

Bacteriological Properties of Commercially Available Fermented Sorghum Beverages (Motoho) Against Selected Spoilage Microorganisms in Maseru

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Abstract: The fermented sorghum beverage (*Motoho*) is one of the famous traditional beverages found in the markets of Lesotho. It is readily consumed by the entire families including babies in Lesotho therefore its safety is of paramount importance. The objective of the study was to assess the microbiological, physical and chemical characteristics of *Motoho* against potential spoilage strains of *Escherichia coli* and *Staphylococcus aureus* which cause Foodborne Illnesses. The unfermented sorghum beverage (*Lesheleshele*) was used as a control. Selected commercially available samples of fermented and unfermented sorghum beverages were inoculated with *Escherichia coli* ATCC-25922 and *Staphylococcus aureus* ATCC Baa-1026 respectively. Samples were incubated at room temperature, 4°C and 8°C and the presence of bacteria was tested at every 3 hrs. Fermented sorghum porridge showed to have some inhibitory properties against *E. coli* and *Staph aureus* at different incubation temperatures. The findings also showed that there is a significant difference in sugar content and pH of products from different manufacturers. More studies are still needed for the large scale production to set standards in producing healthier and safe beverages.

Keywords: Motoho, Bacteriological properties, spoilage microorganisms and Lesotho.

1. Introduction

The fermented sorghum beverage (*Motoho*) is one of the eminent and nutritious traditional beverages found in the markets of Lesotho [1]. It is readily consumed by the entire families including babies in Lesotho therefore its safety is of paramount importance. High

prevalence of diarrheal disease among infant's results from underlying safety problem, and this is critical to the survival and growth of children who are malnourished and maybe HIV positive [2,3]. The objectives of this study was to assess the microbiological, physical and chemical characteristics of *Motoho* against potential spoilage strains of



(a)



(b)

Figure 1. Sorghum fermented beverage before (a) and after cooking (b).

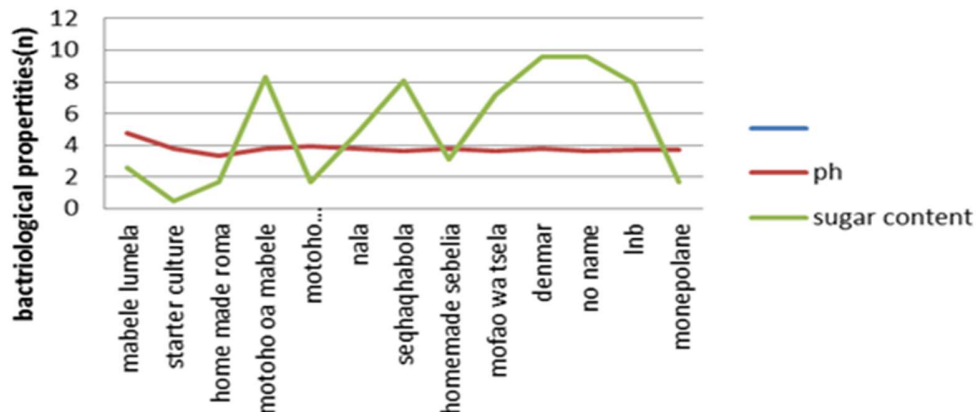


Figure 2. pH and Sugar content of different samples of *motoho*.

Escherichia coli and *Staphylococcus aureus*, which cause Foodborne Illnesses.

2. Materials and Methods

Microbial challenge test in "motoho":

The unfermented sorghum beverage (*Lesheleshele*) was used as a control. Selected commercially available samples of fermented and unfermented sorghum beverages were inoculated with *Escherichia coli* ATTC-25922 and *Staphylococcus aureus* ATCC Baa-1026 respectively [4,5]. Samples were incubated at room temperature, 4°C and 37°C and the presence of bacteria was tested at every 3 hrs.

Table 1: Indicates the results of the samples inoculated with *E coli* under different temperatures

| Name of the sample | 37°C (Incubator) | Room temperature | 4°C Refrigerator |
|---|------------------|------------------|------------------|
| Mabele -lumela | (+3) | Scanty | Scanty |
| Starter culture | (+3) | (+2) | (+1) |
| Home- made Roma | (+3) | (+1) | Scanty |
| Motoho oa mabele | (+3) | (+1) | (+1) |
| Motoho prepared in the nutrition department | (+3) | (+2) | (+1) |
| Nala | (+2) | Scanty | No growth |
| Seqhaqhabola | (+3) | (+2) | (+1) |
| Home- made Sebedia | (+3) | Scanty | Scanty |
| Mofao- oa- tsela | (+2) | (+1) | Scanty |
| Denmar | (+3) | (+1) | Scanty |
| No name | (+3) | (+3) | (+1) |
| LNB | (+3) | Scanty | Scanty |
| Monepolane | (+3) | Scanty | No growth |

Table 2: Summary of Gram reaction test

| Name of the sample | Shape | Gram Stain |
|---------------------------------|---------|------------|
| Home made roma | Cocci | +ve |
| Denmar | Bacilli | +ve |
| Mofao oa tsela | Cocci | +ve |
| Starter culture | Bacilli | +ve |
| LNB | Cocci | +ve |
| Home made Sebedia | Cocci | +ve |
| Monepolane | Cocci | +ve |
| Mabele lumela | Bacilli | +ve |
| No name | Cocci | +ve |
| Motoho oa mabele | Bacilli | -ve |
| Seqhaqhabola | Cocci | +ve |
| Motoho prepared in nut. Kitchen | Bacilli | +ve |

Determination of sugar content in motoho:

The sugar content in motoho was determined using REF-85 Refractometer (Hagavish st, Israel). Distilled water was used as blank.

The end product of sorghum fermented beverage "motoho" (a) Before cooking (slurry) and (b) after cooking (*motoho*).

3. Results and Discussion

Motoho sugar content analysis:

There is a significant difference in sugar content and pH of products from different manufacturers (Figure 1). Fermented sorghum porridge showed to have some inhibitory properties against *E. coli* and *Staph aureus* at different incubation temperature (Figure 2).

Table 1 below shows *Escherichia coli* culture inoculation to various motoho samples and incubation under different temperatures. Generally it can be seen that high growth is observed at high temperatures (37°C and at room temperature) and lower growth is observed in refrigeration temperature (4°C). Table 2 Shows samples before inoculation of the pathogen. It can be seen that only one samples shows gram negative bacteria, indicating spoilage.

4. Conclusions

Due to strong experimental evidence that shows that, lactic fermentation inhibits the growth of pathogenic microorganisms, extending shelf life during storage and increases the availability of nutrients of such foods, it is highly recommended that people should include fermented foods in daily meals. It is also recommended that in Lesotho where fermented foods “motoho” are already employed as a weaning food, its hygienic preparation and safety should be supported and highly encouraged.

More studies are still needed for the large scale production to set standards in producing healthier and safe beverages.

5. References

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