, oct-017, and jan-018 Contamination that was 11 out of 156, 23 out of 290, 13 out of 263, 23 out of 297, 11 out of 239. Very lowest Percentage of contamination (which is below 4%) was recorded in Dec-017, March-018, Contamination that was 11 out of 316 and 5 out of 221. Collected Sample and their detail given by in following table.

Month	Daryapur	Fit	Unfit	Anjangaon	Fit	Unfit	Total	Unfit Ratio Percentage
Apr-17	173	153	20	30	30	0	203	9.85%
May-17	138	136	2	18	9	9	156	7.05%
Jun-17	133	127	6	157	140	17	290	7.93%
jully-17	203	189	14	14	9	5	217	8.75%
Aug-17	167	156	11	96	94	2	263	4.94%
Sep-17	163	147	16	115	95	20	278	12.94%
Oct-17	181	170	11	116	104	12	297	7.74%
Nov-17	192	177	15	114	100	14	306	9.47%
Dec-17	163	158	5	153	147	6	316	3.48%
Jan-18	141	139	2	98	89	9	239	4.60%
Feb-18	168	146	22	74	74	0	242	9.09%
Mar-18	143	140	3	78	76	2	221	2.26%
Total	1965	1838	127	1063	967	96	3028	7.36%

**Table no1- Collected water sample**

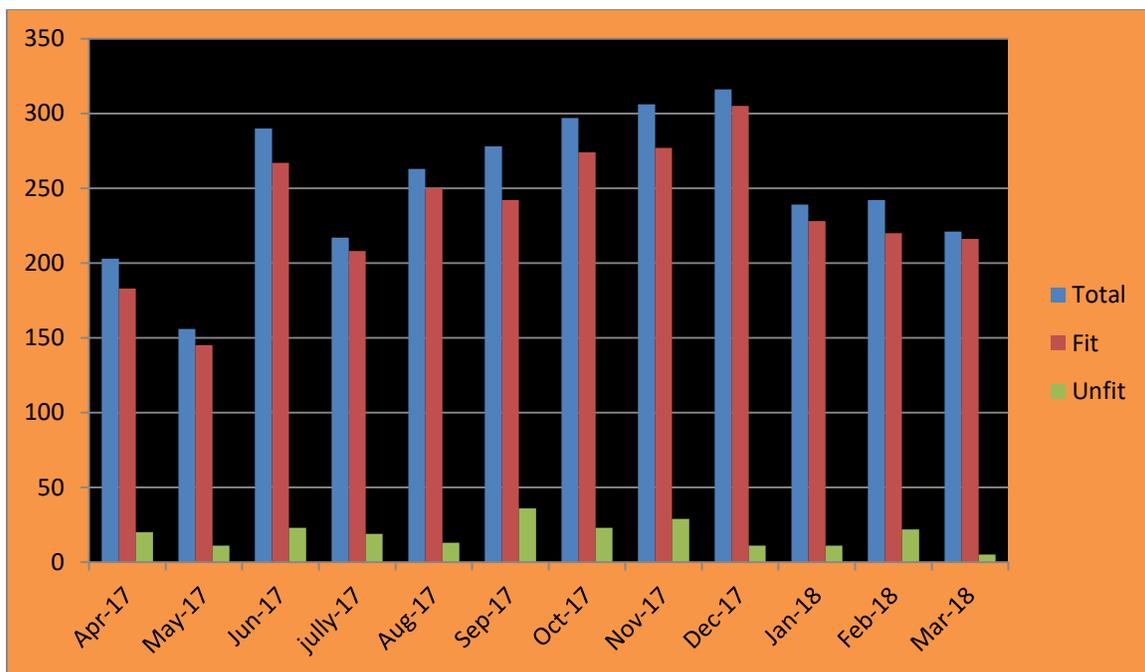


Fig 1- Graph show comparison between tested sample, fit sample and unfit sample

## DISCUSSION

A good deal of the ill health which impacts humanity, specifically in developing nations can be traced to loss of safe and whole water deliver. There may be no kingdom of superb fitness and properly being with out secure water. on the grounds that water is vital for our existence we count on it to be clean and safe. Even water that looks clean won't necessarily be safe or desirable. The water intended for human consumption should be freed from pathogenic for domestic purposes for the reason that water is the maximum crucial ability source of infectious illnesses so water purification is the maximum critical ability available for making sure public fitness. The intake of consuming water contaminated with pathogenic microbes of faecal starting place is a sizable risk to human fitness. This examine has offered microbiological evaluation of water samples taken from distinctive residential region Maharashtra jivan pradhikaran faucet water ( sahanoor dam), government hand pump, public bower nicely and public dug nicely from Daryapur and Anjangaon tahshil and containing villages for a duration of 365 days i.e., all through April 2017 to March 2018. [16] for bacteriological evaluation of consuming water of hand pumps in numerous faculties of Peshawar town. They stated that only 8% samples have been found unfastened from bacterial infection whilst closing 92% samples have been tremendous for bacterial infection and not worthy for drinking however in my examine found 92.64% samples had been discovered loose from bacterial infection at the same time as remaining 7.36% samples had been high quality for bacterial contamination.

This study highlighted a how many chances of infected water observed in Daryapur and Anjangaon tahshil and containing villages in 12 months (2017-2018) and while growth the infection have danger increase disease so water get chlorinated for wholesome potable water for all and keep away from contamination. The results of consuming contaminated water outcomes in hundreds of deaths each day, usually in children underneath five years, in growing nations [7]. In addition, sicknesses triggered through. Over three million deaths in step with yr are attributed to water-bone diarrheal diseases, specifically amongst babies and younger children in poor groups [17].

## CONCLUSION

This observe concluded that, 3028 total drinking water samples taken From public assets in Daryapur and Anjangaon tahshil out of these 92.64 % water free from bacteria and 7.36% water pattern contaminated, hence right here probabilities of contamination is much less compared to probabilities of transportable water and probabilities of diseases fee related to chances of contamination water. present take a look at consequences had shown that ordinarily bacteriological parameters of drinking water were found above the permissible limits of WHO. Presence of E. coli indicates that consuming water is fecally polluted. the main purpose of problem is old water distribution network, leakage in pipeline, awful sanitary circumstance and improper management of waste disposal. The negative sanitary condition in Daryapur and Anjangaon tahshil is in particular answerable for this change in water high-quality, due to

the fact old pipes and leakages in pipes provide manner to waste water and other pollutant contaminates the drinking water and alters their great. furthermore, greater consciousness is wanted about the way to avoid the microbial infection in drinking water.

#### ACKNOWLEDGEMENT:

The authors are truly thankful to the group of workers of sub division laboratory Daryapur for assisting my work, The authors also are thankful to my husband for his ethical aid and hints inside the guidance of the paper. The authors are grateful to the Editor-in-leader for his or her encouragement and help

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