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PHYSICOCHEMICAL ANALYSIS OF THE BIODISHABLE WATER CONSUMED IN THE RURAL AREA OF THE CITY OF PIRIPÁ-BA

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ABSTRACT

Water is of utmost importance for human life and ecosystem Both balance, however there are que Several factors can compromise the quality of this When untreated water and can create risk to the Individuals who consume it. The collection was carried out at different water storage points that supply the Rural Zone of the municipality of Piripá located in the interior of Bahia, which according to the IBGE contain an estimated population of 12,783 thousand people. Laboratory analyzes were performed of the physicochemical parameters, conductivity, resistivity, total solids, turbidity, pH, hardness and alkalinity. The results showed that the only sample that met the standards for human consumption was the closed box sample with rainwater, the other samples were not within the required standards, especially the water sample from the reservoir, which showed antagonistic results to those desired. However, most of the analyzed samples have flaws in their storage, and although the parameters analyzed do not show contamination aspect, special attention should be given to the water reservoirs in question.

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INTRODUCTION

Water plays a vitally important role in human life and the balance of the ecosystem. It supports various physical, chemical and biological processes. However, only about 1% of the total is available for human consumption (Buzelli and Santiyear, 2013; Ferrara *et al*., 2013). But for human consumption to occur safely, it is essential to evaluate its potability thus ensuring the health of the population (Silva, 2013; Boulay *et al*. 2018). In Brazil there are large reserves of groundwater, but this does not ensure that this water has infinite bioavailability, as this resource has a renewal that needs a long period to occur (Mulholland *et al.,* 2015). What is not compatible with the level of consumption of the same by the population, that is, the population enjoys the resource faster than it can renew itself and may lead to its depletion the destination of domestic and industrial sewage in septic tanks and septic tanks, the improper disposal of urban and industrial solid wastes, gas and washing stations, and the agriculture they constitute sources of water contamination by various pathogenic bacteria and viruses, as well as parasites and organic and inorganic substances (Tyagi *et al*., 2013; Noda *et al*., 2017). Untreated water can pose a risk to human health, many diseases are transmitted through waterways and can lead people to pathologies such as typhoid, paratyphoid, bacillary dysentery, cholera, acute, chronic and diarrheal gastroenteritis, hepatitis A and B, poliomyelitis, amoebic dysentery, giardiasis (Sousa *et al.,* 2015; Hour *et al*., 2017). Ministry of Health Ordinance No. 518/2004 provides for quality standards for human consumption in public supply systems and alternative solutions. Therefore, water will only be considered fit for consumption if it meets the established physicochemical

parameters of potability, and thus does not pose a risk to the health of the population that consumes it (Scorsafava *et al.,* 2010). Thus, this project highlights the following problem: What is the level of potability of the water supply points used by the population and whether this water can present any risk to the population that consumes it. The highlight of this study is relevant, because the municipality will collect samples for physical-chemical analysis that will alert the community of the Rural Zone about the water they consume, as well as highlight the importance of water consumption that has its Potability assured, this project aims to evaluate if the physicochemical parameters of different water storage points and report if they are within the parameters, through the analysis of the obtained samples.

METHODOLOGY

This project deals with an observational, descriptive and analytical theme, carried out at different water storage points in the Rural Zone of Piripá, located in the interior of Bahia, which according to IBGE contain an estimated population of 12,783 thousand people. The place of study, are different points of water storage that supply the Rural Zone. The locations chosen were 01 cistern, 01 closed box with stored rainwater, 01 reservoir and 01 artesian well. Collection was performed through 1.5 liter polyethylene bottleswhich served as a container, packed in a thermal box to the places of analysis. It is necessary to collect 03 samples per storage place. Importantly, the flasks are appropriate for physicochemical analysis and were properly identified. The conductivity, resistivity, total solids, turbidity, pH and alkalinity parameters were analyzed at the Chemistry Laboratory of the Independent Faculty of the Northeast, located at R.Luís Eduardo Magalhães, 1305-Candeias, Vitória da Conquista - BA, 45055-030. With the exception of the hardness parameter analyzes of the samples that were performed in the Nutrisegura analysis laboratory at Address: R.Quatro, 2-Candeias, Vitória da Conquista - BA.

RESULTS AND DISCUSSION

Bioavailable water samples were analyzed for consumption from 4 different locations in the rural area of Piripá- BA. From each site 3 samples were collected for better analysis and finally averaged for better visualization of the results.

