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Microbiological screening of pure water sold in Kano Metropolis.

I. I. Indabawa* and M. A. Wudil

Department of Biological Sciences, Faculty of Science, Bayero University, P. M. B. 3011, Kano, Nigeria

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ABSTRACT: Microbiological examination for coliform using membrane filtration technique was carried out on twenty different brands or “pure water” samples collected from different areas within Kano metropolis. Six (30%) of the brands showed coliform count of less than one count/100 ml. These were graded as excellent. Eight (40%) of the brands have a coliform count ranging between 1 and 3 per ml and were graded as satisfactory. Similarly, six (30%) of the samples showed coliform count ranging from 4 – 6/100ml and were graded as intermediate in accordance with the recommended standard of WHO (1970) and EC (1980). It is recommended, therefore, that NAFDAC in Kano State should expedite action towards enforcing the laws for good quality assurance in this industry.

Key Words: Potable water; Water quality control; Microbiological analysis.

Introduction

Water meant for human consumption should be potable (i.e free from pathogens and deleterious chemicals. Chesebrough, (1984). Water can endanger health and life, if it harbour pathogenic micro-organisms and their presence is associated with infectious epidemiological concerned namely: typhoid, paratyphoid fever, dysentery, cholera, gastroenteritis, amoebiasis, helminthiasis ect. Jane (1990)

The business of pure water has become popular in Kano and its environ. Drinking water packed in sealed cellophane paper popularly known as “pure water” is hawked in many streets in Kano, and is bought by travellers and passers-by alike who have no choice. The idea behind this business venture is to satisfy the populace increasing demand for potable water, this to a large extent be commended. But a limiting factor observed, is the lack of proper monitoring of the business by the appropriate government agencies to check why, how, who and more importantly the safety as relate to public health. These limitations have however encouraged both the skilled and the unskilled alike to be involved in this type of business practices unchecked. The involvement of the latter, in particular arises a very serious question to how safe is this “pure water” production for the public consumption. Most individual as , earlier mention involved in this business practice are unskilled, lacking the basic knowledge of necessary procedures already adopted in meeting with standard of water quality for public consumption. The need therefore arises to seriously address this various limitations observed in this fast growing business, so as to curtail possible epidemic.

*To whom correspondence should be addressed.

Ideally, all drinking water samples from the distribution system including consumers premises should be free from coliform. In practice however, this standard is not always attainable. It has therefore been recommended by the World Health Organization (WHO), 1980, that coliform organisms should not be detected in 100ml of any two consecutive samples, no sample should contain more than 10 coliform organism per 100ml of water but in emergencies 0-10 faecal coliform/100ml = reasonable quality, 10 - 1000 faecal coliform/100ml = grossly polluted.

Accordingly, the present research was conducted to ascertain the quality and safety of some brands of pure water being sold for public consumption within Kano metropolis in the year, 1999.

Materials and Methods

Twenty different brands of pure water samples were purchased from different locations (bought from market places, roundabouts, kiosks, and motor parks) in Kano, weekly for a period of one month. Tap water sample was also collected at similar intervals. All the water samples were collected aseptically and immediately taken to the laboratory for presumptive coliform count using membrane filtration technique after the method of Chesebrough (1984)

Results

The results of mean coliform count per 100ml of the twenty brands of pure water samples examined was presented in Table 1. The result showed that six (30%) samples coded 1,2,7,14,17 and 19 had zero coliform count per 100ml. This clearly indicated that the treatment procedure employed by these producers were effective. As such these six samples were classified as "Excellent" quality grade for human consumption. Eight (40%) samples coded 5,6,8,10,15,16,18 and 20 had coliform count ranging between 1-3 per 100ml and were graded as satisfactory. Other six (30%) samples coded 3,4,9,11,12 and 13 had a coliform count ranging from 4-6 100ml and were graded as intermediate which all fit for human consumption. The mean coliform count for tap water during the study was 9 per 100ml and was graded as intermediate.

Table 2 shows the total bacterial count/100ml. On MacConkey Agar. Throughout the 20 samples, the bacterial count ranged between 1.0×10^2 - 4.0×10^3 implying that the samples did not contain a serious overload of bacteria that may show any significant contamination of the samples. For according to World Health Organization (WHO) 1971 and EC (1980). The drinking of water samples would be said to be fearful if it contains total viable count of up to 10^6 CFU/100ml.

Discussion

Water has long been attributed as a mean for transmission of some specified disease agents like cholera, typhoid fever, amoebiasis and others. However, no source of water is 100% free of contamination by micro-organism despite the effective treatment procedure employed McPeter et al (1980).

