

EVALUATION OF WATER USED IN THE MUNICIPAL EDUCATION INSTITUTIONS OF THE SOUTH REGION OF THE MUNICIPALITY OF PARAÍSO DO TOCANTINS-TO.

Iara Morgana A. Souza¹, Sérgio Luis M. Viroli²

1. Estudante da Licenciatura em Química do Instituto Federal de Educação Ciência e Tecnologia do Tocantins: campus Paraíso do Tocantins (IFTO)
2. Professor do IFTO - Departamento de Ciências da Natureza

Summary

The present study verified the water quality of the canteens of three public schools in the southern region of the City of Paraíso do Tocantins - TO. Monthly collections were carried out in the canteens of each school to verify the quality of the water used in the preparation of food. The analyzes of hydrogenation potential, turbidity and hardness followed the analytical methods of AWWA and those of total and thermotolerant coliforms according to the procedures described by the National Health Foundation and compared with Portaria no. 2,914 of January 12, 2011, from the Ministry of Health. The physical-chemical and microbiological analyzes of water from municipal schools located in the southern region of Paraíso do Tocantins - TO presented values in accordance with Ministry of Health Ordinance No. 2,914 2011

Keywords: public health; Municipal School; microbiology.

Introduction

The water destined for human consumption must pass through a set of steps of treatment of coagulation, flocculation, decantation, filtration, disinfection, fluoridation and meeting the criteria of potability established by Administrative Rule 2,914 of 2011 of the Ministry of Health (BRASIL, 2011). Drinking water should not contain pathogenic microorganisms and should be free of bacteria known as coliforms (FUNASA, 2006). Thus, it is not sufficient to only provide water in adequate quantity, since its quality is of increasing importance for all consumers (SANTOS et al., 2011). Schools are institutions that serve a large public of people and use water from their reservoirs in food production (ROCHA et al., 2010). Many children have school feeding as their main meal during the day, but several Brazilian schools do not have a water reservoir sanitation program, either because of lack of knowledge or because of lack of knowledge (SOUSA, 2006; ROCHA et al., 2010). These reservoirs can remain for long periods without any type of treatment. As a consequence, ingestion of contaminated foods can occur, since they are prepared with this water, and may cause some kind of food toxoinfection (TORRES et al., 2000; CALAZANS et al., 2004). It is important to perform a periodic monitoring and control of the water quality used for human consumption and supply, since it is able to carry a great quantity of physical-chemical and / or biological contaminants (TORRES et al., 2000). The periodic hygiene of the water reservoirs must be carried out so that impurities and contaminations will compromise the potability of the water stored in the reservoirs (CALAZANS et al., 2004). Thus, the present study aimed to verify the microbiological and physicochemical quality of water from three basic education institutions in the southern region of the municipality of Paraíso do Tocantins - TO

Methodology

Two monthly collections were carried out in three municipal public schools in the southern region of the municipality of Paraíso do Tocantins, totaling 30 collections between August and December 2018, in the taps of the canteens of each school to verify the quality of the water used in the preparation of food and beverages consumed by students. The procedures adopted for collecting and transporting the samples followed the National Guide for the Collection and Preservation of

Samples of the National Water Agency and Environmental Company of the State of São Paulo (CETESB, 2018). 500 ml glasses were used, 0.02 g (or 1.0 mL of 2% solution) of Sodium Thiosulfate was added to each 2/3 (two thirds) of the flask. The sterilized glasses and the taps were previously sanitized with 70% alcohol, using gloves. The water was collected from the main kitchen faucet of the educational institutions after cleaning the faucet with 70% alcohol and opened in maximum section for approximately 3 minutes. There was a time of water flow and after the collection the samples were immediately sent to the laboratory. The samples were conditioned in a thermal box and transported to the Sanitation Laboratory of the Federal Institute of Education, Science and Technology of Tocantins - Campus Paraíso do Tocantins for analysis of the samples. The analysis of hydrogenation potential (pH), turbidity, and total dedusting followed the analytical methods of AWWA's Standart Methods of Water and Wastewater (APHA, 2005) and of total and thermotolerant coliforms by means of technique of Multiple Tubes, according to procedures described by the National Health Foundation and compared with Portaria n. 2,914 of January 12, 2011, of the Ministry of Health.

Results and discussion

Table 01 shows the average values of the analyzes carried out and values established by Ministry of Health Ordinance No. 2,914 / 2011 for the physical parameters pH, turbidity, electrical conductivity, hardness and microbiological parameters.

Table 1. Results of the water analysis of public schools in the south of the city of Paraíso do Tocantins - TO

Analyzes carried out	School 01	School 02	School 03	Ordinance nº 2.914 / 2011
Hydrogen ionic potential - pH	6,56 ± 0,10	6,65 ± 0,15	6,85 ± 0,12	6,0 a 9,5
Turbidity (UTN)	0,10 ± 0,20	0,12 ± 0,26	0,11 ± 0,22	Up until 1,0
Total Hardness (ppm CaCO ₃)	10,20 ± 0,12	10,64 ± 0,11	10,84 ± 0,10	Máx. 500 ppm
Coliforms at 30 °C (NMP / 100mL)	Absence	Absence	Absence	Absence 100 mL
Coliforms at 45 °C (NMP / 100mL)	Absence	Absence	Absence	Absence 100 mL

According to the data obtained by the physical-chemical and microbiological analyzes of the water, the samples showed values for the physico-chemical and microbiological parameters in accordance with the Ministry of Health Ordinance No. 2,914 / 2011. As for the hygienic sanitary aspect, the water tanks were in good condition, covered and passed through semiannual cleanings. The taps in the kitchens were clean and well preserved, not leaking. In the food preparation environment the taps were cleaned frequently and with alcohol, the premises were always clean, with no garbage accumulation, and only people in clean clothes and a cap were allowed in to avoid contamination of food. The total and thermotolerant coliform counts can be estimated faecal hygiene and contamination, considering that high counts of these groups of microorganisms are usually related to significant levels of enteropathogens. (Alder et al., 2008). A survey carried out by Fernandes (2007) in 18 public schools in the municipality of Silva Jardim, state of Rio de Janeiro, collected 54 water samples from the supplies for consumption. Of these schools, 72.22% were positive for thermotolerant coliforms, as determined by MPN. In contrast to the studies by Fortuna (2006) in the municipal and state schools of Rio de Janeiro, it obtained a satisfactory result regarding the hygienic-sanitary condition of the water obtaining negativity for total and thermotolerant coliforms following the MPN, being thus within the standards established by the Ordinance No. 2,914 / 2011 of the Ministry of Health.

Conclusions

The water analysis used in the municipal school kitchens located in the south of the City of Paraíso do Tocantins - TO presented values in accordance with the Ministry of Health Ordinance No. 2914/2011. The quality of water in school canteens is of paramount importance, since it can act as a transport medium for pathogenic substances and microorganisms. Therefore, it is recommended the continuous monitoring of water quality, cleaning and maintenance of faucets and water tanks for that water distributed to schoolchildren is of a quality, minimizing the health risks of drinking water that does not meet the drinking standard.

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