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MICROBIOLOGICAL ANALYSIS OF DRINKING WATER IN AND AROUND THE VILLAGES OF NARSAPUR, W.G.DT.

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INTRODUCTION

The drinking water of most communities and municipalities is obtained from surface sources-rivers, streams and lakes. Such natural water supplies, particularly streams and rivers are likely to pollute with domestic and industrial wastes. Municipal water purification system has been very effective in protecting the inhabitants, as population centre's grow, pollution problems became more serious, a greater quality of water is required and used water must be disposed of generally by returning it to a natural body of water in vicinity which in turn may be the supply source of another community or municipality.

As a potential carrier of pathogenic microorganisms, water can endanger health and life. The pathogens most frequently transmitted through water are those which cause infections of the intestinal tract; namely typhoid, paratyphoid bacteria, dysentery (bacillary and amoebic), cholera bacteria and enteric viruses. The causative organisms of these diseases are present in the faces and urine of an infected person and when discharged may gain entrance into a body of water that ultimately serves as a source of drinking water.

To determine the portability of water, quantitative bacteriological examination may be under taken. However, there is no simple test or even combination of tests theoretically, it would be better to examine water for the presence of specific pathogenic microorganisms. The objective of the project is to check the microbial contamination of drinking water supplied for house hold. Water can be perfectly clear in appearance, free from peculiarities of odor and taste and yet be contaminated by microorganisms. It is always important to check the microbial contamination of drinking water supplied to us which can only be done by collecting samples, processing, culturing, observing and identifying them.

Materials and Methods

- ✓ The methods are expensive, tedious and slow by that time the water has already been consumed.
- ✓ The number of pathogenic organisms quite small compared to nonpathogenic organisms quiet and would be overlooked.
- ✓ Nonpathogenic organisms may interfere with the examination of pathogens.

General materials

Equipment: Hot air oven, Autoclave, Laminar air flow, Incubator, pH Meter, Weighing balance, Refrigerator, Microscope
Glass ware: Petri plates, Beakers, Pipettes, Test tubes, conical flasks, Measuring cylinders, Glass rod, Spreader, Slide
Reagents: Crystal violet 'Gram's iodine, Saffranine, Decolorizing agent
Other materials: Inoculation needle, Forceps, Needles, Bunsen burner, Nonabsorbent cotton, Marker, Distilled water, Aluminum foil.

Microbial Examination of Water

The approximate determination of total number of bacterial present in the water sample. When the water samples are collected and submitted for bacteriological analysis the following precautions are to be considered.

i. The sample must be collected in a sterile bottle
ii. The sample must be representative of the supply from which it is taken
iii. Contamination of the sample must be avoided during and after sampling
iv. The sample should be tested as promptly as possible after collection
v. If there is a delay in examination of the sample it should be stored at a temperature between 0◦c and 10◦c.

Test for the presence of coli form bacteria

Water gets contaminated with pathogen through intestinal discharges of man and animals. For the more in the intestinal tract of man and animals there exists a characteristic group of organisms designated as coli forms. The coli form group of bacteria includes aerobic facultative anaerobic gram negative non spore forming bacilli, which ferment lactose with acid and produce gas within 48 hrs at 35◦c. The most common species of this group are various strains of E.coli and Enterobacter aerogenes. E.coli is commonly found in

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the intestinal tract of man and animals while E.aerogenes is normally found on plants and grains and may sometimes occur in the intestinal tract of man and animals, contamination of water with either type makes water unsatisfactory for drinking purposes.

Test for Coli forms

To detect the presence of coli forms organisms in water, a number of selective and differential media are used. The tests are performed in 3 successive steps.

1. The presumptive test.
2. The confirmatory test.
3. The completed test.

The presumptive test

A series of lactose broth, lauryl sulphate, try tone broth, fermentation tubes are inoculated with measured amounts of water and incubated at 35◦c for 24 to 48hrs. The formation of gas in the inverted vial (Durham's tubes) in the fermentation tube within 48 hrs indicates positive presumptive test. Absence of acid and gas formation at the end of 48 hrs constitutes a negative presumptive test. This means that water sample does not contain coli form and is considered safe.

Confirmative Test

Some microorganisms other than coli forms also produce acid and gas from lactose fermentation. In order to confirm the presence of coli form, a confirmatory test is done. From each of the fermentation tubes with positive results a loop full of inoculums is added to medium:

1. 3 ml lactose-broth or brilliant green lactose fermentation tube,
2. to an agar slant and
3. 3 ml tryptone water.