The results from microbial analysis on twenty brands of aome pure water samples sold in Kano metropolis revealed that the total coliform count/100ml throughout the twenty brand samples examined ranged between 1-6/100ml. This is in line with the standard value set for potable drinking water as recommended by WHO (1971; 1980). According to WHO 1971; 1980 a water sample containing 0-10 faecal coliform/100ml of water is of reasonable quality and fit for human consumption. This therefore implies that all the water samples examined were free from dangerous contamination.

Table 1: Total coliform count of twenty water samples hawked in Kano streets using MacConkey agar.

Sample Code	Brand name samples	Mean Coliform count/100ml	Quality grading base on bacteriological standards adopted by WHO. (1971).
1	Three star	0	Excellent
2	Nancy	0	Excellent
3	Laseleridges	5	Intermediate
4	Pure table water	4	Intermediate
5	Victory	3	Satisfactory
6	Snow	2	Satisfactory
7	Welcome	0	Excellent
8	Gamji	3	Satisfactory
9	Bevick	5	Intermediate
10	Royal	2	Satisfactory
11	Peacock	6	Intermediate
12	DJM	6	Intermediate
13	Dozie	4	Intermediate
14	De-light	0	Excellent
15	U.S.S.R.	2	Satisfactory
16	My choice	2	Satisfactory
17	Bamac	0	Excellent
18	Natural	3	Satisfactory
19	Santana	0	Excellent
20	T.T.C	1	Satisfactory
	Tap water	9	Intermediate

Table 2: Total bacterial count/100ml of samples on MacConkey agar.

Sample code	Brand name of samples	Total bacterial count on Macconkey Agar
1	Three star	2.2×10^3
2	Nancy	1.8×10^3
3	Laseleridges	2.0×10^3
4	Pure table water	1.6×10^3
5	Victory	1.2×10^3
6	Snow	8.0×10^2
7	Welcome	4.0×10^3
8	Gamji	1.2×10^3
9	Bevick	2.0×10^3
10	Royal	9.0×10^2
11	Peack	2.4×10^3
12	DJM	2.5×10^3
13	Dozie	1.6×10^3
14	De-light	1.0×10^2
15	U.S.S.R	8.0×10^3
16	My choice	8.0×10^3
17	Bamac	4.0×10^3
18	Natural	1.2×10^3
19	Santana	6.0×10^3
20	T.T.C.	1.0×10^2
	Tap water	9.0×10^3

Moreover, this result also conforms with the work of Halliru (1998), who examined the quality of water hawked in kano streets. The result showed that water in sealed cellophane bags (pure water) and water packed in sealed plastic (swan water) had a faecal coliform of 1-5 and 0/100ml respectively and are fit for human consumption. However, the water in unsealed cellophane bags and well water had a faecal coliform

count of 100 and 1000/100ml. Therefore the values did not conform with the recommended standard values set for drinking water according to WHO (1980).

The treated water samples coded 1,2,7,14,17 and 19 with zero coliform count have been graded as “Excellent” and are considered fit for consumption and these were at no reason serve as a source of water borne disease. This clearly indicated that sanitation and disinfection were extensive Trad, (1992). Similarly those coded 5,6,8,10,15,16,18 and 20 have been graded as “satisfactory”, therefore meeting an appreciable limit of safety for consumption. Others coded 3,4,9,11,12 and 13 have been investigated and graded as “intermediate”. The observed graded samples have clearly indicated that the mode of treatment process vary with different plants and best elimination rate of indicator organism occur by extensive treatment Trad, (1992). The slight high coliform count in the tap water samples may be due to contamination through broken pipes and inadequate chlorination, which might leave some microorganism after treatment.

Conclusion

The business of “pure water” in Kano continues to be one of the major ways of providing portable drinking water for human consumption.

The result of the microbiological examination for coliform using membrane filtration technique carried out in 1999 on twenty different brands of pure water showed that 30% of all the pure water tested sold for public consumption within Kano metropolis can be said to be excellent quality, while 40% can be graded to be of satisfactory quality and another 30% of the tested samples were graded as intermediate quality. From, all the pure water samples investigated they were found to be within the standard quality limit set by WHO (1971; 1980) and E.C. (1980) and are therefore found “fit” for human consumption.

Recommendations

The “pure water” business is aimed at improving water quality meant for human consumption. The business is popular, therefore there is a need for both government and members of public to pay attention on the safety of the water from this industry. In view of that, the following recommendations are suggested:

1. The National Agency for Food and Drug Council (NAFDAC) should see to it that procedures are registered with the Council, and their wares checked, making sure they conform with the laid down standards of the agency. This step will go a long way in establishing the type of individual involved in such business. I.e. whether skilled or unskilled.
2. NAFDAC and other government agencies should be monitoring the business regularly. This will make pure water producers very cautious of their illegal practices.

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