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MONITORING OF BACTERIOLOGICAL QUALITY OF DRINKING AND TAP WATER FROM A TERTIARY CARE HOSPITAL IN EASTERN INDIA USING A NEW MEDIUM

S. BHATTACHARYYA[1a], WAJDA[b], A. SARFRAZ[c], N. K. JAISWAL[d], R. KUMAR[e], A. SENGUPTA[f], A. KUMAR[g], D. KUMAR[h] AND S. SINGH[i]

[abcdefghi]Department of Microbiology, AIIMS Patna, Bihar, India

ABSTRACT

Bacteria pathogenic for gut, present in drinking water, pose a great risk to laboratory workers. They should be monitored and reported promptly . It is generally measured by growing the water in MacConkey broth. We here report a new liquid medium for growing and identifying pathogenic enteric bacteria present in tap and drinking water.

KEYWORDS : Bacteriological quality, Drinking water, Phenol red lactose broth

Water is one of the most important elements for all forms of life on our planet and is indispensable for the maintenance of life on Earth and essential for the composition and renewal of all cells(Penna et al, 2002). Enteric bacteria can contaminate inhabit drinking water and cause infections like Typhoid, dysentery, cholera and others(Cabral, 2010). Water contaminated with pathogenic species also has the normal bacterial flora of the human intestine(Cabral, 2010). Water quaility is ususlly measured by culturing the sample in MacConkey broth, also called presumptive coliiform test, and its modifications like culture in Glutamic acid medium (Journal of Hygiene, 1958). As far as we know, Phenol Red lactose broth has not been used for this purpose. The latter medium is also less costly than MacConkey broth (www.carolina.com, www.sigmaaldrich.com). Keeping these things in mind, our study was planned to develop Phenol red latose broth as an alternative to MacConkey broth for bacteriological testing of drinking water.

MATERIALS AND METHODS

This was a laboratory based observational study carried out in Department of Microbiology of the institute from June 2015 to September 2015. Water samples were collected aseptically in sterile glass test tubes with the help of spirit lamps. MacConkey broth was prepared by autoclaving according to manufacturer's instructions (Himedia Labs, India). Single strength MacConkey broth was used due to expected low bacterial count of drinking and tap water. Phenol red lactose broth was also prepared, and its recipe was as follows:

Peptone: 1 gm.

Phenol Red powder: 0.1 gm.

Lactose , anhydrous: 1 gm.

NaCl: 0.5 gm.

Deinonised water: 100 ml,; pH: 7.2.

The phenol red Lactose broth was autoclaved and poured in sterile test tubes.

Water samples were inoculated in both the media in following dilutions:

i) 1 in 2 , ii) 1 in 5, iii) 1 in 10 and iv) 1 in 50. Every sample was inoculated in these dilutions in both liquid media (2 tubes for every dilution in each media). One test tube having only liquid medium was kept as negative control.After overnight incubationof 18 hours, if any color change was observed, 10 microlit. of both were subcultured on CLED agar and subsequently identified using Gram staining and standard biochemical tests. From CLED agar, colonies of the bacteria seen, was also counted manually. Resuklts from both media were also compared.

Sample Source

Samples were collected twice from each source for the two different media. Sources were : i) Tap water of Pathology Department, ii) Drinking water from RO 9Reverse Osmosis) system and tap water of Microbiology Department, iii) Drinking water from RO system of Forensic Medicine and Toxicology Department, iv) Drinking water from Boys' hostel, v)Drinking water from Girls' hostel, vi) Drinking water from RO system of Operation theatre of third floor, OPD building, and vii) Drinking water from Administrative office of the institute.

[1]**Corresponding author**

RESULTS

It was found that there was 100% concordance and compatibility between the findings using Phenol Red lactose broth and Mac Conkey broth. For example, the colony count of Pseudomonas aeruginosa following growth and subculture in MacConkey broth from water of Operation theatre was 1.2 x 105 CFU/ml. It was the same using Phenol Red lactose broth.

E. coli and *Klebsiella pneumoniae* were only isolated from tap water of Pathology department. Both bacteria grew in each of the two media.

Tap water of Microbiology department grew Alcaligenes fecalis in both media.

The most common bacteria found in drinking watewr (RO) of boys' and girls' hostel was Alcaligenes fecalis. Colony count was same in both media.

This Lactose phenol red broth was a good substitute of MacConkey broth for bacteriological quality testing of drinking water.

DISCUSSION

Inadequate and poor bacteriological quality of drinking water is a major cause of morbidity and mortality worldwide(www.who.int). It is accepted that the presence of *E. coli* and other coliforms in drinking water indiactes fecal pollution(www.who.int). Several methoids are available for bacteriological quality monitoring of drinking water, like culture in MacConkey broth (muliple tube method), membrane filter method and molecular method(Eckner, 1998). Our method is less costly than all other methods, and reproducible and accurate, as well as comparable to MacConkey broth culture. Thus we postulate that this Phenol red lactose broth can sfaely be used in place of Macconkey broth for bacteriological water quality assessment of drinking water. Tap water was also tested here because sometimes patients and other staff can consume tap water if the RO system is defunct. As far as we know, this study is the first of this kind from thids region of our country, and further such studies are the need of the hour, keeping in mind the significance of this topic.

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REFERENCES

A comparison between MacConkey broth and glutamic acid media for the detection of coliform organisms in water. Journal of Hygiene 1958, **56** (3): 377-388.

Assessing Microbial safety of drinking water. Improving approaches and methods. http://www.who.int/water_sanitation_health/dwq/9241546301full.pdf.

Cabral J. P. S., 2010. Water Microbiology. Bacterial Pathogens and Water. Int J Environ Res Public Health, **7**: 3657-3703.

Eckner K.F., 1989. Comparison of Membrane Filtration and Multiple-Tube Fermentation by the Colilert and Enterolert Methods for Detection of Waterborne Coliform Bacteria, *Escherichia coli*, and *Enterococci* Used in Drinking and Bathing Water Quality Monitoring in Southern Sweden. Applied and Environmental Microbiol, **64**(8): 3079-83.

MacConkey Broth for microbiology. http://www.sigmaaldrich.com/catalog/product/sial/70144.

Penna V. T. C., Martins S. A. M., Mazzola P. G., 2002. Identification of bacteria in drinking and purified water during the monitoring of a typical water purification system. BMC Public Health, **2**:13-23.

Phenol Red Dehydrated Lactose Medium. 500 gram. http://www.carolina.com/dehydrated-media/phenol-red-lactose-broth.