The inoculated lactose-broth fermentation tubes are to be incubated at 37°C and inspected for gas formation after 24 ± 2 hours. If no gas production is seen, further incubated up to a maximum of 48 ±3 hours to check gas production.

The agar slants should be incubated at 37°C for 24± 2 hours and **Gram-stained preparations** made from the slants should be examined microscopically.

The formation of gas in lactose broth and the demonstration of Gram-negative, non-spore-forming bacilli in the corresponding agar indicate the presence of **a member of the coli form group** in the sample examined.

The absence of gas formation in lactose broth or the failure to demonstrate Gram-negative, non-spore-forming bacilli in the corresponding agar slant constitutes a negative test (absence of coliforms in the tested sample).

Tryptone Water Test

1. Incubate the tryptone water at (44.5 ±0.2°C) for 18-24 hours
2. Following incubation, add approximately 0.1mL of Kovacs reagent and mix gently.
3. The **presence of in dole** is indicated by a red color in the Kovacs reagent, forming a film over the aqueous phase of the medium.
    a. Confirmatory tests positive for in dole, growth, and gas production show the presence of thermo tolerant E. coli.
    b. Growth and gas production in the absence of in dole confirm thermo tolerant coli forms.

Completed test

Since some of the positive results from the confirmatory test may be false, it is desirable to do completed tests. For this inoculum from each positive tube of the confirmatory test is streaked on a plate of EMB or Endo agar.

In this process, a loopful of a sample from each positive BGLB tube is streaked onto selective medium like **Eosin Methylene Blue agar** or Endo's medium. One plate each is incubated at 37°C and another at 44.5± 0.2°C for 24 hours.

High temperature incubation (44.5 ±0.2) is for detection of thermo tolerant E.coli.
Following incubation, all plates are examined for the presence of typical colonies.

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- Coli forms produce colonies with a greenish metallic sheen which differentiates it from non-coli form colonies (show no sheen). The presence of typical colonies on high temperature (44.5 ±0.2) indicates the presence of thermo tolerant **E.coli.**

Methods

The procedure to be used for testing relatively unpolluted water, such as treated water from waterworks, is described below.

Media Preparation

Commercially available dehydrated media simplify the preparation of culture broths and are therefore recommended for laboratory work. Various manufactur- ers produce these media as powders, which can then be easily weighed out, dissolved in distilled water, and dispensed into culture tubes before sterilization.

I) Double strength MacConkey broth preparation

COMPOSITION

- Peptic digest of animal tissue -40gm
- Lactose -20gm
- Bile salts -10gm
- Sodium chloride -10gm
- Neutral red -0.140gm
- Crystal violet -0.001gm
- Distilled water -1 ltr
- ph – 7.4+0.2

REQUIREMENTS

GLASSWARE- conical flasks, test tubes, Durham's tubes, Beaker, Measuring jar, Petri plates, spreaders etc.
MATERIALS–Weighing balance, micropipette Autoclave, Laminar Airflow (LAF), Incubator, Hot air oven.

PREPARATION

- Add 80.15gm powder to distilled water.
- Bring volume to 1ltr and mix thoroughly.
- Gently heat and bring to boiling.
- Distribute into 5 tubes containing an inverted Durham's tube.
- Autoclave at 15 lbs pressure at 121 C for 15mins.

II. Single strength MacConkey broth preparation

COMPOSITION

Gelatin peptone -20gms
Lactose monohydrate-10gms
Dehydrated bile-5gms
Bromo cresol purple-0.010gms
Distilled water-1lit
pH -7.4+ 0.2

REQUIREMENTS

GLASSWARE- conical flasks, test tubes, Durham's tubes, Beaker, Measuring jar, Petri plates, spreaders etc.
MATERIALS–Weighing balance, micropipette Autoclave, Laminar Airflow (LAF), Incubator, Hot air oven.

PREPARATION

- Add 80.15gm powder to distilled water.
- Bring volume to 1ltr and mix thoroughly.
- Gently heat and bring to boiling.
- Distribute into 10 tubes containing an inverted Durham's tube.
- Autoclave at 15 lbs pressure at 121 C for 15mins.

