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PHYSICAL-CHEMICAL AND MICROBIOLOGICAL ANALYSIS OF PLUVIAL WATER USED FOR CONSUMPTION STORED IN RESERVOIRS OF A RURAL AREA IN THE MUNICIPALITY OF CONDEÚBA

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ABSTRACT

This paper presents results obtained from the determination of physico-chemical and microbiological parameters of rainwater used for human consumption. Eight rainwater samples were collected from reservoirs located in rural areas of the city of Condeúba located in the state of Bahia Southwest Region. The objective of this study was to evaluate and compare the results obtained by the analysis of the maximum values allowed in accordance with the Order of consolidation No. 5/2017 Annex XX of the Ministry of Health, which deals with water quality for human consumption and its standard potability. The results of analysis of pH ranged from 4.38 to 8.07 with an average of 6.49; hardness ranged from 26.8 mg / L to 106.4 mg / L, with a mean of 48.1 mg / L; electrical conductivity ranged from 10.8 to 146.9 S / cm, with an average of 79.96 S / cm; turbidity ranged from 0.35 to 8.18 NTU, with an average of 1.70 NTU; alkalinity ranged from 13.4 mg / L to 61.4 mg $CaCO_3$ / L CaCO 3 with an average / total alkalinity of 39.8 mg / L $CaCO_3$; 8,8K resistivity ranged from Ωm to 22,6K Ωm at an average of 12,82K Ωm; total solids ranged from 5.46 mg / L to 51.8 mg / l with an average of 35.44 mg / L; In the case of the results of microbiological analysis, the eight samples evaluated it was observed the presence of total coliform and, Escherichia coli absence in a sample only.

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INTRODUCTION

The water theme is a world-debated issue, addressed by different media, social and fragments present in monographs, conferences, legislation, books and educational component projects. Scholars violate that drinking water is being degraded following human action, which has shown the urgency of actions to restore, maintain and preserve water resources (FREITAS & MARIN, 2015). The water being a universal solvent is essential for many daily tasks, however, can pose risks to human health if not treated properly. It is of great importance to monitor the quality of water continuously, so that waterborne diseases are reduced or even avoided, as well as enjoy the direct and indirect benefits that water provides (LIMA; SANTOS, 2016). About 3 in 10 people worldwide, or 2.1 billion people, lack access to safe drinking water (UNICEF, WHO, 2017). According to the Order of Consolidation No. 5 of the Ministry of Health of 03 October 2017 Annex XX, which deals with the Control and Quality Monitoring of Water for Human Consumption and its potability standard, drinking water is one that meets the potability standards, namely that complies with the physical, chemical and microbiological parâmentro, making it safe for consumption. The man throughout the ages has been seeking ways to mitigate the global challenge of water shortages, in order to meet the daily needs. One of the alternatives found by man is the capture of rainwater, which is an economical and sustainable choice (IGBINOSA; OSEMWENGIE, 2016). The collection of rainwater in reservoirs, such as through the run-off of the roof, is a path that could help in the supply of water should residences for drinking and other purposes, especially in ruarais communities in which the vast majority do not there is water networks and no other complementary source (KWAADSTENIET *et al*., 2013). In addition, the World Health Organization (WHO) identifies rainwater harvesting as an alternative and improved water source with artesian wells. Water can be obtained from various sources, such as streams, lakes, rivers, ponds, rain, springs and wells. Although there are these sources, clean water, free of contaminants and safe exists only fleetingly in nature and is quickly contaminated by environmental and natural factors predominate and human action. Because of this, several scientific tools and procedures were developed to assess the contaminants of the water. The successful manipulation depends on regular monitoring of physical-chemical and microbiological quality of water (SUNDAY *et al*., 2014). The physical properties of water are related to the specific order of appearance and water with certain parameters such as color, temperature, taste and odor. However, choosing the best water quality aspect does not certify it. The chemical characteristics of water are associated with diluted substances that modify values of parameters as acidity, alkalinity, pH, turbidity, total hardness, in addition, are crucial to detect the presence of heavy metals in water (BORTOLI, 2016).

