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## Quality evaluation of Sorghum based fermented milk beverage

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### Abstract

Content in *Sorghum based fermented milk beverage* sample T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> differed significantly ( $P < 0.05$ ). The protein content of *Sorghum based fermented milk beverage* in T<sub>0</sub> was lowest (2.77%) while it was highest in T<sub>3</sub> (3.78%). Ash content in *Sorghum based fermented milk beverage* sample T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> differed significantly ( $P < 0.05$ ). The ash content of *Sorghum based fermented milk beverage* in T<sub>0</sub> was lowest (0.72%) while it was highest in T<sub>3</sub> (0.90%). The total sugar content of *Sorghum based fermented milk beverage* in T<sub>0</sub> was lowest (3.28%) while it was highest in T<sub>3</sub> (9.32%). The total solid content of *sorghum based fermented milk beverage* in T<sub>0</sub> was lowest (11.27%) while it was highest in T<sub>3</sub> (18.91%). The acidity content of *Sorghum based fermented milk beverage* in T<sub>3</sub> was lowest (0.75%) while it was highest in T<sub>0</sub> (0.85%). control (T<sub>0</sub>) and sensorily best sample (T<sub>2</sub>) were considered. The SPC was observed more or less same; T<sub>0</sub> ( $13.20 \times 10^2$  cfu /ml) and T<sub>2</sub> ( $10.80 \times 10^2$  cfu /ml). The samples under study showed presence of yeast and mould count at very low levels, (*Sorghum based fermented milk beverage* samples were prepared and evaluated for various quality (sensory, chemical and microbial) parameters. The minimum score obtained by sample T<sub>3</sub> ( $7.52 \pm 0.05$ ) and was very closer to T<sub>2</sub>, T<sub>1</sub> and T<sub>0</sub>, they were at par. Sample T<sub>2</sub> was graded as "liked very much". About the chemical parameters the Fat content in Sorghum based Fermented milk beverage sample T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> differed significantly ( $P < 0.05$ ). The fat content of *Sorghum based fermented milk beverage* in T<sub>0</sub> was lowest (2.32%) while it was highest in T<sub>3</sub> (2.55%). Protein  $8.94 \times 10^2$  cfu /ml for T<sub>2</sub> and ( $10.26 \times 10^2$  cfu /ml) for T<sub>0</sub>. Coliforms was nil which is an indicative that means hygienic conditions were followed during production, processing, handling and storage.

**Keywords:** Fermented milk beverage, Sorghum.

### 1. Introduction

Fermented milk beverage contains appreciable amount of milk proteins and phospholipids. During the manufacturing of fermented milk beverage the digestibility of proteins and fats is significantly increased, due to the effect of lactic acid and the proteolytic activity of lactic cultures and due to the applied homogenization and lipase activity of cultures. An improved utilization of calcium, phosphorus and iron may be due to the effect of lactic acid. A considerable decrease of vitamins B<sub>12</sub> and B<sub>6</sub> may be partly balanced by a considerable increase in folic acid. A significant increase of choline may be beneficial in the fat oxidation and the regulation of the cholesterol metabolism.

Milk fermented beverage are valuable component of the mixed diet in addition to an increased digestibility. It stimulates the secretion of gastric and intestinal juices.

Sorghum has high nutritional value, with high levels of unsaturated fats, protein, fiber and minerals like phosphorus, potassium, calcium, and iron. It also has more antioxidants than blueberries and pomegranate. Sorghum consumption reduces the risk of colon and skin cancer more than any other grains. Consumption of sorghum promote cardiovascular health and lower cholesterol.