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III. Brilliant green bile broth preparation

COMPOSITION

Peptone-10gms
Lactose-10 gms
Oxgall-20gms
Brilliant green-0.0133gms
Distilled water-1lit
pH-7.2+0.2

REQUIREMENTS

GLASSWARE- conical flasks, test tubes, Durham's tubes, Beaker, Measuring jar, Petri plates, spreaders etc.
MATERIALS–Weighing balance, micropipette Autoclave, Laminar Airflow (LAF), Incubator, Hot air oven.

PREPERATION

- Dissolve peptone and lactose in 500ml distilled water.
- Add 20gms dehydrated ox gall dissolved in 200ml distilled water. The pH of the solution should be 7.0-7.5.
- Mix and add water to make 975ml. Adjust pH to 7.4.
- Add 13.3ml of 0.1% aqueous brilliant green in distilled water. Add distilled water to make 1lit.
- Dispense into fermentation tubes, making certain that fluid level covers inverted vials.
- Autoclave 15 mins at 121C. Final pH 7.2+0.2.

IV. Dispensing media into Test tubes

This set up is used for single water sample only

1. 10 ml of double strength MacConkey broth media is dispensed along with a Durham's tube into 5 separate test tubes and plugged with nonabsorbent cotton.
2. 10 ml of single strength MacConkey broth media is dispensed along with Durham's tube into 5 separate test tubes and plugged with nonabsorbent cotton, similarly one more 5 tubes with single strength media is prepared.
3. All the 15 test tubes are then autoclaved at 121 C for 15 minutes and cooled to room temperature before sample inoculation.

Determination of MPN

The following example shows how the results are obtained.
Suppose that, after confirmation of the presence of thermotolerant (faecal) coliforms, the following results are obtained:

- 5 positive tubes in row F1 (sample volume inoculated, 10 ml)
- 3 positive tubes in row F2 (sample volume inoculated, 1 ml)
- 1 positive tube in row F3 (sample volume inoculated, 0.1 ml).

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MPN Full table

MPN VALUES PER 100ml OF SAMPLE AND 95% CONFIDENCE LIMITS FOR VARIOUS COMBINATIONS OF POSITIVE AND NEGATIVE RESULTS (When five 10ml, five 1ml, five 0.1ml test portions are used)

No. Of Tubes Giving Positive Reaction out of:			MPN Index per	95% Confidence Limits:	
5 of 10 ml	5 of 1 ml	5 of 0.1 ml	100 ml:	Lower	Upper
0	0	0	<2	-	-
0	0	1	2	<0.5	7
0	1	0	2	<0.5	7
0	2	0	4	<0.5	11
1	0	0	2	<0.5	7
1	0	1	4	<0.5	11
1	1	0	4	<0.5	11
1	1	1	6	<0.5	15
1	2	0	6	<0.5	15
2	0	0	5	<0.5	13
2	0	1	7	1	17
2	1	0	7	1	17
2	1	1	9	2	21
2	2	0	9	2	21
2	3	0	12	3	28
3	0	0	8	3	24
3	0	1	11	4	29
3	1	0	11	4	29
3	1	1	14	6	35
3	2	0	14	6	35
3	2	1	17	7	40
4	0	0	13	5	38
4	0	1	17	7	45
4	1	0	17	7	46
4	1	1	21	9	55
4	1	2	26	12	63
4	2	0	22	9	56
4	2	1	26	9	78
4	3	0	27	9	80
4	3	1	33	11	93
4	4	0	34	12	93
5	0	0	23	7	70
5	0	1	31	11	89
5	0	2	43	15	110
5	1	0	33	11	93
5	1	1	46	16	120
5	1	2	63	21	150
5	2	0	49	17	130
5	2	1	70	23	170
5	2	2	94	28	220
5	3	0	79	25	190
5	3	1	110	31	250
5	3	2	140	37	340
5	3	3	180	44	500
5	4	0	130	35	300
5	4	1	170	43	490
5	4	2	220	57	700
5	4	3	280	90	850
5	4	4	350	120	1000
5	5	0	240	68	750
5	5	1	350	120	1000
5	5	2	540	180	1400
5	5	3	920	300	3200
5	5	4	1600	640	5800
5	5	5	≥1600	-	-

Most Probable Number Index and 95 % Confidence Limits for Five Tube, Three Dilution Series

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IMVIC REACTIONS

Bacteria are normally referred to as fecal and non- fecal contaminants of water respectively and are the most important organisms of coli forms groups. Since they closely resemble each other in their morphology and cultural characteristics. Bio-chemical test are performed to differentiate them. These tests are collectively designated as the IMVIC reactions. The name was coined by part from the first of the form test namely in dole production test, methyl red test, voges proskauer and citrate utilization test. There are 24 possible combinations of positive and negative test of 3,4 characteristics most of three combinations have been found but the reaction of enterobacter are commonly found.