While the physico-chemical composition of the water can affect the safety, taste and appearance, bacterial contamination can not be detected by the appearance, taste or smell. Analysis of quality of water intends to ensure that the consumer is protected from pathogenic organisms such as bacteria, viruses and protozoa, such as total coliforms, faecal or thermotolerant and Escherichia coli (MULAMATTATHIL; Bezuidenhout; Mbewe, 2015). Sampling and analysis of this parameter should be done more regularly than the physical and chemical, as microbial contamination can have acute effects on the health of consumers (MULAMATTATHIL; Bezuidenhout; Mbewe, 2015). The current study was meant to examine the physical, chemical and microbiological parameters for determining the drinkability of the water stored in reservoirs rains in rural areas of the municipality of Condeúba, according to the Order of consolidation No. 5/2017 Annex XX Ministry the Health.

METHODOLOGY

This was a field research and experimental approach to quantitative and qualitative. The population involved in the research were those residing in rural areas of the municipality of Condeúba, which has no access to piped water, and use reservoirs as a means to store rainwater. The municipality of Condeúba the state of Bahia is located in the southwestern region of the state, the city has a land area of 1348.437 square kilometers, with a population in 2018 of 17,319 inhabitants, according to the Brazilian Institute of Geography and Statistics (IBGE). The semi-arid climate is hot and dry, with an average annual temperature between 23 ° C and 32 ° C, and the vegetation is of the type scrub. The field work was carried out in May 2019, in which the rainwater collection for physicochemical and microbiological analyzes were done randomly, in the morning in three rural communities in the municipality, Riachão, Mangarito and Mandacaru. Eight samples were collected in total, where they were identified as A1, A2 and A3 - Riachão; A4, A5 and A6 - Mangarito; A7 and A8 - Mandacaru. Samples for physical and chemical analysis were collected in three distinct and consecutive days and were placed in sterile containers 1500 mL, since the samples for microbiological analysis were collected on the third day of collection in sterile plastic bags 1kg. These were placed in an insulated box and transported to the laboratory to perform the analyzes, and the microbiological analysis was performed within 24 hours after collecting. In the laboratory, the procedures described in the Handbook of Practical Analysis of Water were used for the determination of physico-chemical parameters comprising the determination of pH, alkalinity, turbidity, conductivity, hardness, resistivity and total solids. The determination of hardness and alkalinity were made by titration method, while the conductivity, resistivity, total solids, turbidity and pH using specific equipment for each parameter. For microbiological analysis was used the technique of Chromogenic Enzyme Substrate IDEXX Colilert that detects presence or absence of total coliforms and Escherichia coli in 100 ml of each sample with results in 24 hours. The samples were incubated in the greenhouse at a temperature of 35 ± 0.5 ° C for 24 to 28 hours, according to manufacturer's recommendation.

RESULTS AND DISCUSSION

Physical-Chemical Analysis

Hydrogen potential (pH)

Table 1. pH of rainwater samples stored in reservoirs of rural Condeúba

Sample	pH	Temperature (°C)
1	4,38*	22,6
2	8,07*	21,4
3	6,82	23,0
4	6,60	23,4
5	7,10	20,4
6	7,10	22,0
7	5,15	23,4
8	6,70	21,0
Average	6,49	22,15
Consolidation Ordinance Nº 5/17 Attachment XX of MS - 6,0 a 9,5		

