

Butter-milk based fruit juice beverages

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ABSTRACT

Buttermilk based mango, orange and banana beverages were developed. Composition of an acceptable beverage formulation varied with the type of fruit, its juice content ranged from 10 for mango to 35 % for orange . The buttermilk content of the beverages ranged from 62 to 83%. Total solids, fat and protein content in different fruit beverages varied from 11.3 to 18.3%, 0.12-0.38% and 0.25-0.68% respectively .Among the beverages mango beverage was found to be preferred most. It contained 12% mango juice, 81% buttermilk , 7% sugar, 0.05% pectin, 0.12% CMC, and pH 4.25

Key words: Beverage, Buttermilk, Fruit juice, Sensory evaluation.

INTRODUCTION

Buttermilk obtained during the manufacture of butter is an important by-product. A large quantity of milk produced in India is utilized for conversion into ghee (30%), curd (6%) and butter (10%). It is estimated that 1,50,000 million tones of ghee and butter, respectively was produced in 1997 in India. It is further estimated that 30,708 million tones of buttermilk has been produced in 1995 in India (Dairy India, 1997).

Barring a small quantity of sweet cream buttermilk utilized for standardization purpose, most of the buttermilk is drained out mainly because of the absence of economically viable methods of its utilization. The main difficulty in economic utilization of buttermilk is lower yield, poor keeping quality and low sale price (Singh and Ganesh, 1980)

But at the same time it is widely recognized that buttermilk, can become an imperative tool of cost control to solve nutritional problems to a great extent and pollution problems if utilized efficiently.

Several attempts have been made to use buttermilk in products like fluid milk and dried milk (Pal, *et.al*, 1985), ice cream (Rao *et.al.*, 1986), beverages (Chopra *et.al.*, 1989), khoa and channa (Puranik *et.al.* 1986) , *etc* ., have been made to utilize sour buttermilk with or without neutralization .Considering the fact that world market for beverages has increased by 31% in terms of sales and 26% in terms of volume since 1996 and is now estimated to be more than US \$200 billion according to report on " global soft drinks" from Euro monitor (Byrne, 2000) , it would be worthwhile to explore ways to utilizing buttermilk as a beverage.

Thus on similar lines, it was planned to standardize a method for extending the utility of Sweet Cream Butter Milk (SCBM) by devising optimum condition for the

production of buttermilk based fruit beverages which would provide a satisfactory outlet for the utilization of buttermilk

MATERIALS AND METHODS

Buttermilk : Buttermilk was collected from the Sumul Dairy, Surat at the time of draining the buttermilk from churn. The buttermilk was found to contain 9.1 total solids, 0.1-0.5% fat, 3.7% protein and 0.75% ash.

Stabilizers and emulsifiers: To prevent coagulation during pasteurization and de-emulsification of pulps during subsequent storage and to increase the apparent viscosity of the beverage, colloidal stabilizer – pectin and emulsifier – carboxy-methyl cellulose (CMC) supplied by Loba Chemie, Mumbai, were added to formulated beverages.

Buttermilk based beverages: The various proportions of the orange juice, buttermilk, sugar, pectin and CMC tried for optimization of sensory parameters of beverages are given in Table 1. After the addition of sugar and juice in the buttermilk, the total quantity was divided into three proportions. The pH of the three different proportions of the drink were adjusted using lactic acid. The beverages were filled in 200 ml glass bottle and pasteurized at 95 °C for 10 min. The flow diagram for the preparation of the beverage is presented in fig.1.

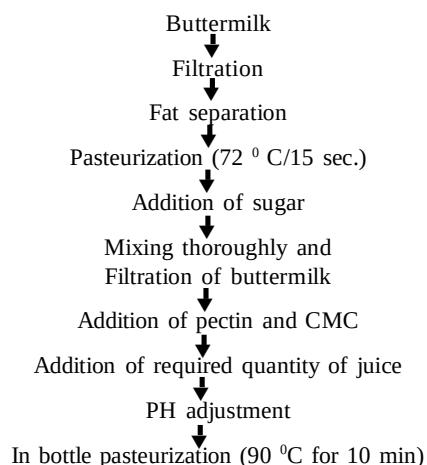
Chemical analysis: The total solids and ash content of buttermilk were determined by the method recommended by BIS (BIS, 1961). The protein content of buttermilk and beverages were determined by standard A.O.A.C. (1995) method. The total solids beverages was determined by Gravimetric method (BIS, 1961).

Sensory evaluation : Sensory evaluation of beverages was carried out using a 9 point hedonic scale by a panel of seven trained judges (IS: 6273, 1971).

