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PP9: Bacterial Diversity in Water Distributed under Intermittent Water Supply

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Introduction and Objective(s): The fluctuation of bacteriological water quality in Intermittent Water Supply (IWS) in Drinking Water Distribution Networks (DWDNs) poses significant challenges in maintaining water safety, particularly in developing countries where IWS is common. With the prevalence of IWS in many regions of Sri Lanka, comprehensive studies are needed to address the problems associated with IWS. Consequently, the current study attempted to investigate the bacterial diversity during the supply resumption phase of IWS.

Methods: Three water samples from the resumption phase of IWS and two samples during continuous water supply (CWS) were collected from a DWDN which experiences IWS regularly. Sterivex filters were used to send samples to the Research Laboratory, Faculty of Medicine, University of the Ryukyus, Japan, and DNA was extracted from the Sterivex filters by using the DNeasy PowerWater Sterivex Kit (Qiagen, Hilden, Germany), according to a standard protocol. The V4 region of the bacterial 16S rRNA gene was then sequenced by Illumina MiSeq sequencing.

Results: The findings revealed that most taxonomic groups were commonly present in samples collected during the CWS and supply resumption phases of IWS. However, specific taxonomic groups, such as Sphingomonadales, Actinomycetales, Enterobacterales, Burkholderiales, and Caulobacterales were prevalent in samples taken during the supply resumption phase of the IWS. The soil and environment-related bacteria groups, such as Actinomycetales and Burkholderiales were predominant in the samples taken during the supply resumption phase of IWS than in CWS which may probably be due to intrusion of outside water into the water distribution or sloughing of biofilms. In contrast, Aeromonadales, Neisseriales, Rhizobiales, and Pirellulales groups were prevalent in samples collected during the CWS phases.

Conclusions: The soil and environment-related bacteria groups, such as Actinomycetales and Burkholderiales were prevalent in water during the supply resumption phase of IWS than in continuous water supply. In contrast, Aeromonadales, Neisseriales, Rhizobiales, and Pirellulales were prevalent in CWS. Based on the results of this preliminary research, further research is recommended to elucidate whether all the IWS systems follow similar trends, the origins of the dominant bacterial groups identified during IWS, and their health-related and ecological issues.

Keywords: Intermittent Water Supply (IWS), drinking water distribution networks (DWDNs), bacterial diversity, 16S rRNA gene, health risks.