Source: Survey data (2019)
(*) Change

The pH is ranked as one of the most important quality parameters. The pH measurement concerns the acidity or alkalinity of the water. A sample is considered acidic if the pH is below 7.0. However, it is alkaline the pH is greater than 7.0 (Rahmanian *et al*., 2015). An acidic water, for example, can lead to corrosion of the medium in which it is inserted or passage. Meanwhile, alkaline water disinfection signals. The rainwater acidity depends on the concentration of anionic and cationic species. The acid pH reveals the presence of strong acids as neutral or alkaline pH by acid neutralization indicates carbonates, minerals or the ammonium. This may be due to sulfuric and nitric acid reaction in aerosols absorbed with alkaline carbonates in the particulate material. Thus the pH becomes a useful tool to measure the acidity of rain water (Chughtai; MUSTAFA; MUMTAZ, 2014). The results are shown in Table 1 where we can observe the pH values found in the physico-chemical properties of samples 1 analyzes, 2, 3, 4, 5, 6, 7 and 8 compared with the limit established in Ordinance Consolidation No. 5 2017 Appendix XX of the Ministry of Health. the pH of the water varied from 4.38 to 8.07 and resulted in an average of 6.49 with an average temperature of 22.15 ° C. This parameter rain water samples stored in reservoirs in accordance with the general mean is within the prescribed limit, thus characterizing samples which are suitable for consumption, in relation to this parameter. In the case of samples 1 (pH 4.38) and 7 (pH 5.15) these did not meet the standard stipulated in this way they are more aggressive than others and may associated with the fact of carbonic acid (H2CO3) in this water dominate the bicarbonate (HCO3-) which is a basic element of the water balance. Thus it requires a pH correction (Atherton; Matini; LOUZOLO-KIMBEMBE; & MBAYI Mabiala, 2019). In a study by Menezes *et al*. (2013) pH values ranged from 6.3 to 6.7, which is consistent with the average found in this study. In water samples analyzed by Viriato (2011) Paraiba values found varied from pH 8.3 to 9.6. Similar values were seen by Almeida (2018) for an analysis in Caraubas / RN with a range from 7.36 to 9.36 with a mean of 8.40.

Turbidity

Table 2. Turbidity of rainwater samples stored in reservoirs of rural Condeúba

Sample	Turbidity (UT)
1	0,47
2	1,92
3	0,43
4	0.63
5	1,23
6	0,40
7	8,18*
8	0,35*
Average	1,70
Consolidation Ordinance Nº 5/17 Attachment XX of MS - 5 UT	

Source: Survey data (2019)
(*) Change

The cloudiness and turbidity of the water caused by a variety of particles and is another fundamental parameter in the analysis of drinking water. This is measured by the amount of light reflected by a given sample water (Rahmanian *et al*., 2015). Water with high turbidity has been linked to pathogenic microorganisms. The legislation on drinking water recommends that the turbidity should not transmit any unusual change, and should be acceptable to consumers. In the case of water volumes when they are increased and mixed with materials, for example, derived from the roof tends to increase the turbidity (IGBINOSA & AIGHEWI, 2017). Table 2 depicts the turbidity values found in the physical-chemical analysis of samples 1, 2, 3, 4, 5, 6, 7 and 8 compared with the predetermined threshold in Ordinance Consolidation No. 5 2017 Appendix XX Department Health. the turbidity of water switched from 0.35 to 8.18 UT and UT gave an average of 1.70 UT. In the case of this parameter the rainwater samples stored in the reservoirs as the overall average is within the given limit, thus representing that the samples are suitable for use on this parameter. This factor can is related to the fact that over time the suspended solids in the water is deposited in the bottom of the tank used for storage of rainwater. However, the sample 7 (8.18 UT) did not meet the standard stipulated, this proved quite murky in which it was possible to observe the presence of impurities which certainly contributed to increase this parameter, thus making the sample unfit for human consumption. The results obtained by Almeida (2018) to study the water stored in tanks in rural communities Caraúbas / RN observed values between 0.04 and 8.48 UT, which resembles those of the present study. As well, Dias (2016) obtained pH values in their analysis between 0 and 8.4 UT with an average of 1.1 UT.

