Phytochemical and mineral content of pulp drink and analogue yoghurt from pretreated balanites aequyptiaca fruit pulp

Abstract
Production, phytochemical characteristics and mineral contents of pulp rink and analogue yoghurt from pretreated balanites aequyptiaca fruit pulp were investigated. Production of rink a yoghurt analogue ever mae from balanite fruit via boiling sifting, water elution to make pulp rink. A yoghurt stock was ration with pulp rink sample at 50:50 dilution and allow to ferment over night to make analogue yoghurt from balanites pulp. Results revealed that tanin, saponin, flavonoids and alkaloids were present in pup rink qualitatively. Tannin and saponin were not found in yoghurt samples except flavonoids and a alkaloids. The mineral content were favorable in the drink, for Zn at (0.0306mg/L), Cu at (0.6328mg/L), Fe at (2.796mg/L), Mg at (18.5767mg/L) and Ca at (6.6783mg/L) compared with the control (Zn, 0.0250mg/L) (Cu,0.0103mg/L)mg/L, (Fe,1.3001mg/L), (Mg 17.1005mg/L), (Ca, 46.3778mg/L). Only Zn and Cu were found abundant in balanites analogue yoghurt at 50:50 blend ratios compare with the control. Production of balanites juice and analogue yoghurt are possible and could fight age related nutrition, hidden hunger and alternative to imported black currant drink and expensive powdered milk base which are not affordable by our rural society.

Keywords: production, balanite drink, analogue yoghurt, phytochemical, minerals, nutrition

Introduction
There have been significant use of plants, for food and as animal protein substitutes, this is arousing interest among consumers, dieticians and nutritionists. Plants are now being used in the preparation of food of high energy value by dietetics: yoghurt, flour for babies, jams, marmalades. It has been reported that dates products have been developed including Ketchup, biscuits, ice, Tamarheep (a mixture of flour of dates and milk), flour of dates and yogurt with extract of dates. Fresh fermented dairy products such as yoghurt are widely consumed foods in many countries. Yogurt is one of the most popular products sold on the market because of the diversification of its constitution, such as fat yoghurt, probiotic yoghurt, yoghurt mousse, ice cream yoghurt, liquid yoghurt for drinking yoghurts are healthy food because of its beneficial live bacteria. However, in competition with pathogenic bacteria in both food and the environment. The extract of balanites such as pulp, leaves, juice had been reported to be rich in micro and macro nutrients especially proteins and vitamins. Dates are rich in fiber and pectin minerals such as (Ca, P, K, Fe) and other biological active substances like Group B vitamins, essential amino acids and polyphenols. The purpose of this research is to Make yoghurt analogue from balanites pulp drink, as a functional food base material that may meets consumers' expectations in the modern day of infection, diseases and age related issues .These potentials, balanites polyphenols contents has. This research work seeks to establish the best analogue yoghurt and juice products from balanites pulp produce at various pretreatments for children and adult that depends on milk, milk intolerance people as well as ovo-lacto vegetarians. The bioactive, minerals and vitamins contents may help against hidden hunger.

Materials and methods
Balanites pulp: The fruit from balanites were picked from the floor from and around the university campus. Sorting was done on pulp made by boiling. The pulp was sieved and diluted with an equal amount of water to make a balanites pulp drink

Milk used for the manufacture of yoghurt
The milk used was full cream dehydrated powdered peak brand milk.

Starter organism: Raw fresh cow milk was used for dilution culture preparation or as operation culture. Milk contains lactic acid fermenters with dominant species containing Streptococcus thermophilus and Lactobacillus bulgaricus as natural sourced starter.

The balanites drink used for manufacture of yoghurt: The drink was obtained after heating fruit to pulping at 80°C for one hour, followed by hot sifting there after diluting with equal amount of water to make balanites pulp drink. This drink was also used as base for the analogue yoghurt preparation (Figure 1) (Figure 2).

Yoghurt making: The preparation of the balanites yoghurt analogue was done at the science laboratory of the Federal University Gashua. Standard yoghurt with a modification concerning the substitution of balanites was prepared. This was simmered with pulp drink on combination. The culture sample was allowed to stay for 24 hours for maturation of the yoghurt analogue. This is shown in Figure 1.
Phytochemical screening of fresh yoghurt

Analogue yoghurt, currant drink and pulp drink of Balanites aegyptiaca fruits were carried out according to the methods of (Figure 1). Alkaloids

0.5g extracts from pulp drink and pulp yoghurt were diluted with 10mL of acid alcohol, boiled and filtered. To 5ml of the filtrate was added 2mL of dilute ammonia, 5mL of chloroform was added and shaken gently to extract the alkaloid base. The chloroform layer was extracted with 10mL of acetic acid. This was divided into two parts each of the samples. Mayer’s reagent was added to one portion of the sample and Draggendoff’s reagent was added to other portion of the sample. The formation of cream (with Mayer’s reagent) or reddish brown precipitate (with Draggendoff’s reagent) indicates the presence of alkaloid.

