

Safety in bottled water; bottled up or tapped out?

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Around 9% of the world's fresh water supply comes from the landmass of Canada which is among the first three largest suppliers in the world. Despite having the cleanest tap water, large number of urban Canadian population is switching over to bottled water for its daily hydration requirements. Unsurprisingly, the consumers assume that since bottled water carries a price tag, it is purer and safer than most tap water. On the contrary, it has been observed that some brands of bottled water are not as safe as they intend to be. The level of microbial contaminants found in some bottled water is of potential concern. As there is no guarantee that bottled water undergoes the process of absolute purification and is free from bacteria in large numbers, there are many different brands of varying quality in the market. Some non-pathogenic heterotrophic microorganisms, which are normally of little or no significance, may grow to considerable levels in bottled water and since their importance in relation to health and diseases is not entirely understood, they might pose serious health concerns for the vulnerable sector of the population such as pregnant women, infants, children, immuno-compromised patients and elderly. Unfortunately, regulatory bodies such as Food and Drug Administration (FDA), Environmental Protection Agency (EPA), Canadian Food, Inspection Agency (CFIA) and Health Canada etc. have not established any limit of heterotrophic microbial count in the bottled water consumed on a large scale. Also, the rules and laws associated with the quality of water in the packaged form are ambiguous. United States Pharmacopeia (USP) specifies a perimeter according to which no more than 500 colony forming units (cfu) should be present in drinking water. However, according to Health Canada bottled water is considered as food product and is not required to meet the *Guidelines for Canadian Drinking Water Quality*.

This project was initiated and performed at Ccrest Laboratories, Montreal, QC, Canada in response to an employee's complaint of foul taste and sickness after the consumption of bottled water at the company. Ccrest Microbiology Laboratory is responsible for carrying out this study which is self-funded by Ccrest Laboratories. This work is being presented in the form of a poster at the 110th Annual Meeting of American Society of Microbiologists, San Diego, CA, USA (May 23rd-27th, 2010)

Several brands of bottled water, irrespective of their sources and packaging formats, were randomly purchased from the marketplace and subjected to microbiological analyses. Surprisingly, it was discovered that more than 40% of the famous brands tested did not meet the USP specifications for drinking water (≤ 500 cfu/ mL). Heterotrophic bacteria counts in some of the bottles were found to be in revolting figures of one hundred times more than the permitted limit. Although, the presence of Coliforms (indicator of fecal contamination) and other known pathogens was not confirmed, bacterial colonies of different morphologies were isolated from water. Preliminary studies carried out on bottled water did not rule out the presence of opportunistic pathogens that could be of potential harm to people with weak or immuno-compromised system. Further investigation involving isolation, identification and characterization of the bottled water microflora is required to comprehend the detailed overview of safety in packaged water.

Heterotrophic bacteria, in water, do not require rich source of energy to grow and multiply. These microorganisms utilize the organic compounds of carbon and nitrogen dissolved in water for their nourishment requirements. It was also observed that the unidentified heterotrophic flora in water was able to proliferate at temperatures as low as 3 - 4°C. Also, this study was conducted on bottled water, within the first few weeks of their manufacturing date. Since the manufacturers claim that their products have a shelf life of two years, it is evident that the microbial count in these bottles is likely to increase to higher figures during the course of time. Therefore, even if the water is stored under refrigerating conditions, a 'best-before' stamp on the bottle does not hold much significance in terms of its microbiological quality.

Current study on the microbiological traits of bottled water puts a question mark on the safety of common public who consumes unknown mysterious microorganisms in water. During the past few years a number of cases have been reported where well-known brands of bottled water were recalled from the market on account of their poor microbiological quality leading to serious episodes of infection amongst the vulnerable sections of the population. To avoid such drastic consequences, there is an urgent need for comprehensive regulations on bottled water industry in the public interest. It is very evident that a limit of heterotrophic microbial count should be established, tested and regulated periodically. In addition to Coliforms, bottled water should be confirmed for the absence of other pathogens (e.g. *Pseudomonas* and *Bulkholderia*) before its release into the market. Furthermore, the label on the bottled should disclose the purification/ treatment procedure as well as special instructions/precautions for weak or immuno-compromised individuals.