Electrical Conductivity and Resistivity

Table 3. EC and Resistivity of rainwater samples stored in reservoirs of rural Condeúba

Sample	Electric Conductivity (µS/cm)	Temperature (°C)	Resistivity (Ωm)
1	10,8*	22,5	8,8K*
2	81,0	22,1	12,3K
3	75,8	22,1	13,1K
4	103,9	22,2	9,6K
5	146,9*	21,4	13,2K
6	76,4	21,8	13,1K
7	76,4	22,1	22,6K*
8	100,2	21,0	9,9K
Average	79,9	21,9	12,8K

Source: Survey data (2019)
(*) Change

Electrical conductivity (EC) is the resistivity measurements that are equivalent to water's ability to resist or conduct an electric current. This is used to rapidly estimate the total concentration of ions or water-soluble salts, or its purity. The presence of dissolved solids such as chloride anion, nitrate, sulphate, phosphate, sodium, magnesium, and calcium cations, aluminum and iron in water samples will conduct electrical current through this (SAGAR; Chavan; PATIL; Shinde & KEKANE , 2015) (Rahmanian *et al*, 2015) (IGBINOSA & AIGHEWI, 2017) (Chughtai;. MUSTAFA; MUMTAZ, 2014). The values obtained are shown in Table 3 where we can observe the EC and resistivity discovered in the physicochemical analysis of samples 1, 2, 3, 4, 5, 6, 7 and 8. The EC water ranged from 10.8 µS / cm and 146.9 S / cm and resulted in an average of 79.9 S / cm with an average temperature of 21.9 ° C. Already switched resistivity of 8,8K the 22,6K averaging 12,8K, which is worth remembering that this should be the EC above values, ie, the higher their values better water quality. Furthermore, although not included in the Order is important to note that lower values EC 100 S / cm as in sample 1 (10.8) 2 (81.0) 3 (75.5) 6 (76.4) and 7 (44.7) mean a low mineralization of water harvested rain. Low levels of conductivity and resistivity high in rainwater suggests that rainwater captured was not charged by dissolved salts or other impurities roof, gutters and pipes (IGBINOSA & AIGHEWI, 2017). On the other hand, the high conductivity and low resistivity can lead to reduced aesthetic value of the water, imparting flavor mineralized water (Rahmanian *et al*., 2015). In water samples analyzed by Viriato (2011) EC values were 101.3 to 698.5 S / cm; Dias (2016) found values 61-685 S / cm, with an average of 120 S / cm; Wedge (2014) derived a range between 120 and 300 S / cm, yielding an average of 201 S / cm; Mitchell *et al*. (2018) had an average result of 167 S / cm, ranging from 112-234 S / cm, above values of this study.

Total dissolved solids

Table 4. TDS of rainwater samples stored in reservoirs of rural Condeúba

Sample	Total Dissolved Solids (mg/L)
1	5,46*
2	40,6
3	38,1
4	51,8*
5	37,8
6	37,6
7	22,1
8	50,1
Average	35,44
Consolidation Ordinance Nº 5/17 Attachment XX of MS - 1000 mg/L	

Source: Survey data (2019) (*) Change

The total dissolved solids (TDS) is the total amount charged ions by mobile means, including minerals, salts or dissolved metal in a given volume of water in mg / L (SAGAR; Chavan; PATIL; Shinde & KEKANE, 2015). In the case of rainwater TDS varies with its volume decrease and therefore the larger the volume of the largest rain is the number of suspended particles and dust, thereby TDS will rise (Chughtai; MUSTAFA; MUMTAZ, 2014). The Table 4 reproduces the TDS values seen in the physicochemical analysis of samples 1, 2, 3, 4, 5, 6, 7 and 8 compared with the threshold defined in Ordinance No. 5 Consolidation 2017 Annex XX of the Ministry of Health. the TDS of the water ranged from 5.46 mg / L to 51.8 mg / L and succeeded an average of 35.44 mg / L. For this parameter, rainwater samples stored in reservoirs in relation to the values found, as well as the overall average is within the defined threshold, thereby identifying the samples that are conducive for use in relation to the analyzed parameter. The values found by Almeida (2018) for samples of water from the settlement tank Glênio SA municipality Caraubas / RN to TDS is in a range of variation from 4.1 to 52.2 mg / L, which resembles in the present study. Already Days (2016) in their analysis noted that the stored water in the reservoirs showed values between 31 and 342 mg / L, with an average of 60 mg / L. Wedge (2014) noted that the samples taken, the values extravasated not recommended, a variation between 60 and 150 mg / L and averaging 100 mg / L which is somewhat higher than that found. Values obtained similarly Mitchell *et al*. (2018), which varied, and 56 to 113 mg / L.