BIO- CHEMICAL CHARACTERISTICS:

In dole, methyl red, voges proskauer and citrate utilization test are both positive and negative reactions.

In dole test

Test organism is cultured in a medium, which contain traptophan. In dole production is detected by Kovac's reagent or Ehrlich 's reagent which contain 4(p) – die methyl amino benzaldehyde. This reacts with in dole to produce red colored compound.

In the following method the use of the combined motility in dole area (mu) is described. A Kovac's reagent paper strips inserted the neck of the tube and in dole production is indicated by a reddening strip. In dole is a volatile substance. the tube must be well Stoppard during incubation. The indole can also be performed by culturing tryptophan and detecting in dole production by adding Kovac's reagent to an 18-24 hrs culture.

Tryptophan – 30 grams
Potassium die hydrogen phosphate – 1gram
Sodium chloride – 5 grams
Agar -4 grams
Phenol red – 25 grams /liter
Distilled water -1liter

METHYL RED TEST

The methyl red test is employed to detect the production of sufficient acid during the fermentation of glucose and the maintance of conditions such that of the ph of an old culture in the sustained below 4.5 as shown by a change in color of the methyl red indicator which is added at the end of incubation

Glucose phosphate peptone water

Peptone – 5gms
Di Potassium hydrogen phosphate – 5gram
water -1liter
Glucose (10 % solution) – 50 ml
Methyl red indicator solution:
Methyl red – 0.1 gm
Ethanol – 300 ml
Distilled water -200 ml

Inoculate the liquid medium lightly from a young agar slope culture and incubate at 37 o c for 48 hrs. Add about fine drops of the methyl red reagent mix and read immediately.

Positive tests are bright red
Negative tests are yellow color.

Voges-Proskauer test

The test organism is cultured in glucose phosphate peptone water for 48hrs.sodium hydroxide and a small amount of creatine are then added under alkaline conditions and expose to the air. The action produced from the fermentation of glucose is oxidized to diacetyl which forms a pink. Compound with creative.

Glucose phosphate peptone water

Peptone – 0.5gms
Di Potassium hydrogen phosphate – 0.5gram
Glucose – 0.5gms
Distilled water -100 ml
Sodium chloride -400 gms

1) Incolate 2ml of sterile glucose phosphate peptone water with the test organism. Incubate at 35-37°c for 48hrs.
2) Add very small amount of creatinine and mix.

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3) Add about 3ml of NaoH reagent and shake well.
4) Remove the cotton plug and leave for 1hr at room temperature look for slow development of a pink red colour.

Pink red colour – positive test –acetoin produced
No pink red colour –negative test – no acetoin produced.

Citrate test

In the absence of the glucose some microorganisms use citrate as carbon source, citrate is acted on by the enzyme citrase, which produce oxalo acetate and acetic acid. These are again converted to pyruvate and co2 enzymatic ally which reacts with sodium carbonate changes bromothymol blue indicator from green to blue color.

Kosers citrate medium

Oxoid dehydrated medium gms/lt.
Sodium ammonium phosphate -1.5
Potassium dehydrogenate phosphate -1.0
Magnesium sulphate-0.2
Sodium citrate -2.5
Bromo thymol blue-0.016

1) Using a sterile loop inoculate 3.4ml of sterile koshers citrate medium using a broth culture of test organism.
2) Incubate the inoculated broth at 35-37^0 for up to 4 days checking daily for growth.

Turbidity and blue color –positive test-citrate utilized
No growth- negative test

Staining

Gram's staining

This is a differential staining used to differentiate two groups of bacteria, gram positive and gram negative based on the cell wall composition. A clean grease free slide was taken and one cm^2 area was marked on it. A drop of distilled water is added on the slide. A smear was prepared with loopful culture was air –dried and heat fixed and flooded with crystal violet and left for two minutes. Then iodine was added on the slide. This was washed under tap water. The smear was washed with alcohol until the blue colour stops running down. It was washed with tap water and was counter stained with saffranine and washed after 1 min. Air dried and observed under oil immersion microscope.

