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Bacteriological Quality Assessment of Some Selected Kunun Zaki Drinks Marketed in Maiduguri

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Abstract: *Contemporary cheaper, locally produced Kunun zaki and Zobo drink consumption patterns of most people in Nigeria have recently increase due to it nutritional value coupled the current economic challenges that make the conventional commercial carbonated soft drinks such as coke become more expensive. The high demand of such coupled by poor handling during production and packaging drinks may compromise the quality of product with high possible microbial contamination which have shown to cause diarrhea, and other adverse health effects. The study aimed at bacteriological quality assessment of Kunun zaki marketed within three markets Monday, Custom, Bulumkutu Kasuwain and Baga Road in Maiduguri. The bacteriological quality of five randomly selected Kunun zaki samples were most probable bacteria count method. The results of this study releveled that most of the bacteria isolated and identified are belong to Enterobacteriaceae family including Escherichia coli, Salmonella spp, and Staphylococcus aureus. Total heterotrophic bacteria count of Kunun zaki collected and analyzed from different markets count are as follows Monday markets 3.25 x 10^5, 2.95 x 10^4 , 1.15 x 10^3 percentage frequency of E. coli, Salmonella and Staphylococcus respectively, on the other hand the bacteria isolates from custom, ranges from 1.25 x 10^5, 2.95 x 10^4 , 1.15 x 10^3 on the other hand total bacteria counts of sample analysed from Baga Road market include 25 x 10^5, 2.95 x 10^4 , 1.15 x 10^3 for E coli, Salmonella and Staphylococcus respectively. Proper washing of the Kunun zaki drink and handling of raw materials, adequate implementation of packaging were found as effective critical control points. Training of producers on the hazards analysis and good manufacturing and hygiene practices have been suggested as strategies to improve the safety of indigenous drink.*

Keyword: *Bacteriological, Kunun zaki, Zobo, Maiduguri.*

Introduction

Kunu-zaki is an excellent fermented non-alcoholic beverage, with favorable characteristic palatable and sweet-sour taste marketed and widely consumed in majorly in northern part of

Nigeria especially during the hot weather (Adeniran, et al., 2020; Aboh & Oladosu, 2014; Adeleke & Abiodun, 2010; Amusa & Odunbaku, 2009; Anumudu & Anumudu, 2019; Braide et al., 2018; Edem et al. 2017). (Okechukwu et al., 2011). The nutritional beverage is consumed mostly in the morning and afternoon as a food supplement/appetizer. The beverage can be locally prepared using millet (*Pennisetum glaucum*), maize (Zea mays), wheat (Triticum aestivum) or sorghum (*Sorghum bicolor*) and flavoured with ginger. Thus, contemporary cheaper, locally produced Kunu zaki and Zobo drink consumption patterns of most people in Nigeria have recently increase due to it nutritional value coupled the current economic challenges that make the conventional commercial carbonated soft drinks such as coke become more expensive. Kunun zaki drinks are beverages that locally prepared using water, sugar and flavoring agents. The high demand of such coupled by poor handling during production and packaging drinks may compromise the quality of product with high possible microbial contamination which have shown to cause diarrhea, and other adverse health effects."

However, in the present days, the street foods and drinks product is undoubtedly one of the most important sectors of activity providing urban employment in the Nigerian cities. These incomes allow several households to cover the family's financial needs. Sadly, street foods are perceived as a major public health risk due to the lack of basic infrastructure, difficulties in controlling the large number of meals served, their diversity and nature. (Adeniran, et al., 2020). (Aboh & Oladosu, 2014) (Adeleke & Abiodun, 2010). (Amusa & Odunbaku, 2009) (Anumudu & Anumudu, 2019). (Braide et al., 2018). (Edem et al. 2017). (Okechukwu et al., 2011). (Umaru et al., 2014).

2. Materials and methods

Study area

The study was conducted in Borno state in north-eastern Nigeria. Its capital is Maiduguri. The state was formed in 1976 from the split of the North-Eastern State. The state is located within latitude 10 N and 14 N and longitude 11 30 E and 14 45 E. The State which has an area of 61, 435sq km shares borders with Republic of Niger to the north, Republic of Chad to the northeast and Cameroon Republic to the east. It also shares borders with Adamawa State to the south, Gombe State to the southwest and Yobe State to the west. It comprised 27 local Government Areas.

2.1. Sample collection and preparation

Nine different (9) locally produced and marketed soft Kunun zaki drinks were randomly purchased from some sellers in three different markets, Bulumkutu Kasuwa Market area, Monday Market and Custom Markets in Borno state. All samples purchased had no manufacturing dates stated on them. The samples were immediately transported to the Department of Microbiology laboratory of University of Maiduguri in a cooler of ice-packs for bacteriological assessment. The drinks were packaged and sold in recycled coke, fanta, sprite or medium water bottles of 35cl at 50 naira each.