Alkalinity

Table 5. Alkalinity of rainwater samples stored in reservoirs of rural Condeúba

Sample	Alkalinity (mg/L)
1	13,4*
2	41,4
3	41,4
4	52,0
5	61,4*
6	38,0
7	22,6
8	48,0
Average	39,8

Source: Survey data (2019)
(*) Change

Alkalinity is a measure of chemical water's ability to neutralize acid. This measure also the buffering capacity of the water or their ability to resist changes in pH upon the addition of acids or bases. The alkalinity of the raw water is mainly due to the presence of weak acid salts, although strong bases can also contribute, for example, OH- (SAGAR; Chavan; PATIL; Shinde & KEKANE, 2015). Given the above, although this parameter is not specified in the resolution of Ordinance No. 5 Annex XX it is of great importance to assess the overall quality of water. Moreover, having the knowledge of the alkalinity of the water, it becomes possible to determine concentrations of flocculating agents, as well as the corrosive characteristics and fouling the water analyzed. The results are shown in Table 5 where we can observe the alkalinity values found in physical-chemical analyzes of samples 1, 2, 3, 4, 5, 6, 7 and 8. Generally specimens having alkalinity below 40 mg / L tends to be more aggressive, low amount of neutralizing agents which resembles the overall average (39.8 mg / L) and samples 1, 6 and 7; alkalinity to between 40 mg / L and 100 mg / L water tends to come to equilibrium which means that the base neutralized acid, which is the case of samples 2, 3, 4, 5 and 8; for alkalinity of 100 mg / L and 150 mg / L water has a slightly fouling character, wherein no carbon deposition; and alkalinity greater than 150 mg / l water is replaced strongly fouling characteristic (Atherton; Matini; LOUZOLO-KIMBEMBE; & MBAYI Mabiala, 2019). In water samples analyzed by Mitchell *et al*. (2108) were the values for alkalinity 8 to 92mg / L, with a mean of 39.5 mg / L, which is consistent with that found in the present study. The results found by Dias (2016) to study the water stored in tanks in rural communities in João Pessoa / PB observed values between 27.7 to 95.6 mg / L, with a mean of 51.4 mg / L, which is also approximates that obtained in this analysis. Already Viriato (2011) in their analysis found values for alkalinity ranging from 16-58 mg / L.

Total hardness

Table 6. Total Hardness of rainwater samples stored in reservoirs of rural Condeúba

Sample	Total Hardness (mg/L)
1	26,8*
2	29,2
3	33,2
4	32,0
5	58,8
6	33,2
7	106,4*
8	65,2
Average	48,1
Consolidation Ordinance Nº 5/17 Attachment XX of MS - 500 mg/L	

