PROXIMATE COMPOSITION, SENSORY EVALUATION, AND PRODUCTION COST OF FIG MILK SHAKE PREPARED FROM BUFFALO MILK

P.R Mule¹, R.P. Barbind², R.L. Korake³, D.P. Gavit⁴

ABSTRACT

Milk shake, a cold beverage, prepared from milk and ice cream, is a palatable and perfect health–diet. It can be made more nutritious and health protector with addition of fig (Ficus carica) due to its rich mineral contents, zero cholesterol level, and health invigorating antioxidant, anticancerous, and antibacterial properties against harmful pathogens. There has been no scientific study on milk shake, blended with fig (Ficus carica), particularly from buffalo milk, which is more nutritious, and rank higher with respect to sensory appeal over cow milk. This paper describes the preparation, proximate composition, sensory evaluation, and production cost of buffalo milk shake blended with dried fig fruit at different proportion, viz., 5%, 7.5%, and 10%. Proximate analysis of the fig milk shakes revealed that it contained significantly (P≤0.05) higher fat%, protein%, total sugar%, and ash% than buffalo milkshake (control). Comparison between the treatment samples revealed that milk shake with 10% fig had significantly (P≤0.05) higher protein content (4.52%) and sugar content (12.78%) than the other two samples (5% fig and 7.5% fig). The overall acceptability score (8.3) was the highest in the sample with 7.5% fig, but it did not differ (P≥0.05) from the sample with 5% fig (8.25). The production cost of milk shake with 5% fig (Rs. 73.50) was lower than the other two samples. The study tends to conclude that milk shake prepared from buffalo milk with a blend of 5% fig (Ficus carica) was more consumer-friendly than buffalo milk shake (control) due to its better sensory appeal and high nutritive value, and was more cost-effective than the other two variants. Incidentally, this is the first empirical documentation on fig milkshake prepared from buffalo milk.

KEY WORDS

Fig, Milk shake, Production cost, Proximate composition, Sensory qualities
INTRODUCTION

Milk shake, a cold beverage, prepared from milk and ice cream, is a palatable and perfect health–diet due to its low fat and sugar contents, and high milk solids-not-fat (MSNF) content than ice cream (Sharma and Gupta, 1978). It can be made more delicious and nutritious with addition of fruits. Fig (*Ficus carica*) is one such fruit.

Fig belongs to a very unique genus “Ficus” in the family of mulberry. It is a pantropical tree native to the ancient Caria region between the Mediterranean and Black Seas, but now cultivated worldwide, including India.

Fig is rich in minerals (Ficsor *et al.*, 2013) and has antioxidant (Crisosto *et al.*, 2010), anticancerous (Rubnov *et al.*, 2001) and antibacterial properties against harmful pathogens like *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Klebsiella pneumoniae* (Hosainzadegan *et al.*, 2012). It is used to reduce high cholesterol level, which is one of the main reasons for coronary heart disease (Cakilcioglu and Turkoglu, 2007). Fig was always an elite ingredient in the health promoting Mediterranean diets for millennia, and is liked for its color, lusciousness, and aroma (Solomon *et al.*, 2006).

Milkshake is a western delicacy prepared from cow milk. However, the dairy products prepared from buffalo milk has been found to be more nutritious, and ranked higher for the sensory appeal than cow milk (Murtaza *et al.*, 2008, 2013).

Milk shake is being prepared adding many fruits, including fig, but no scientific study has been done on the physicochemical and sensory profile of fig milk shake. This is reported for the first time, in this paper, that too fig milk shake prepared from buffalo milk.

MATERIAL AND METHODS

Treatment of fruits: Fresh and ripe figs were procured from the local market, washed well for cleaning and removal of extraneous material, dried with the help of a clean cloth, and then cut into small pieces with the help of knife and crushed by using homemade grinder for preparation of milk shake.