Reagents: Crystal violet
Gram's iodine
Saffranine
Decolorizing agent 70% Alcohol

FLOW CHART OF GRAM'S STAINING

Preparation of smear
↓
Heat fix
↓
Flood with crystal violet
↓
wait for 2 min
↓
water wash
↓
Flood with Gram's iodine
↓
Wait for 2 min
↓
Wash with ethanol
↓
Flood with counter stain saffranine
↓
Wait for 2 min
↓
Water wash
↓
Air dry
↓
Observe under oil immersion microscope
1000X magnification

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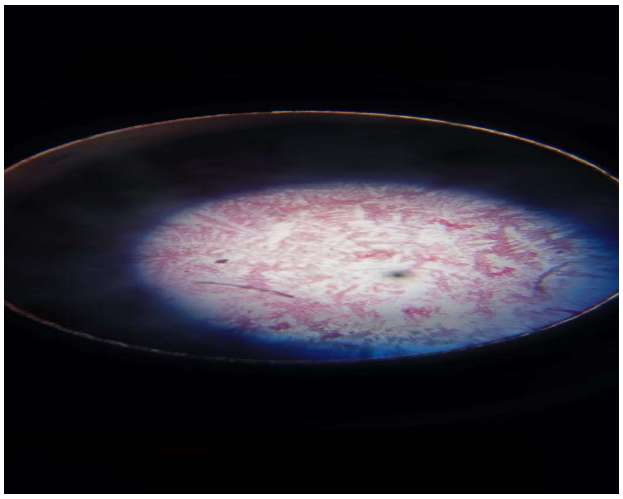

Observations

MPN TEST FOR POSITIVE (Yellow) &
Negative (pink) reactions
PHOTOGRAPHS
(MPN TUBES- SINGLE & DOUBLE STRENGTH)

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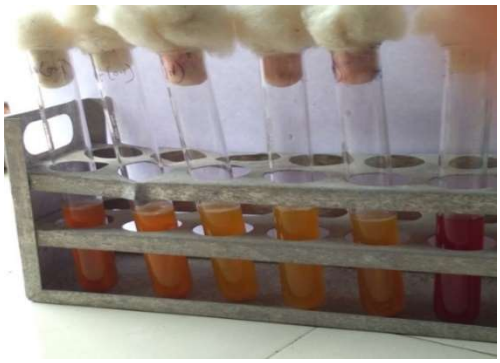

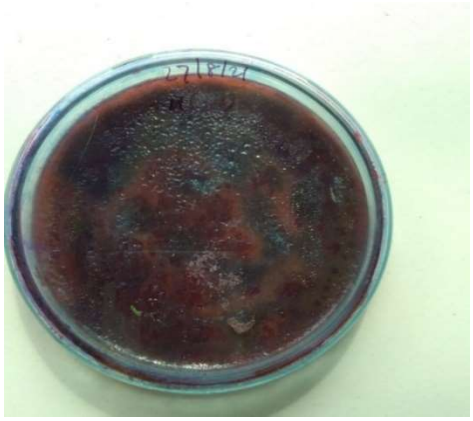

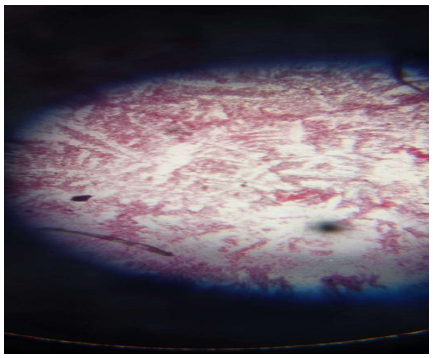

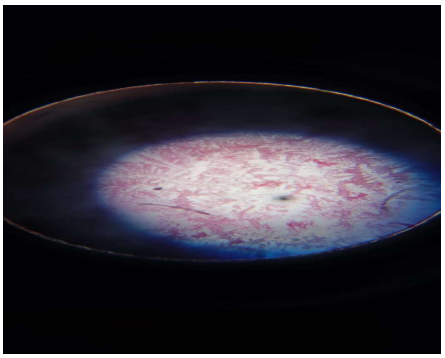

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RESULTS& DISCUSSION

Samples were collected 3- 4 times in a week from 27th July 2021 to 26th August 2021 within 24 selected areas as shown in the table.