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TABLE 1: Formulation of buttermilk based beverages

Ingredients	Beverages								
	Mango			Orange			Banana		
Juice%	10	12	15	25	30	35	20	25	30
Buttermilk (%)	83	81	78	68	62	57	73	68	62
Sugar(%)	7	7	7	7	8	8	7	7	8
Pectin and CMC	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	and	and	and	and	and	and	and	and	and
	0.10	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
pH	4.5	4.25	4.25	4.5	4.5	4.25	4.8	4.6	4.5

**FIG 1:** Process for the manufacture of buttermilk based fruit beverages.

Buttermilk based beverages were subjected to sensory evaluation separately by trained judges. The data were subjected to analysis of variance to compare their sensory ratings (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

Formulation of mango beverage : *Mango beverage* containing 12% pulp and 81% buttermilk was found more acceptable to Judges. The flavor, color and appearance scores for buttermilk based beverages were significantly higher ($p < 0.05$). The overall acceptability score of buttermilk containing 12% mango pulp was significantly better ($p < 0.01$ CD 0.376) than other formulations. In general, *mango beverage* from buttermilk containing 12% mango pulp, 81 % buttermilk, 0.05 and 0.12 % pectin and CMC respectively and 7% sugar at PH 4.25 was preferred by the panel (Table 1 and 2).

Formulation of orange beverage:

Sensory qualities of orange beverage prepared from buttermilk did not differ significantly (Table 2). The beverage containing 25% and 35% orange juice varied significantly ($p < 0.05$) in respect of flavor, body, color and appearance and mean sensory score was highest for formulation iii. The overall acceptability score of buttermilk based containing orange juice 35% was significantly higher ($p < 0.05$ CD 0.29) than other formulations. In general, it was observed that

orange beverage prepared from buttermilk containing 35% orange juice, 57% buttermilk, 0.05% pectin and 0.12 % CMC and 8% sugar at pH 4.25 was more acceptable (7.6) to the judges (Table 1 and 2).

Process for hydrolysis of banana pulp : Fully ripe bananas were peeled, blended; the pulp was heated at 90 °C for 10 min to prevent enzymatic browning and cooled to room temperature.

Formulation of banana beverage: The beverage prepared from 20% banana juice, 73% buttermilk, 7% sugar and pH 4.8 was found to be the most acceptable (Table 1). The flavor score 7.5 of formulation I of banana from buttermilk whey was significantly better ($p < 0.05$, CD 0.257). The overall acceptability score of buttermilk containing 20% banana juice was significantly higher ($p < 0.05$, CD 0.377) than the other formulation. *Banana beverage* containing 20% banana juice, 73% buttermilk, 7% sugar and pH 4.8 was found to be the most acceptable (7.4) to the judges (Table 1 and 2).

TABLE 2: Mean sensory score for beverages :

Fruit Juice	Formulations	Flavor	Body	Color and Appearance	Overall acceptability
Mango	i	6.9	6.9	7.2	7.1
	ii	7.9	7.9	7.8	7.9
	iii	7.5	7.4	7.5	7.5
Orange	i	6.8	6.9	6.9	6.9
	ii	7.2	7.1	7.4	7.3
	iii	7.6	7.4	7.7	7.6
Banana	i	7.5	7.4	7.4	7.1
	ii	7.1	6.9	7.1	7.0
	iii	6.8	6.9	6.6	6.7

Overall acceptability of buttermilk based beverages:

Effect of different fruit juices on buttermilk-based beverages was studied by subjecting the best formulation from each group to sensory evaluation. Mango beverage showed highest (7.9) flavor score whereas banana beverage possesses least (7.5). The body score was highest (7.9) for mango beverage and was lowest for banana beverage (7.4). Mango beverage was also judged as highest (7.8) in color and appearance while banana beverage possessed minimum (7.1) score. Thus the overall acceptability was best (7.9) of mango beverage was best followed by orange beverage (7.6) and banana

beverage (7.4). Banana beverage was the least (7.1) preferred beverage.(Table 2 and 3).

TABLE 3: Sensory scores for best *buttermilk based* fruit juice formulations

Sensory parameters	Mango formulation	Orange formulation	Banana formulation
Flavor	7.9	7.6	7.5
Body	7.9	7.4	7.4
Color and appearance	7.8	7.7	7.4
Overall acceptability	7.9	7.6	7.4

CONCLUSION

Mango beverage had 18.3 % total solids, 0.3% fat and 0.52% protein contents were found. *Mango beverage* contained maximum total solids (18.3%) whereas orange beverage had minimum total solids (11.3%). Fat and protein content in different fruit beverages varied from 0.2 to –0.4% and 0.50-0.68% respectively.

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