Bacterial count (M. P. N.) as pollution indicator, in Shahpura Lake of Bhopal (India)

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ABSTRACT

Most probable number (MPN) of bacteria shows the pollution load in water resources i.e. Shahpura Lake water. The widespread danger associated with drinking water is bacterial contamination by sewage and other organic wastes. Coliforms are microbial indicator of drinking water pollution. Hence MPN count is investigated in the present study by mutiple tube technique, WHO (1979) recommended MPN 10/100 ml is fit for human consumption in the present study MPN count /100 ranged form 742/100 ml. Coliforms are recognized as microbial indicator of drinking water. Hence systematic monitoring and bacteriological analysis becomes important for public health and hygiene and is valuable for water management for water ecosystem and biodiversity.

Key words: MPN, Shahpura lake, Bhopal.

INTRODUCITON

Bhopal, the capital of Madhya Praesh, is territorally the largest state of India witnessed the world's worst industrial disaster, i.e. leakage of methyl isocyante (MIC) gas from union carbide factory on 3rd Dec. 1984. Bhopal is situated on 23°16' N latitude and 77° 25' E longitude and is located on a hard pink red sand stone of vindhyan region at 503 meters above the mean sea level (MSL). The lower lake of Bhopal is supporting source of water supply as well as boating, bathing and immersion of idols in festival. The maximum and minimum depth is 8.0m and 0.5m. According to meterological department of India, the 3 seasons are monsoon from mid (June to Sepetember) winter (From October to Feb.) and summer (From March to Mid June) of the year.

The most common and widesperad danger assoicated with drinking water is bacterial contamination by sewage and other organic wastes, human or animal excrement. Coliforms servive only a few hours or days outside their hosts.

Escherichia coli (E.coli) is excreted by healthy individuals are the only organisms used as indicators of faecal contamination. Chlorea is water borne disease caused by vibrio-chloreae. Salmonella typhi cause thypoid fever, parva viruses causes different viral diseases in human by consumption of polluted water.

A fairly good number of contributors have carried out bacteriological examination pertaining to most probable number (MPN), Notable studies are those of Taylor (1941), Kelly, P. (1960) Clark, J.A. (1973) Rai, H. and Hill, G. (1978), Kataria (1998 and 2005).

MATERIAL AND METHODS

Multiple tube technique is adopted for the estimation of the number of presumptive faecal coliform (MPN count) present in 100 ml of water. Lake samples collected in 250ml sterile glass bottles by lowering into lake upto ''6 to 8" depth, and after collection of water were hauled up and tied with stopper and samples were immediately

taken to laboratory for examination and were inoculated with 1-2 hours in a series of fermentation tubes. 3 tubes for each dilution varying sample medium ratio (10ml : 10 ml medium 1ml sample 10 ml medium and 0.1ml sample: 10ml medium lactose broth) medium was used for presumptive test. All these tubes which produced acid and gas in the durham's fermentation tubes were recorded as the (+) ve tubes, that incubated again for 48 hrs. at 355°C Tubes showing gas bubbles were regarded to an prescribed by APHA (1986) indicate confirmed (+) ve test as prescribed by APHA (1986)

RESULTS AND DISCUSSION

By determining MPN of coliform bacteria, sanitary quality of water of lower lake can be determined. The lake water was found to have significantly higher coliform count. Sampling stations (8) around the lakes 1,3,4,6 registered with higher number of coliforms.

The minimum of 11/100 ml was recorded on 4, while the maximum of 2000/100ml was observed on some occasions at SS No. 1,4 8th in Summer. Bacterilogical examinations of lake water has a significant in pollutions study, measures

deleterious effect of pollution on human health. The pathogenic bacteria contaminated into water bodies by domestic sewage and other pollutants boating, bathing and immersion of idol and domestic sewage. Bacterial population are after considered as important indicator of pollution and eutrophication in the aquatic ecosystem. Faecal pollution of drinking water may introduce a variety of industrial pathogens i.e. bacteria viruses and other parasites. According to WHO (1978) water having MPN more than 10/100 ml is unfit for human use. Bacterial analysis directly shows the potability of water. Narayana studied Warrangal well water MPN count and faecal coliforms noted more than 10/100 ml Rao *et al.* (1986) noted nil to 1600/100 ml MPN in bore-wells of Nuzvid town of A.P. The total of Coliforms bacteria indicates degree of pollution kumar and saha (1989), Clark *et al.* (1977), Badge and Verma (1982) observed maximum number of bacteria in summer of followed by monsoon and winter. Increase after rain in bacterial number is due to the accumulation of run-off water from nearby areas and due to stirring of the decomposed organic matter at the bottom hat spreads and distributes throughout the lake observed by Taylor(1941). All bacterial require inorganic phosphate for growing (Rai and Hill

Table - 1: Mean Seasonal values of MPN (Most Probable Number) of coliforms in this study during 2004-05 Seasons Sampling Stations

2004	1	2	3	4	5	6	7	8
Winter (Nov. to Feb.)	160.0	138.00	174.0	160.0	138.4	135.4	86.6	194.0*
Summer (Mar to Jun)	58.0	1240.0	295.4	688.4*	384.0	95.4	248.4	296.6
Monsoon	98.0	239.0	132.2	1028.6*	556.4	574.0	104.0	208.0
2005								
Winter (Nov. to Feb.)	105.0	140.0	135.6	175.0	224.0*	214.5	65.7	146.8
Summer (Mar to Jun)	418.6	1202.0	554.0	940.4	136.4	496.5	368.0	135.4
Monsoon	560.5*	208.0	360.0	236.4	316.4	101.7	130.6	186.6

*Higher mean seasonal values.
Sampling Stations: 1. Infront of Academy 2. Manisha Market 3. Shahpura 4. Near Hanuman Temple
5. Behind Ayushman Hospital 6. Cunabhatti 7. Near Kashish Lake View 8. Near EPCO, Office

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1978). Kataria (1998), Kataria *et al.* (2005) noted MPN count of 10 to 2400/100ml in ground water of Bhopal and 10-395/100 ml in Halali river water of Vidisha (M.P.), Kelly (1960) and Pathak *et al.* (1993).

Hence water of lake may required proper treatment before use of drinking purpose with hygienic poing of view in public interest. Most of the water borne diseases are essentially dependent on edcretal pollution, *E. coli* and *Salmonella* are important bacteria found in water, they are liable to be contaminated directly or indirectly by matter originating from the human intestine. *E.coli* acts as indicator "danger signal" that pathogens may also present in water and causes typhoid, food poisoning and dysentery to human being.

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