1. Water analysis for microorganisms by MPN and IMViC tests.
2. 24 Drinking water samples collected from various places in West Godavari – Narsapur will be analysed for bacterial presence through microbial testing.
3. The MPN helps in predicting portability of water
4. The IMVIC test helps in identifying possible bacterial species.
5. 10 water samples are analyzed per week.
6. The results obtained for MPN an IMVIC are tabulated as below-

Date :27/7/2021

No of samples: 04

Sample code	10 ml	1 ml	0.1 ml	MPN INDEX
NSP-I(R)	5	4	2	220
NSP-II(kmg)	5	5	3	920
M-III	01	00	00	02
T-IV	04	04	01	38

NSP (R)- Ramalayam-220

NSP (kmg)-Kondalamma gudi-920

Date :31/7/2021

No of samples:05

Sample code	10ml	1 ml	0.1ml	MPN INDEX
SRP-(pond water)	04	03	01	31
SRP-PH	02	03	01	11
NSP-(patha bazaar)	04	02	00	25
LP	03	02	01	16
AP	03	02	01	13

Date:6/8/2021

No of samples:04

Sample code	10 ml	1 ml	0.1ml	MPN INDEX
YNC-I	01	00	00	02
NTR-II	01	01	00	04
CSR-III	02	02	00	07
KPR-IV	01	02	00	05

Date:09/8/2021

No of samples:04

Sample code	10 ml	1 ml	0.1ml	MPN INDEX
YSR-Colony	01	00	00	02
VR	02	02	00	07
LC	02	01	01	07
WH	02	03	00	11

Date :11/8/2021

No of samples: 04

Sample code	10 ml	1 ml	0.1 ml	MPN INDEX
PN	02	02	00	11
CS	00	00	01	02
MHS	02	01	01	07
MVM	03	01	00	09

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Date :12/8/2021
No of samples:04

Sample code	10ml	1 ml	0.1ml	MPN INDEX
PC	04	04	01	38
YNC	04	04	01	38
LM	05	05	03	920
GN	02	01	01	07
MVM	02	03	00	11

LM – Lakshmaneswaram = 920

Date:14/8/2021
No of samples:04

Sample code	10 ml	1 ml	0.1ml	MPN INDEX
SRN	05	04	02	220
KA	02	00	01	05
HB	05	04	04	350
RD	05	04	02	220

SRN- Sita rampuram-220
HB- Housing board-350
RD- Rusthambhad-220

Date: 16 /8/2021
No of samples:04

Sample code	10 ml	1 ml	0.1ml	MPN INDEX
PC	01	00	03	04
KC	03	00	00	07
PN	01	00	01	04
RD	01	01	02	04

MICROBIOLOGICAL ANALYSIS OF DRINKING WATER QUALITY OF VILLAGES

Sample code\ Date	MPN - index	No of bacterial colonies on EMB	Bacterial colony morphology on EMB	Gram's Nature	Indole	Methyl red	Voges-proskauer	Citrate Utilization	Possible bacterial spcs
NSP-27/7/21	220	28	pink color	Gram-ve	-ve	-ve	-ve	-ve	pseudomonas
Kmg-II	910	34	pink color	Gram-ve	-ve	+ve	-ve	-ve	Proteus
MG-III	02	03	colorless	Gram-ve	-ve	-ve	-ve	-ve	Pseudomonas
T-IV	38	10	pinkcolor	Gram-ve	-ve	+ve	-ve	+ve	Citrobacter
PH-I-31/7/21	31	06	colorless	Gram-ve	-ve	-ve	-ve	-ve	Pseudomonas
PH-II	11	04	colorless	Gram-ve	-ve	-ve	-ve	-ve	Pseudomonas
PB-III	25	05	colorless	Gram-ve	-ve	-ve	+ve	+ve	Klebsiella

