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STUDIES ON FINGER MILLET *LASSI*

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ABSTRACT

Lassi **samples were prepared and evaluated for various quality (sensory, chemical and microbial) parameters. The minimum score obtained by sample T_0 (7.11 ± 0.05) and was very closer to T_2 and T_3, they were at par. Sample T_2 was graded as "liked very much". About the chemical parameters the Fat content in lassi sample T_0, T_1, T_2 and T_3 differed significantly (P < 0.05). The fat content of *lassi* in T_3 was lowest (1.82%) while it was highest in T_0 (2.70%). Protein content in *lassi* sample T_0, T_1, T_2 and T_3 differed significantly (P < 0.05). The protein content of *lassi* in T_0 was lowest (3.20%) while it was highest in T_3 (4.18%). Ash content in *lassi* sample T_0, T_1, T_2 and T_3 differed significantly (P < 0.05). The ash content of *lassi* in T_0 was lowest (0.73%) while it was highest in T_3 (0.85%). The total sugar content of *lassi* in T_0 was lowest (14.43%) while it was highest in T_3 (16.26%). The total solid content of *lassi* in T_0 was lowest (21.06%) while it was highest in T_3 (23.11%).). The acidity content of lassi in T_3 was lowest (0.74%) while it was highest in T_0 (0.88%). control (T_0) and sensorily best sample (T_2) were considered. The SPC was observed more or less same; T_0 (13.20 X 10^2 cfu /ml) and T_2 (10.80 X 10^2 cfu /ml).The samples under study showed presence of yeast and mould count at very low levels, (8.94 X 10^2 cfu /ml) for T_2 and (10.26 X 10^2 cfu /ml) for T_0. Coliforms were very less detected which is an indicative that utmost hygienic conditions were followed during production, processing, handling and storage.**

Key words: Fermented milk product, Finger millet, *Lassi*.

INTRODUCTION

Lassi, one of the fermented milk products is ideal for serving with hot dishes as it helps the body to digest the spicy food. *Lassi* is a digestive aid for the afternoon meal; it settles the upset stomach and it is the perfect cooling agent (Anonymous, 2006). *'Chaach'* or *'Mattha'* also called as *'lassi'* refers to desi buttermilk, which is the byproduct obtained while churning curdled whole milk with crude indigenous devices for the production of desi butter (De, 1997). Along with all essential nutrients required for growth, development and tissue differentiation, fermented milks contain growth hormones – gastrin and insulin (Arora, 2006). In India, a great variation is reported in technology of *lassi* preparation as well as the basic ingredients used. Presently, the kinds of *lassi* available in different markets of India are plain *lassi*, salted *lassi*, *Bhang lassi*, Amritsari *lassi*, Soya *lassi*, Vanilla *lassi*, Saffron *lassi*, *Makhaniya lassi* and *lassi* prepared using pulp or juice of fruits like – Mango *lassi*, Mango – passionfruit *lassi*, Mango – pineapple *lassi*, Mango – strawberry *lassi*, Banana *lassi* and Pineapple *lassi*, etc.

Finger millet is an important staple food in Eastern and Central Africa as well as some parts of India. The calcium and iron contents in finger millet varieties have been reported to be 220-450 and 3-20 mg per cent, respectively (Balkrishna Rao *et al.*, 1973).

Finger millet is a rich source of calcium (300-350 mg %), phosphorus (283 mg %) and iron (3.9 mg %) (Gopalan *et al.*, 2000). It is a rich source of vitamins *viz.*, thiamine, riboflavin, folic acid and niacin. Finger millet is especially valuable as it contains the amino acid methionine, which is lacking in the diets of hundreds of millions of the poor who live on starchy staples as cassava, plantain, polished rice or maize meal. Finger millet can be ground and cooked into cakes, puddings or porridge. The grains are made into a fermented drink (or beer) in Nepal

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and many parts of Africa. The straw from finger millet is used as animal fodder. Therapeutic value of finger millet is to improvement in digestibility and assimilation of ingested nutrients by means of fermentation (Tamang and Holzapfel, 1999; Arora, 2006). Conditioning of human gastro – intestinal tract by lactobacillus and a moderate cholesterol lowering action (Onge *et al.*, 2000; Ashar and Prajapati, 2000a and b). The study was taken in NDRI Karnal in which bajra lassi was prepared and overall liking of bajra lassi was found to be higher among urban consumers than the rural consumers.These findings reflect the popularity and willingness of urban consumers to purchase traditional foods produced in a food plant (Jadoun 2011).

MATERIALS AND METHODS

Based on the results of various pre - experimental trials, the experimental trials were planned and conducted. Water, sugar and finger millet flour at predecided levels were incorporated in *dahi* for the preparation of *lassi*. Level of water and sugar were kept constant for each treatment. On the basis of different levels of finger millet flour; various lots of *lassi* 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 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.

Flow chart for preparation of finger millet *lassi*

Milk
↓
Heat treatment 85°C/10 min
↓
Cooling at (20°C)
↓
Addition of culture @ 1.5 %
(individual starter culture produced from market)
↓
Incubation (30°C/12 h)
↓
Cooling (7°C)
↓
Breaking of coagulum
↓
Addition of finger millet flour @ 2, 3, 4 %
↓
Addition of sugar (10%)
↓
Addition of water (20%)
↓
Blending
↓
Packaging (Polystyrene 200 ml)
↓
Refrigeration (7°C)

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 Finger millet the percentage of proteins, carbohydrates and ash in finger millet was determined by Ranganna (1977). For sensory evaluation score card given by Dharam Pal and Gupta (1985) with slight modification (Ashwani, 1992) was used for sensory evaluation of lassi. 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 *lassi* 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).