Bacteriological assessment of the samples

Each sample of Kunun zaki drinks were gently mixed properly by inversion three times and 1ml of each sample (neat) were aseptically pipetted and transferred to

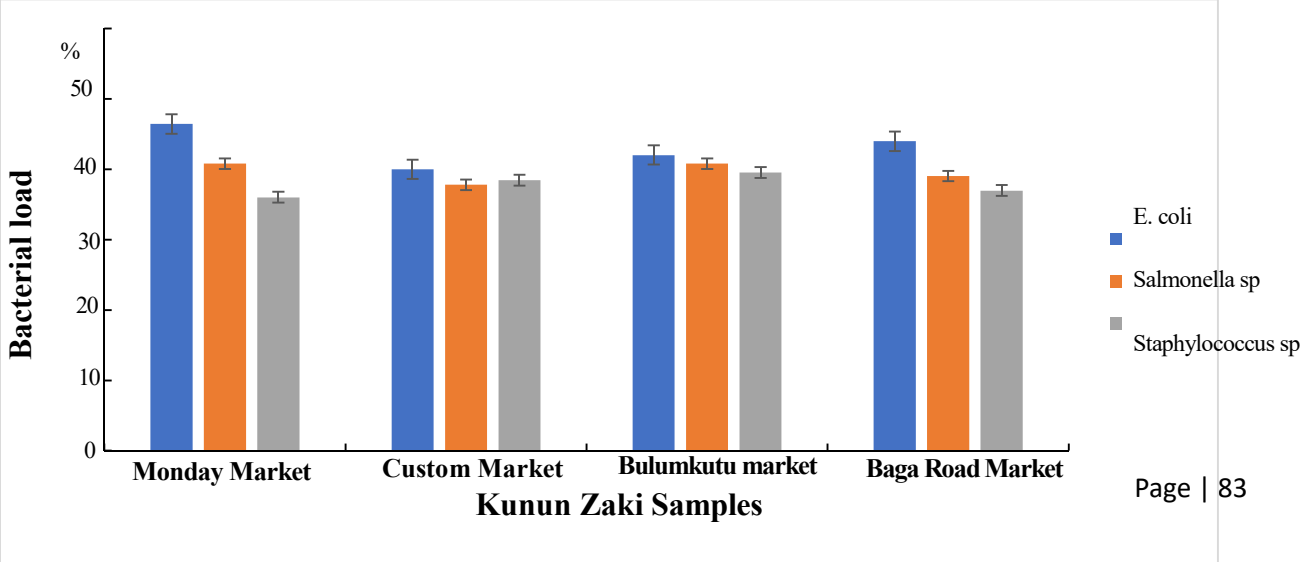
9 mL of sterile distilled (sterilized by autoclaving at 121° C for 15 minutes). Subsequent serial dilutions were made up to 10^5 and 0.1ml of the last dilution (10^5) and then inoculated on the surface of solidified nutrient agar and MacConkey agar and inoculated plates were incubated at 37° C for 18 - 24 hours and examined for growth. Following successful isolation, the isolates were successfully identified by gram staining and biochemical tests. The microbial loads of the ready to Kunun zaki purchased were evaluated using standard methods. Serial decimal dilutions (10-1 to 10-6) were done using 9 mL of sterile saline solution (0.85%NaCl) and 1 mL of each sample collected. Between two successive dilutions, the previous suspension was vortexed at350 rev/min for 2-3 min before being used for the preparation of the next dilution. At the end, the appropriate dilution was chosen and 1 mL of the aliquot was plated in specific solid medium (Adeniran, et al., 2020). (Aboh & Oladosu, 2014) (Adeleke & Abiodun, 2010). (Amusa & Odunbaku, 2009) (Anumudu & Anumudu, 2019).

RESULTS AND DISCUSSION

Table 1 shows total heterotrophic bacteria count of Kunun zaki collected and analyzed from different markets count are as follows Monday markets 3.25 x 10^5, 2.95 x 10^4 , 1.15 x 10^3 percentage frequency of E. coli, Salmonella and Staphylococcus respectively, on the other hand the bacteria isolates from custom, ranges from 1.25 x 10^5, 2.95 x 10^4 , 1.15 x 10^3 on the other hand total bacteria counts of sample analysed from Baga Road market include 25 x 10^5, 2.95 x 10^4 , 1.15 x 10^3 for E coli, Salmonella and Staphylococcus respectively. On the other hand figure 1 show the percentage frequency distribution various bacteria identified from samples analyzed from four markets. The results clearly showed that Escherichia coli occurred with a higher frequency, followed by Salmonella spp and then Staphylococcus spp.

Table 1. Total heterotrophic bacteria count of Kunun zaki collected and analyzed from different markets

S/N	Markets	*Escherichia coli*	*Salmonella* spp	*Staphylococcus* spp
1	Monday	3.25 x 10^5	2.95 x 10^4	1.15 x 10^3
2	Custom	1.25 x 10^5	1.95 x 10^3	1.05 x 10^2
3	Bulumkutu	1.93 x 10^5	1.01 x 10^2	1.25 x 10^3
4	Baga Road	2.35 x 10^4	1.00 x 10^3	1.35 x 10^2



Percentage frequency of three different bacteria isolated from four samples analyzed.

CONCLUSION

The bacteria isolated from the Kunun zaki samples examined shows a great concern to the consumers as the result of the huge contamination of the product with disease causing microbes. Such contamination can be minimize and totally controlled by using aseptic methods of preparation and packaging of the products.

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