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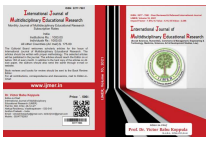
MLP-IV	16	03	colorless	Gram-ve	+ve	-	-	-	Proteus
AP-V	13	02	colorless	Gram+ve	-	-	-	-	-
SRN-14/8/21	220	46	Pink color	Gram-ve	-ve	-ve	ve	-ve	Pseudomonas
KA-14/8/21	05	13	pink color	Gram-ve	-ve	+ve	-ve	-ve	Proteus
HB-17/8/21	43	09	light pink	gram-ve	-ve	+ve	-ve	+ve	Citrobacter
RD-17/8/21	220	38	pink	gram-ve	-ve	-ve	-ve	-ve	Pseudomonas
PC-18/8/21	38	21	pink	gram-ve	-ve	-ve	+ve	+ve	Klebsiella
YNC(H)	38	43	pink	gram-ve	-ve	-ve	-ve	-ve	Pseudomonas
YNC(C)	02	22	pink	gram-ve	-ve	-ve	+ve	+ve	Klebsiella
LSM	910	96	pink	gram-ve	-ve	-ve	+ve	+ve	Klebsiella
PC-23/8/21	04	06	colorless	gram-ve	-ve	-ve	+ve	+ve	Klebsiella
KC-II	07	09	pink	gram-ve	-ve	-ve	-ve	-ve	Pseudomonas
PN-24/8/21	04	05	pink	gram-ve	-ve	-ve	+ve	+ve	Klebsiella
RD-II	04	04	colorless	gram-ve	-ve	-ve	-ve	-ve	Pseudomonas
GN	07	08	pink	gram-ve	-ve	+ve	-ve	+ve	Citrobacter
NTR-26/8/21	04	04	light pink	gram-ve	-ve	+ve	-ve	-ve	Proteus
CS	07	02	colorless	gram-ve	-ve	-ve	-ve	-ve	Pseudomonas
KP	05	32	pink/green	gram-ve	-ve	-ve	-ve	-ve	Enterobacter
YSR	02	04	colorless	gram-ve	-ve	-ve	+ve	+ve	Klebsiella
VR	07	31	pinkcolor	gram-ve	-ve	-ve	-ve	-ve	Pseudomonas
MRM	09	04	colorless	gram-ve	-ve	-ve	-ve	-ve	Proteus

Water samples collected from local areas in and around Narsapur

Narsapur- local areas (Ramalayam, Kondalamma gudi, YN college campus, YN college hostel, Lecturer colony, Sri haripeta, NTR colony, church square, YSR colony, Rusthambhad , Housing board , Panja center , Patha bazaar , Kotha colony, Valendar revu, Kondalama arch,) Sita rampuram, Mogalthuru , Kopparu, Patha navaraspuram, Kotha navaraspuram, Mallavaram, Lakshmaneswaram.

The present study indicates the polluted condition of the water resource which will have serious effects. The MPN index is above 50 for 100ml of sample, according to Central Pollution Control Board of India, total coli form organisms MPN/100 ml shall be **50 or less** in drinking water source.

Enteric pathogens cannot normally multiply in water hence water is not its mode of transmission to humans (WHO, 1996). However, the presence of entero bacteriae would be enough to infect people whose local or general natural defense mechanisms are impaired too significantly low. The people likely to be at risk would be the very old or the very young as well as patients undergoing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immunosuppressive therapy. Other immuno-compromised individuals suffering from AIDS would also be at risk. Also, water polluted by bacteria when permitted to contaminate food would lead to the multiplication of the pathogens to very large doses.

As per the results obtained from water samples collected from the following areas, Narsapuram rural, Narsapuram Kondalamma temple area, Lakshamneswaram, Housing board colony and Rustambada areas hve shown significant bacterial load, the predominant bacteria are Pseudomonas, Proteus, Citrobacter and Klebsiellla Spcs. The bacteria which are present mainly Pseudomonas, Proteus and Klebsiella are infectious.

The most serious infections caused by Pseudomonas include malignant external otitis, endophthalmitis, endocarditic, meningitis, pneumonia, and septicaemia. The infections can be treated by antibiotics such as Ciprofloxacin and Tobramycin proteus cause diseases such as Cystitis, pyelonephritis, prostatitis, wound infections, and urinary tract infections. The infection can be treated by aminoglycosides, carbapenems Klebsiella can cause pneumonia, bloodstream infections, wound or surgical site infections, and meningitis. The infection caused can be most effectively treated with cefroperazone. sulbactam (95.8%), piperacillin. tazobactam (95.7%) and imipenem (97.7%).

CONCLUSION

Finally, it can be concluded that water even though treated may get contaminated due to underground leakages and improper handling, hence advised to public in these areas to drink boiled and cooled water stored in copper vessels to minimize water borne diseases. Routine Microbiological testing of drinking water supplies, recreational waters and environmental waters is essential for the protection of public health.

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