Table 1. Values obtained for the analyzed parameters

Analysis	Reference values	Sample Closed Box	Cistern Sample	Sample Dam	Sample artesian well
Conductivity (µS / cm)	10 to 100 µS / cm	87.27	677	21.609	2.170
Resistivity (Ω / cm)	Not in Legislation	11.1	1.438	45.6	456
Total solids (mg / L)	Up to 1000 mg.L^{-1}	44.9	350	10,715	1,081
Turbidity (UT)	Up to 5 UT	0.0	1.6	1.14	0.01
pH	6.0 - 9.5	8.14	6 , 79	6.95	6.43
Alkalinity (vol)	> 20 mg L^{-1}	2.7	6.6	1.6	9.0
Toughness (vol)	500 mg.L	1.8	5.8	5,741	15.2

The different water quality parameters constitute a set of values that define the drinking water potability standard, thus ensuring the safety of the individuals who consume it (Santos, and Mohr, 2013). The physical chemical parameters analyzed included resistivity, dissolved solids content, turbidity, pH, alkalinity and hardness. The conductivity is directly related to the ability of the water has to carry electrical current, due to the presence of dissolved substances that dissociate into cations and anions (Silva *et al*., 2017). According CONAMA 357/05 values up to 100 µS/cm and allowed acceptable for water to be considered safe for human use, entertaining, it can be seen that the results of the analysis of the sample just closed box with rainwater presented within the compliant, the 87.27 µS/cm debris presented a very high value in the dam sample with 21,609 µS/cm. According to a study conducted in Nerópolis-Goiás, samples contaminated with a high amount of sewage may present conductivity values ranging from 100 to 10,000 µS/cm (Nogueira *et al*., 2015). Electrical resistivity is considered to be the ease that electric current has to travel through a given body. Studies argue that this method is essential and effective in the analysis of water potability, since it can verify whether or not areas are contaminated by solid waste (Almeida and Flavio, 2019). However, no minimum values are set for this parameter. But in analyzing the results obtained, noted a considerable variation between the samples, where the highest value was found in water from the 1,438 Ω / cm secuwellgear withcyano 456 Ω/cm. According to Ministry of Health Ordinance No. 2.914 / 2011, it considers that the maximum acceptable value of dissolved solids content is 1000 mg/L for human consumption. The only sample that considerably exceeded this reference value was the dam sample, such results may be derived from the addition of waste on site and sewage discharges for example (Oak *et al*., 2017). The turbidity parameter is the analysis of solid suspended particles that can decrease the brightness and light transmission of the medium. Turbidity can be influenced when there is presence of organic debris and other substances such as iron, manganese compounds and sand which may result from human action, or even derivatives of sewage release (Carvalho *et al.,* 2017). Ordinance No. 2914/2011 of the Ministry of Health, describes the value of 5.0 TU as the maximum allowed, and all samples are within this parameter. PH refers to the hydrogen potential of water, which may vary depending on what you get, such as ground water, from rain and sewage. These variations can still occur due to the absorption of gases in the atmosphere, photosynthesis or oxidation of organic matter, thus altering the natural pH (Galdino and Trombini, 2017). The pH represents equality between the H ions, $^{+}$ ions and $OH^{-}$with scale of 1 to 14. When a substance has value less than 7 considered that as acid and when its value is equal to 7 is considered ie neutral, means that the concentration of H $ions^{+}$ and OH $ions^{-}$be equal; and for water to have alkaline characteristics its pH values must be greater than 7 (Almeida, and Flavio, 2019).

The pH parameter is important due to the strong relationship with bacterial growth. The resolution of CONAMA 357/05 determines acceptable pH values between 6.0 to 9.5 for drinking water. Analyzing the results described in the table, it is noted that all samples are within this parameter (Santos *et al*. 2015). The Alcalá-affinity a measure that relates the capacity of power or water to neutralize acids acting as buffer, due the presence of strong bases, weak bases and weak acid salts.

Water must have an alkalinity higher than 20 mg/L^{-1} $CaCO_3$ to be considered within the parameters (Santos and Mohr, 2013). All samples show results below the required standards, indicating that they may not be able to neutralize acidic solutions if necessary. Finally, the hardness that can be defined as the sum of the multivalent cation concentration in the sample, which characterizes an unpleasant taste in water and may also be responsible for fouling in pipes causing clogging (Gomes *et al*., 2018). Hardness is mainly caused by the presence of Caions $^{2+}$ and Mg $^{2+}$, and the limit established by Ordinance MS 2,914 is a maximum of 500 mg $CaCO_3$/ L. Note that only the sample of the dam performed outside the box with 5.74 mg/L, more than double the maximum allowed value, and resulting in a taste muiso strong. With the realization of the analyzes it can be seen that the closed box samples derived from rainwater proved to be the most appropriate for human consumption, with practically all results within the analysis parameters. In contrast, the samples derived from the dam water showed results that were antagonistic to the desired results.

Conclusion

On the results, there is a maior would the analyzed samples show flaws in storage. The only samples that proved to be really fit for human consumption were those derived from the closed box, which stores rainwater. The others did not fit most of the parameters, especially the dam samples that presented extremely high parameters compared to the desired ones. Although, in general, the analyzed parameters do not show contamination aspect, special attention should be given to the water reservoirs in question, wells, but mainly to the reservoir, which presented the most critical parameters and should be taken into account by monitoring and analyzing thoroughly.

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