Heterotrophic plate count Bacteria in drinking water supply of a selected area of Nanded City

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ABSTRACT

The quality of drinking water supplied, has a large bearing on health of the citizens. Godavari River is the main source of consumable water supply to Nanded city. Microbial analyses are an important step to follow before water is declared fit for consumption, specially taking water borne diseases into account. In present study, drinking water supply of a selected area from Nanded City, Maharashtra State, India, was screened for unravelling its bacterial flora through Heterotrophic Plate Count (HPC) by plating serial dilution of collected water samples on Nutrient Agar and a high HPC of bacteria, including pigmented ones was observed.

Key words: consumable water, Heterotrophic Plate Count, micro flora, pigmented bacteria waterborne diseases.

INTRODUCTION

The universal solvent, water, is an indispensible ingredient of life. Being colourless, tasteless and odourless is an essential prerequisite for good quality of water. Besides being the most vital component of life, water also happens to be a carrier for pathogens that can cause diseases in case it is contaminated, such diseases being termed, as water borne diseases.

Water drawn from any source is generally treated at a water treatment plant, prior to supply, as untreated water can pose a threat to human health as a result of increased exposure to pathogenic microbes. The microbiological quality of drinking water in municipal water distribution systems depends on several factors and chlorines and/or chloramines are generally used for minimizing recontamination, however, despite such preventive measures, presence of heterotrophic and opportunistic bacteria in bulk water and biofilms is yet to be controlled successfully (Chowdhury, 2012). Growth of bacteria, post treatment is referred to as 'regrowth' and a high HPC can be observed in stagnant piped distribution systems possibly as a result of absence of residual disinfectant and availability of nutrients (WHO 2003, n.d.).

Heterotrophic Plate Counts tests have been used to check the functioning of water treatment processes (especially sand filtration) and thus, indirect indicators of water safety, providing useful qualitative bacteriological data and continue to be used worldwide (Reasoner, Blannon, Geldreich, & Barnick, 1989; WHO 2003, n.d.). Nanded city receives its water supply from Godavari River. There are 10 pumping stations that take water to three treatment plants. Sand filtration and chlorination are the treatment methods followed at the water treatment plants before water is supplied through tap connections (Nanded Vision, 2006). This simple study was designed to check the supplied water for presence of bacteria through the HPC technique.

MATERIALS AND METHODS

Water samples were collected from morning tap water supply from different homes in a selected locality in containers sterilized autoclaved at 121 degree Celsius at 15psi for 15 minutes. Collection of samples was done by holding the container against the flow from the tap and screw capping back immediately. Samples were processed within 2 hr of collection. Serial dilutions of each sample were spread on Nutrient Agar (Odeyemi, Fagbohun, & Akindolapo, 2011) with a

flamed bent glass spreader followed by incubation for 24 hr, 48 hr and 72 hr. Following incubation, plates were subject to colony counts and Colony Forming Units per milliliter in each sample were calculated and recorded separately for total and pigmented colonies.

RESULTS AND DISCUSSION

The HPC of bacterial colonies with relevant details was as given in Table 1. The lowest number of colonies recorded is 23 for sample 3 whereas highest number of recorded colonies was 62 from sample 2. The colonies of the pigmented bacteria were recorded after 72 hr of incubation due to their slow growth. The results indicate that the HPC of bacteria in the present research is, higher than <10-100 cfu/ml that is presumed general for treated water. The possibility of low levels of residual chlorine and presence nutrients

supporting the regrowth cannot be ruled out. of There have been mixed views on presence of pigmented bacteria in water samples, with their presence being considered an indication of low pollutants in water, to several reports recording association of their presence with occurrence of human diseases (Reasoner *et al.,* 1989). However when the health of a large population is concerned, every aspect has to be taken into account. Though Heterotrophic Plate Count technique is a rather simple technique, it can be a valuable tool for gaining insight into the bacteriological quality of water. Another advantage being, it is more cost effective and can be practiced without the need of a sophisticated equipment facility, especially in places where presumably, little is done to monitor the quality of supplied water in terms of bacteriology.

Table 1: Sample, numbers of colonies of non-pigmented and pigmented bacteria and total number of colonies expressed as colony forming units per ml of sample.

Sample	Number		Percentage (%)		Total number of colonies	Total Colony Forming Units/ml of sample
	Non-pigmented colonies	Pigmented colonies	Non-pigmented colonies	Pigmented colonies		
Sample 1	28	12	70	30	40	40×10^4
Sample 2	19	43	30.64	69.35	62	62×10^4
Sample 3	12	11	52.17	47.82	23	23×10^4
Sample 4	12	32	27.27	72.72	44	44×10^4
Sample 5	12	21	36.36	63.63	33	33×10^4

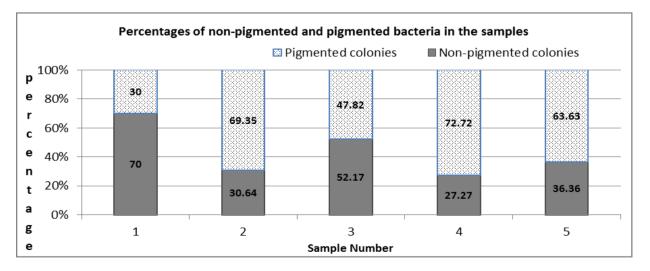Colony forming units are calculated as: total number of colonies/dilution factor

Figure 1: percentages of non-pigmented and pigmented bacteria in the samples

A thorough investigation of efficiency of treatment procedures, regrowth and possible role of the isolates in epidemiology of human diseases as a future attachment to the present research, is needed.

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