

Evaluation on the Drinking Water Quality Concerning Bacteria and Inorganic Nitrogen, PO₄-P and COD Using Spring Water Samples

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Extended Abstract

Background: The safety of tap water in Japan is widely acknowledged and bacterial contamination is hardly observed. However, a certain percentage of the people, especially elderly in Japan, have a habit of drinking spring water on a daily basis, because they hate the chlorine sterilization odor in tap water. In the previous study, we examined the bacterial contaminations such as coliform, *E. coli*, and other general bacteria and inorganic nitrogens such as NH₄-N, NO₂-N, and NO₃-N in Japanese ten spring water samples. We concluded that five of ten samples were not suitable for drinking. And these data suggested deterioration of water quality in Japan. [1]. In this study, we evaluated the levels of phosphate-phosphorus (PO₄-P) and chemical oxygen demand (COD) using five samples that were judged to be suitable for drinking in our previous research. Five spring water samples were taken from Rakannoi, Funabashidaijin, Kemigawajinja, Katushikahachi and Matudojinjya. These samples were collected at the same locations as previous research and were carried out from Nov. 28 to Dec. 17 in 2017. EC blue and desoxycholate agar test were carried out to detect coliform in those samples. Fluorescent EC blue test was also used to detect *E. coli*. Other general bacteria were found by standard agar test. NH₄-N, NO₂-N, NO₃-N, PO₄-P and COD were evaluated by digital pack test meter (KYORITSU CHEMICAL Corp, Japan.).

Results and Discussion: Fluorescent EC blue test showed positive in Funabashidaijin's sample and NO₃-N concentration of Kemigawajinja's sample was 10.6 mg/L. According to Japan's water quality standards, *E. coli* should not be recognized and NO₃-N concentration level should be below 10mg/L. Therefore, these two samples were judged inappropriate as drinking water in this study. Actually, a sign board is presented at Funabashidaijin that this water is suitable for drinking and boiling is recommended. But no information on water quality was showed at Kemigawajinja. The values of COD concentrations ranged from 5.8 to <2.0 mg/L in five samples. Three samples such as Kemigawajinja, Rakannoi, and Matudojinjya showed 5.8, 2.5 and 2.4 mg/L respectively, which were evaluated not suitable compared with Japan's environmental standard of lake water. According to our standards, the first grade quality as tap water was below the level of 1.0mg/L. The values of PO₄-P concentrations ranged from 0.82 to <0.03 mg/L in all samples. Three samples such as Funabashidaijin, Katushikahachi, and Kemigawajinja showed 0.82, 0.16 and 0.09 mg/L respectively, which were evaluated not suitable compared with environmental standard of lake water. The first grade criteria as tap water quality was below 0.01 mg/L according to Japanese standards.

Conclusions: We evaluated the levels of PO₄-P and COD in 5 samples which were considered suitable for drinking in previous study. Finally, 2 samples were suggested not suitable for drinking.

Reference

- [1] M. Goto, T. Kaneko, et al, "Evaluation on The Drinking Water Quality Concerning Bacteria and Inorganic Nitrogen Using Ten Spring Water Samples," in *Proceedings of the 3rd World Congress on New Technologies*, Rome, Italy, 2017, ICEPR 160.