Figure 1 Making of Analogue ration Yoghurt.
Phytochemical and mineral content of pulp drink and analogue yoghurt from pretreated balanites aegyptiaca fruit pulp

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Figure 2 Ration yoghurt from Pre treatments.

Figure 3 Flow diagram for making balanites pulp drink and (50:50) yoghurt analogue.

**Saponins**

To 0.5g of pulp drink and analogue yoghurt were added 5mL of distilled water in a test tube. The solutions was shaken vigorously and observed for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and is shaken vigorously. An appearance of creamy mass of small bubbles indicates the presence of saponins.

**Tannins**

0.5g of the samples (pulp drink and pulp yoghurt) were boiled for 5 minutes separately in 10mL of water in a test tube and then filtered. Drops of 0.1% ferric chloride was added and was observed. Coloration indicted the presence of tannins.

**Flavonoids**

On the sample of pulp drink and yoghurt, fragments of magnesium ribbon were added to the test the drink and yoghurt solution followed by adding Hydrochloric acid, pink scarlet, crimson red or occasionally green to blue colour appears after few minutes.

**Analysis of minerals**

The mineral elements of Zn, Cu, mg, Fe and Ca were determined.

**Flame photometer test**

About 2g of liquid drink and control sample were weighed and placed in acid-washed test digestion tubes respectively. TenmL of
Table 2: Phytochemical characteristics of Balanites Aegyptiaca pulp yoghurt

<table>
<thead>
<tr>
<th>Sample Tannin</th>
<th>Saponin</th>
<th>Flavonoid</th>
<th>Alkaloid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>A1</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>A2</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>A3</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

Key: A1 = 50:50 zero cold temperature yoghurt
      A2 = 50:50 one hour boiled yoghurt
      A3 = 50:50 boiled pulp for 10 minutes

Table 3: Mineral Analysis of Balanites aegyptiaca Pulp yoghurt Product showed that (Zn 0.6020mg/L), (Cu 0.326mg/L), (Fe 2.796mg/L), (Mg 18.5767mg/L) and (Ca 6.6783mg/L) were present. Zinc mineral ions, copper, iron and magnesium in pulp rink were higher than the control sample this revealed that minerals element was made available at these treatment and dilutions. These could be inferred that balanites pulp drink can compete with black currant drink esteemed nutritionally important to fight age and cancer related illnesses. The low presence of Ca might have come from inhibitory action of saponin which is confirmed present in the pulp drink (Table 3).

Table 4 shows mineral Analysis of Balanites aegyptiaca Pulp Yoghurt Product showed that (Zn 0.6020mg/L), (Cu 0.326mg/L), (Fe 2.252mg/L), (Mg 14.73mg/L) and (Ca 6.6783mg/L) were present. Zinc mineral ions and copper were higher in the analogue yoghurt samples compare to control. However iron, magnesium, and calcium were lower comparing to control. This high content of Zn and Cu observations and low F, mg and Ca in the yoghurt samples may have come from fermentation process that allows the use and generation of certain mineral ions (Appendixes).
Table 3 Some mineral analysis of Balanites aegyptiaca pulp drink product

<table>
<thead>
<tr>
<th>Sample</th>
<th>Zn (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Mg (mg/L)</th>
<th>Ca (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (Black Currant Drink)</td>
<td>0.025</td>
<td>0.0103</td>
<td>1.3001</td>
<td>17.1005</td>
<td>46.3778</td>
</tr>
<tr>
<td>A1</td>
<td>0.0206</td>
<td>0.6328</td>
<td>2.796</td>
<td>18.5767</td>
<td>6.6783</td>
</tr>
</tbody>
</table>

Key, A=Drink from 1 hour boiling

Table 4 Some mineral analysis of Balanites aegyptiaca pulp yoghurt product

<table>
<thead>
<tr>
<th>Sample</th>
<th>Zn (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Mg (mg/L)</th>
<th>Ca (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (Natural Yoghurt)</td>
<td>0.3501</td>
<td>0.1067</td>
<td>5.2603</td>
<td>132.6</td>
<td>195.614</td>
</tr>
<tr>
<td>B1</td>
<td>0.602</td>
<td>0.3267</td>
<td>2.2526</td>
<td>14.73</td>
<td>6.6782</td>
</tr>
</tbody>
</table>

Key, B=50.50 blend ration yoghurt

Conclusion

Phytochemicals were present in the pulp drink and analogue yoghurt, which may have effect on nutrient absorption or metabolism. The mineral contents were abundant especially zinc. Zinc is one critical mineral element for healthy living therefore analogue yoghurt and pulp drink from balanites fruits are good sources. Because of the presences of certain pro-bio actives the yoghurt products will be an excellent anti-oxidant, anti-microbial and mineral substances as well as reduce the burden on dry milk stock which is very expensive in Nigeria. The products are easy to make and abundant hence can alleviate hidden hunger in our rural society as well help against protein energy malnutrition.

Acknowledgements

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Conflict of interest

Author declares that there is no conflict of interest.

References


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