RESULTS AND DISCUSSION

Chemical composition: The fat content of the *lassi* sample under treatment T_0, T_1, T_2, T_3 was 2.70, 2.34, 2.18 and 1.82, respectively and it differed significantly ($P < 0.05$) from each other (Table 1). The protein content of finger millet *lassi* is differed significantly ($P < 0.05$) from each other. The ash content of T_0, T_1, T_2 and T_3 is 0.73, 0.75,

TABLE 1: Chemical composition of *lassi* (per cent)

Treatment	Constituents (per cent)					
	Fat	Protein	Ash	Total Sugar	Total solid	Acidity% L.A.
T_0	**2.70**	**3.20**	**0.73**	**14.43**	**21.06**	**0.88**
T_1	**2.34**	**3.60**	**0.75**	**14.83**	**21.53**	**0.84**
T_2	**2.18**	**4.04**	**0.82**	**15.51**	**22.55**	**0.78**
T_3	**1.82**	**4.18**	**0.85**	**16.26**	**23.11**	**0.74**
SE+	0.05	0.04	0.01	0.02	0.09	0.007
CD at 5%	0.16	0.12	0.03	0.06	0.27	0.02

0.82,0.85per cent, respectively .The ash content in finger millet *lassi* is differed significantly ($P < 0.05$) from each other. The total sugar content of T_0, T_1, T_2 and T_3 was 14.43, 14.83, 15.51, 16.26 per cent, respectively and it differed significantly ($P < 0.05$) from each other. It is observed that the total solid content of T_0, T_1, T_2 and T_3 were 21.06, 21.53, 22.55, 23.11 per cent, respectively and it differed significantly ($P < 0.05$) from each other. The higher acidity content in T_0 while lower acidity content can observe in T_3 and it differed significantly ($P < 0.05$) from each other.

Organoleptic evaluation of lassi: It is noticed that the colour and appearance score of T_0, T_1, T_2 and T_3 sample of lassi was 7.97, 7.66, 7.54 and 7.17 per cent respectively which differ significantly ($P < 0.05$) (Table 2). The flavour of T_0, T_1, T_2 and T_3 is 7.23, 7.30, 7.56 and 7.31 respectively which differ significantly ($P < 0.05$). The body and texture T_0, T_1, T_2 and T_3 *lassi* were 7.11, 7.49, 8.02 and 7.60, respectively which differ significantly ($P < 0.05$). The acidity score of T_0, T_1, T_2 and T_3 *lassi* was 7.21, 7.24, 7.33 and 7.19, respectively. There was considerable variation among the value. The overall acceptability of T_0, T_1, T_2 and T_3 is 7.39, 7.41, 7.54 and 7.37, respectively which differ significantly ($P < 0.05$). The overall acceptability of finger millet *lassi* increases as increase in the level of finger millet flour.

Microbial evaluation of finger millet *lassi:* From the present study it was observed that the Standard Plate Count of T_0, T_1, T_2 and T_3 is 13.20, 14.00, 10.80 and 15.80 x 10^2 cfu /ml respectively which differ significantly ($P < 0.05$) (Table 3). The coli form count in finger millet *lassi* treatment T_0, T_1, T_2 and T_3 was 4.0, 3.4, 1.60 and 2.80 x 10^2 cfu /ml respectively and differed significantly ($P < 0.05$) from each other. It was observed that the yeast and mould count of T_0, T_1, T_2 and T_3 was 10.26, 10.24, 8.94 and 11.10 x 10^2 cfu /ml respectively.

Cost analysis: There slight variation in cost of all treated *lassi* sample prepared with finger millet. The

TABLE 2: Organoleptic evaluation of the *lassi*

Treatment	colour	flavor	Body and texture	Acidity	Overall acceptability
T_0	**7.97**	**7.23**	**7.11**	**7.21**	**7.39**
T_1	**7.66**	**7.30**	**7.49**	**7.24**	**7.41**
T_2	**7.54**	**7.56**	**8.02**	**7.33**	**7.54**
T_3	**7.17**	**7.31**	**7.60**	**7.19**	**7.37**
SE+	0.04	0.01	0.02	0.01	0.007
CD at 5%	0.12	0.04	0.08	0.03	0.02

TABLE 3: Microbial Analysis

Treatment	Standard plate count	Cfu /ml	Yeast and mould count
T_0	13.20	4.00	10.26
T_1	14.00	3.40	10.24
T_2	10.80	1.16	8.94
T_3	15.80	2.80	1.10
SE+	0.36	0.25	0.19
CD at 5%	1.08	0.76	0.58

TABLE 4: Cost analysis of finger millet *lassi*

Treatments	Milk/l(Rs)	Culture(Rs)	Finger millet(Rs)	Sugar (Rs)	Other (Rs)	Total cost/l(Rs)
T_0	22	0.3	– –	4	1	27.30
T_1	22	0.3	0.30	4	1.8	28.40
T_2	22	0.3	0.45	4	1.9	28.65
T_3	22	0.3	0.60	4	2	28.90

lassi prepared with addition of 3% flour having the cost Rs.28.65 per lit (Table 4). Good quality value added *lassi* with more acceptability might be prepared by addition of 3% finger millet flour.

CONCLUSION

It may be concluded that good quality ,value added *lassi* with more acceptability be prepared by addition of finger millet flour.

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