### 2. Material and Method

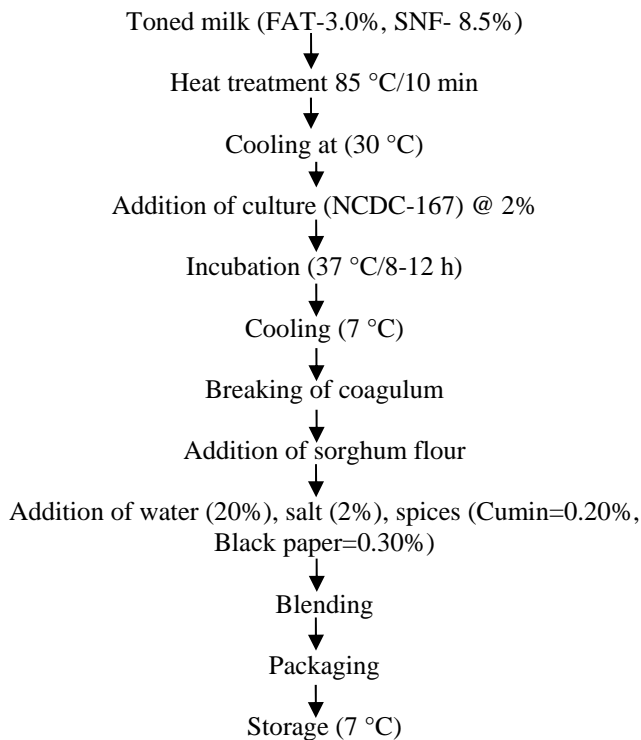
Based on the results of various pre -experimental trials, the experimental trials were planned and conducted. Water, salt and sorghum flour at predecided levels were incorporated in *dahi* for the preparation of *Sorghum based fermented milk beverage*. Level of water and salt were kept constant for each treatment.

On the basis of different levels of sorghum flour; various lots of *sorghum based fermented milk beverage* were prepared and evaluated for sensory, chemical and microbial quality. Selection of starter culture: Different lots of *dahi* were prepared in the laboratory using individual starter cultures procured from market under four different brands. Rest of the conditions were maintained uniform. *Dahi* prepared in laboratory was evaluated

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organoleptically by a panel of judges using 9 point Hedonic scale. The *dahi* starter culture (selected brand) was thus considered for further use in these studies.

**Schematic flow diagram for manufacture of Sorghum based fermented milk beverage:-**



**2.1. Proximate analysis:** Fat content was determined by Gerber’s method as per procedure stated in IS: 1224 (Part – I) 1977. Protein nitrogen content was determined by semi – microkjeldahl’s method described in IS: 1981 (Part – II). This was multiplied by 6.38 to obtain protein percentage. Lactose was determined as per Lane and Eynon method given in IS –

1479 (Part – II) 1961, Ash content was determined by IS: 1479 (Part – II) 1961. Total solids were determined by IS: 1479 (Part –II) 1961. Acidity (% LA) was determined by IS: 1479 (Part– I) 1960. For the chemical analysis of Sorghum the percentage of proteins, carbohydrates and ash in sorghum was determined by Ratnavathi CV (2013) [24]. For sensory evaluation score card given by Dharam Pal and Gupta (1985) with slight modification (Ashwani, 1992) was used for sensory evaluation of sorghum based fermented milk beverage. Standard Plate Count (SPC) was determined by adopting standard procedure using Standard Plate Count Agar (SPCA) media as mentioned by Amin (1997). Yeast and Mould Count (YMC) was determined as per procedure described in IS: 5403 (1969) using Potato Dextrose Agar (PDA). Coliform count of *sorghum based fermented milk beverage* samples was determined as per procedure described in IS: 5550 (1970) using McConkey’s agar. Different media like SPCA, PDA, MA, LPA and MRS were prepared as per the procedures explained by Amin (1997).

**3. Results and Discussion**

**3.1. Chemical composition:** The fat content of the *sorghum based fermented milk beverage* sample under treatment T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> was 2.32, 2.40, 2.46 and 2.55, respectively and it differed significantly (P < 0.05) from each other (Table 1). The protein content of sorghum based fermented milk beverage is differed significantly (P < 0.05) from each other. The ash content of T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> is 0.72, 0.77, 0.84, 0.90 per cent, respectively. The ash content in sorghum based fermented milk beverage is differed significantly (P < 0.05) from each other. The total sugar content of T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> was 3.28, 5.42, 7.53, 9.32 per cent, respectively and it differed significantly (P > 0.05) from each other. It is observed that the total solid content of T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were 11.27, 14.00, 16.62, 18.91 per cent, respectively and it differed significantly (P > 0.05) from each other. The higher acidity content in T<sub>0</sub> while lower acidity content can observe in T<sub>3</sub> and it differed significantly (P < 0.05) from each other.