Source: Survey data (2019)
(*) Change

The water hardness is expressed in mg / L of equivalent calcium carbonate ($CaCO_3$). The hardness indicates the concentration of multivalent cations in water, especially calcium (Ca2 +) and magnesium (Mg + 2), and to a lesser extent aluminum (Al + 3), iron (Fe +2), manganese (Mn + 2) and strontium (S + 2) (Silva, Brito, Duarte; Braz& SILVA, 2017). The low concentration of hardness is due to the low concentration of calcium and magnesium ions in rainwater. Therefore, it can be said that rainwater is not harsh and can be used for washing purposes (Chughtai; MUSTAFA; MUMTAZ, 2014). Although not present health importance, the use of water with excess of these ions can take, for example, the industrial level, the fouling problems, corrosion and loss of efficiency in heat transfer in boilers and cooling systems (MOUSINHO; GONÇALVES; HAIL & CARVALHO, 2014). Table 6 reflects the total hardness values found in physical-chemical analysis of samples 1, 2, 3, 4, 5, 6, 7 and 8 compared with the limit stipulated in the Ordinance of consolidation No. 5 2017 Annex XX Ministry of Health. the total hardness of the water ranged from 26.8 mg / L to 106.4 mg / L and gave an average of 48.1 mg / L. Related to this parameter the rainwater samples stored in reservoirs in accordance with the overall average, as with the values found are within the given threshold, representing samples that are appropriate for consumption associated with this parameter. A water is entitled to very hard when water exhibits a higher concentration of calcium carbonate to 180 mg / L; Hard with a concentration between 120 and 180 mg / L, moderately lasts between 60 and 120 mg / L (samples 7 and 8) and soft when the levels of calcium carbonate are <60 mg / L (samples 1, 2, 3, 4 5 and 6) (BAGNARA, 2014). In water samples studied by Viriato (2011) values were below the limits permitted by law and ranged from 39 to 80 mg / L. The values for total hardness in the samples studied by Almeida (2018) ranged between 44.14 and 63.76 mg / L. Dias (2016) in a study conducted in Sydney / PB found that the water stored in the tanks showed values between 30 and 160 mg / L, with an average value of 59mg / l. In water samples analyzed by Mitchell *et al*. (2018) values for total hardness were between 18.8 to 86.5 mg / L, with a mean of 38 mg / L.

Microbiological Analysis

To analyze the microbial quality of rain water stored in the two parameters studied tanks were used, the presence / absence of total coliforms and Escherichia coli through rapid test Colilert IDEXX. According to the test made, it is Posito coliforms when the samples present a yellow color; yellow / fluorescent positive for E. coli; Negative colorless. According to Kaushik; Balasubramanian & Dunstan (2014) the microbiological quality of water is usually analyzed to identify the presence of faecal indicator bacteria such as E. coli and coliforms totail. The presence of these microorganisms in water samples is used to indicate the presence of faecal pollution and the possibility that feces associated with pathogens may also be present, E. coli being considered best indicator of faecal contamination in water. Because of this, the presence of these pathogens in the water is unacceptable from a public health point of view, it points out that a major health risk. Of the eight samples evaluated immediately after reagent addition and incubation period in the greenhouse, all showed a yellow color which is indicative of total coliforms. Already when analyzing the presence / absence of E. coli seven samples exhibited yellow color / fluorescence upon exposure to ultraviolet (UV) light and only one (Sample 5) remained colorless. Thus, according to the provisions of Ordinance Consolidation No. 5 2017 Annex XX Ministry of Health rainwater evaluated are not suitable for use due to the presence of these microorganisms in virtually all samples, which according to analysis must be absent in 100 ml.