Preparation of milk shake: Milk shake was prepared as per Sharma and Gupta (1978) with minor modifications, as per the flow chart given below (Figure-1).

FIGURE-1. PREPARATION OF FIG MILK SHAKE

[FLOW CHART]

- Pre-Heating of milk (38-40°C)
- Filtration of milk
- Standardization of milk (Fat-6%, SNF-9%)
- Pan-Heating of milk
- Addition of sugar (10%)
- Addition of Custard powder (1%)
- Addition of crushed Fig
- Addition of Sodium alginate (0.5%)
- Heating of Mix (71°C, 30 min)
- Ageing of Mix (6-10°C, 2-3 h)
- Deep Freezing of Mix (-2 to -6° C)
- Final Product (Milk shake)
Treatment details
T1 = Control (without Fig)
T2 = Crushed Fig @ 5% of buffalo milk (w/w)
T3 = Crushed Fig @ 7.5% of buffalo milk (w/w)
T4 = Crushed Fig @ 10% of buffalo milk (w/w)

Proximate composition: The various constituents of milk shake were estimated in the following manner, fat % by Gerber’s method (IS, 1977), protein% by Micro Kjeldhal’s method (Meneffee and Overman, 1940), total sugar% and ash% by the volumetric (lane-Eynon) method (IS, 1981), and acidity as per IS specification (IS, 1961).

Sensory evaluation: The sensory characteristics, viz., colour and appearance, flavor, body and texture, and overall acceptability were evaluated by a panel of five assessors using “9-point Hedonic scale” developed by Quarter Master, Food and Container Institute, USA (Gupta 1976). The scores ranged between 1 and 9, depending upon the liking. The descriptors were, extremely liked (9), liked very much (8), liked moderately (7), liked slightly (6), neither liked nor disliked (5), disliked slightly (4), disliked moderately (3), disliked very much (2), and extremely disliked (1). The scores were pooled and mean score for overall acceptability was worked out.

Cost of production: The ingredients required for preparation of Fig milk shake was calculated on the basis of prevailing market price and cost per liter of Fig milk shake was worked out. The cost towards fuel and other items was considered under miscellaneous charges.

Statistical Analysis: The data were subjected to statistical analysis by using Completely Randomized Design as described by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

Proximate composition: Proximate analysis revealed that fig milk shake contained significantly (P≤0.05) higher fat%, protein%, total sugar%, and ash% than the control (Table-1).

Comparison between the treatment samples revealed that there was significant (P≤0.05) improvement in protein% with the increase in fig content in the milk shake, and was the highest (4.52%) in the sample with 10% fig. Total sugar was significantly (P≤0.05) higher in 10% fig sample (12.78%) than the other two samples, whereas the difference between them was non-significant (P≥0.05).

Table-1. Proximate composition of fig milk shake.