**Table 1:** Chemical composition of Sorghum based fermented milk beverage (per cent)

Constituents (per ml)						
Treatments	Fat	Protein	Ash	Carbohydrate	Total solids	Acidity
T <sub>0</sub>	2.32	2.78	0.72	3.28	11.27	0.85
T <sub>1</sub>	2.40	3.12	0.77	5.42	14.00	0.84
T <sub>2</sub>	2.46	3.45	0.84	7.53	16.62	0.80
T <sub>3</sub>	2.55	3.77	0.90	9.32	18.91	0.75
S.E. (±)	0.01	0.02	0.01	0.29	0.03	0.01
C.D at 5%	0.03	0.04	0.02	0.62	0.06	0.01

**3.2. Organoleptic evaluation of lassi:** It is noticed that the colour and appearance score of T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> sample of lassi was 7.84, 7.92, 8.08 and 7.52 percent respectively which differ significantly (P > 0.05) (Table 2). The flavour and taste of T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> is 8.26, 7.90, 8.68 and 7.88 respectively which differ significantly (P > 0.05). The consistency T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> sorghum based fermented milk beverage were 8.33, 8.20, 8.52 and 8.15, respectively which differ significantly (P > 0.05). The overall acceptability score of T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> sorghum based fermented milk beverage was 7.21, 7.24, 7.33 and 7.19, respectively which differ significantly (P > 0.05). The overall acceptability of finger millet *lassi* increases as increase in the level of Sorghum flour.

**Table 2:** Organoleptic evaluation of sorghum based fermented Milk beverage

Treatment	Flavour and Taste	Colour appearance	consistency	Overall acceptability
T <sub>0</sub>	8.26	7.84	8.33	7.80
T <sub>1</sub>	7.90	7.92	8.20	7.84
T <sub>2</sub>	8.68	8.08	8.52	8.04
T <sub>3</sub>	7.88	7.52	8.15	7.68
S.Ed. (±)	0.13	0.15	0.11	0.10
C.D. at 5 level	0.56	0.32	0.27	0.23

**3.3. Microbial evaluation of sorghum based fermented milk beverage:** From the present study it was observed that the Standard Plate Count of T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> is 13.20, 14.00, 10.80 and 15.80 x 10<sup>2</sup> cfu /ml respectively which differ significantly (P < 0.05) (Table 3). The coli form count in

sorghum based fermented milk beverage treatment T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> was 0.00, 0.00, 0.00 and 0.00 cfu /ml respectively. It was observed that the yeast and mould count of T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> was 10.26, 10.24, 8.94 and 11.10 x 10<sup>2</sup> cfu /ml respectively.

**Table 3:** Microbial Analysis of Sorghum based fermented milk beverage.

Treatment	Standard Plate count	Cfu/ml	Yeast and mould count
T <sub>0</sub>	13.20	0.00	10.26
T <sub>1</sub>	14.00	0.00	10.24
T <sub>2</sub>	10.80	0.00	8.94
T <sub>3</sub>	15.80	0.00	1.10
S. Ed. (±)	0.36	0.00	0.19
C.D at 5% level	1.08	0.00	0.58

**3.4. Cost analysis:** There slight variation in cost of all treated *sorghum based fermented milk beverage* sample prepared with Sorghum. The *sorghum based fermented milk beverage* prepared with addition of 10% flour having the cost Rs.36.79

per lit (Table 4). Good quality value added *sorghum based fermented milk beverage* with more acceptability might be prepared by addition of 10% sorghum flour.

**Table 4:** Cost analysis of Sorghum based fermented milk beverage.

Treatment	Toned milk	Sorghum	Salt	Cumin Powder	Starter culture	Black pepper	Water	Total
T <sub>0</sub>	28.69	00	0.36	1.44	3.60	4.8	0.35	39.24
T <sub>1</sub>	27.22	0.85	0.36	1.44	3.60	4.8	0.35	38.62
T <sub>2</sub>	25.74	1.70	0.36	1.44	3.60	4.8	0.35	37.99
T <sub>3</sub>	24.27	2.55	0.36	1.44	3.60	4.8	0.35	37.37

#### 4. Conclusion

It may be concluded that good quality, value added *sorghum based fermented milk beverage* with more acceptability be prepared by addition of sorghum flour.

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