According Dehghani-sanij *et al*. (2016) to several reasons for the presence of microbial contaminants in the reservoirs may be: any contaminants input by venting through openings present in the reservoirs; contamination due to waste inlet humans or animals in the reservoirs; and lack of timely dredging, cleaning and chlorination of the reservoirs. It is known, however, that the presence of total coliforms in the rain water collected from the roof is planned, since the roof is exposed to air and the feces of animals, rich in organic compounds and contributes to the development of microorganisms. Based on the results found in this study can compare them to similar surveys that also involve the use of the technique of Chromogenic Enzyme Substrate IDEXX Colilert for analysis of different sources of water and which has been held by several authors: In Bugres-MT bar, Ferreira (2017) via rapid test Colilert detected contamination of samples evaluated throughout the study period, which become alarming, since the infection rate was predominant in almost 100% of the samples. It is understood that such rate due to lack of sanitation in the region and the period of realization of samples (rain). Furthermore Silva (2017) found the microbiological quality (Total Coliforms and Escherichia coli) of water supplied seven public schools in the urban area of the municipality of Hope-PB, using the method of substrate Chromogenic Enzyme Colilert. After application of the Colilert reagent and incubated for 24 hours at 37 ° C, it was observed that the seven samples analyzed sampling 6 and 7 showed yellow in color, indicating the presence of coliforms. However it has not detected the presence of E.coli in any of the samples because they did not exhibit fluorescence under ultraviolet light. Marquezi (2010) compared the efficiency of the method with rapid colilert Colitag, to perform the analysis of basic water and river samples was observed that all samples showed contamination by E. coli coliforms in both tests, demonstrating the equality of the methods in this way, compared to the similarity of the results obtained, one could be selected for analysis of pathogens. Sandri (2010) to examine the roof rainwater in the Boa Vista area, testified that in all samples was found the presence of total coliforms, which when quantified ranged from 90 to 16,000 MPN / 100 mL. The same place although the presence of total coliforms in roof rainwater is something to be expected that the roof is exposed to air and the bird droppings, is rich in organic compounds and contributing the growth of microorganisms.

Brooks *et al*. (2017) to check the quality of the water in Nyanza region Kenya, matched concentrations of Escherichia coli qualitatively and quantitatively with the Colilert and the housing bag test (CBT) in the origins of water (well, river, rain) and drinking water stored in 35 homes in western Kenya. Within the shared quantification range, E. coli concentrations listed Colilert and CBT were similar and generated a significant coefficient of correlation of 0.896 with 95% confidence interval. Invik *et al*. (2017) in order to explore techniques to describe the microbial quality of the water wells in rural areas made use of the rapid test Colilert IDEXX, taking into account space-time, time series analysis, mapping and relative risk. Testing of Escherichia coli and coliform of public and private water wells were examined between 2004 and 2012 in Alberta, Canada. Overall, the assessed wells, 14.6% had total coliforms and in 1.5% of wells tested positive for E. coli. Baum *et al*. (2014) conducted a study to examine the relationship between microbial quality of drinking water and the source of water in the region of Puerto Plata, the Dominican Republic, in which aimed to identify the presence / absence of E. coli. In his study he analyzed 409 families in 33 communities. The results showed that 47% of improved sources (rain, pipe, well protected) drinking water presented considered high risk to very high and therefore unsafe for consumption. However, the probed communities, you could see that still a large portion of households consume water contaminated by microbes, arising from improved water sources. Given the above and according to the quality of the water samples, sees the need for greater care in the use of this source of water, that despite being natural, depending on how this is captured and stored, there may be substances and pathogens to change its quality. For this, preventive and corrective measures can be used such as: perform cleaning of the roof and gutters before collection; always despise the first rainwater before storing it in reservoirs, which already helps in roof cleaning; make cleaning the tanks at least once a year; boil and filter the water before use; if necessary perform chlorination.

Conclusion

In physical chemistry determining the quality of rainwater samples stored in the reservoirs of rural areas in the municipality of Condeúba / BA could be found little variation compared to the standards established by the Brazilian legislation, Consolidation Ordinance No. 5/2017 Annex XX

Ministry of Health. Furthermore, when assessing the microbiological quality of these was noticed the presence of pathogens in accordance with the legislation in force mentioned, should be ausentente in 100 ml. It is concluded, finally, that a rainwater reservation system is efficient to supply water to a population, preserved the clean use of it. It is recommended to study water purification alternatives such waters, such as the use of operations such as filtration and disinfection with frequent monitoring of the water quality of these reservoirs analyzing other parameters relevant to its potability.

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