<table>
<thead>
<tr>
<th>Constituent (%)</th>
<th>Control</th>
<th>5% Fig</th>
<th>7.5% Fig</th>
<th>10% Fig</th>
<th>SE</th>
<th>CD at 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat</td>
<td>5.91b</td>
<td>6.01a</td>
<td>6.02a</td>
<td>6.04a</td>
<td>0.025</td>
<td>0.075</td>
</tr>
<tr>
<td>Protein</td>
<td>4.22d</td>
<td>4.26c</td>
<td>4.43b</td>
<td>4.52a</td>
<td>0.048</td>
<td>0.144</td>
</tr>
<tr>
<td>Total Sugar</td>
<td>12.58c</td>
<td>12.72b</td>
<td>12.73b</td>
<td>12.78a</td>
<td>0.010</td>
<td>0.030</td>
</tr>
<tr>
<td>Total solid</td>
<td>23.56NS</td>
<td>24.06NS</td>
<td>24.33NS</td>
<td>24.59NS</td>
<td>0.18</td>
<td>0.55</td>
</tr>
<tr>
<td>Acidity</td>
<td>0.06d</td>
<td>0.07c</td>
<td>0.10b</td>
<td>0.14a</td>
<td>0.002</td>
<td>0.006</td>
</tr>
<tr>
<td>Ash</td>
<td>0.85b</td>
<td>1.07a</td>
<td>1.13a</td>
<td>1.25a</td>
<td>0.073</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Note: (1) Means are based on 6 samples. (2) Means sharing common superscripts do not differ at P≤0.05.
Table 2. Sensory parameters of fig milk shake.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Control</th>
<th>5% Fig</th>
<th>7.5% Fig</th>
<th>10% Fig</th>
<th>SE</th>
<th>CD at 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>8.06c</td>
<td>8.31ab</td>
<td>8.38a</td>
<td>8.20b</td>
<td>0.045</td>
<td>0.13</td>
</tr>
<tr>
<td>Texture</td>
<td>8.19bc</td>
<td>8.22b</td>
<td>8.29a</td>
<td>8.16c</td>
<td>0.016</td>
<td>0.048</td>
</tr>
<tr>
<td>Flavour</td>
<td>8.09bc</td>
<td>8.23ab</td>
<td>8.29a</td>
<td>8.04c</td>
<td>0.012</td>
<td>0.15</td>
</tr>
<tr>
<td>Acceptability</td>
<td>8.11c</td>
<td>8.25bc</td>
<td>8.30a</td>
<td>8.13bc</td>
<td>0.138</td>
<td>0.427</td>
</tr>
</tbody>
</table>

Note: (1) Means are based on 6 samples. (2) Means sharing common superscripts do not differ at $P \leq 0.05$.

Table 3. Production cost (Rs/litre) of fig milk shake.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Components</th>
<th>Unit cost (Rs)</th>
<th>5% Fig (Rs)</th>
<th>7.5% Fig (Rs)</th>
<th>10% Fig (Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Milk</td>
<td>30.00/litre</td>
<td>28.50 (950 ml)</td>
<td>27.70 (925 ml)</td>
<td>27.00 (900 ml)</td>
</tr>
<tr>
<td>2</td>
<td>Sugar</td>
<td>30.00/kg</td>
<td>3.00 (100 g)</td>
<td>3.00 (100 g)</td>
<td>3.00 (100 g)</td>
</tr>
<tr>
<td>3</td>
<td>Fig</td>
<td>360.00/kg</td>
<td>18.00 (50 g)</td>
<td>27.00 (75 g)</td>
<td>36.00 (100 g)</td>
</tr>
<tr>
<td>4</td>
<td>Custard powder</td>
<td>250.00/kg</td>
<td>2.50 (10 g)</td>
<td>2.50 (10 g)</td>
<td>2.50 (10 g)</td>
</tr>
<tr>
<td>5</td>
<td>Sodium alginate</td>
<td>200.00/kg</td>
<td>1.00 (5 g)</td>
<td>1.00 (5 g)</td>
<td>1.00 (5 g)</td>
</tr>
<tr>
<td>6</td>
<td>Electricity</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>7</td>
<td>Labour</td>
<td>128.00/h</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
</tr>
<tr>
<td>8</td>
<td>Fuel</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>--</td>
<td>73.50</td>
<td>81.70</td>
<td>90.00</td>
</tr>
</tbody>
</table>

Sensory parameters: Sensory parameters revealed that overall acceptability was the highest in the sample with 7.5% fig (8.3), but it did not differ ($P \leq 0.05$) from the sample with 5% fig (8.25).

Production cost: The production cost of milk shake with 5% fig (Rs. 73.50) was lower than the other two samples (Table 3, Figure 1).

The results were not discussed due to lack of empirical literature on the subject, since it is the first report on fig milkshake prepared from buffalo milk.

CONCLUSION

The study concluded that blending of Fig (5%) with buffalo milk resulted in superior quality milk shake and was cost efficient.
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