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DEVELOPMENT OF DIETETIC HERBAL FLAVOURED MILK AND ANALYSIS FOR IT'S PHYSICO CHEMICAL PROPERTIES

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ABSTRACT

Dietetic herbal flavoured milk were prepared using 5 per cent *Aloe vera* pulp extract and artificial sweeteners like aspartame and sucralose at different concentrations and analysed for their physico-chemical properties. Among the physico chemical properties analysed, the mean pH and titratable acidity of dietetic herbal flavoured milk were within the normal range. Whenever the level of aspartame or sucralose increases to replace the sugar in dietetic herbal flavoured milk, both the specific gravity and viscosity are in decline range. There was no adverse effect in the fat, lactose, protein and minerals content in dietetic herbal flavoured milk. The palatability of milk could be enhanced by addition of flavours. Addition of *Aloe vera* and artificial sweeteners leads to health promoting effects.

Key Words: *Flavoured Milk, Aloe vera*

INTRODUCTION

Flavoured milk is a delicious, nutritious, healthy and relatively inexpensive thirst quenching drink consumed by all categories of people. More and more people are adopting herbal way of life for their health benefits. There is also a need to find diverse technologies to add value to milk and its by-products. *Aloe vera* is one of the oldest known medicinal plants gifted by nature. Herbal flavoured milk was prepared by incorporating 5 per cent *Aloe vera* pulp extract.

Artificial sweeteners have an important role in planning diets for people with diabetes and obesity. Artificial sweeteners are ubiquitously present in a variety of foods, beverages and hygiene products. A search for a more versatile and better tasting sweetener is ongoing to yield improved products. This would find improved palatability and acceptability by the consumer (Modi and Borges, 2005). The discovery of a great number of sweeteners during the last decade has triggered the development of new sugar free food products particularly for diabetics, people on special diets and for the obese (Ozdemir and Sadikoglu, 1998).

In the present study, different dietetic herbal flavoured milk were prepared using *Aloe vera* pulp extract and artificial sweeteners like aspartame and sucralose and analysed for their physico-chemical properties and chemical composition.

MATERIALS AND METHODS

Fresh cow milk immediately after receiving at model dairy plant, Department of Dairy Science, Madras Veterinary College was separated using a cream separator to obtain skim milk. Fresh, clean and leafy *Aloe vera*, good quality cane sugar, apple green colour (Bush Boak Allen - IH 8925) and cardamom flavour (Bush Boak Allen - MC 1919) were used in this study. Aspartame (Sugar Free Natura, Cadila Health Care Ltd., Ahmadabad, India) and sucralose (Ensigns Health Care Pvt. Ltd., Pune, Maharastra, India) were used as artificial sweeteners.

Aloe vera pulp extract was prepared as per the procedure outlined by Ramachandra and Rao (2008). After several washing of fresh *Aloe vera* leaves, the pulp was removed from the cuticle and blended to prepare homogenous *Aloe vera* pulp extract. For the preparation of dietetic herbal flavoured milk, the procedure given by De (1980) was followed.

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Trials were conducted to assess the level of addition of *Aloe vera* pulp extract to prepare herbal flavoured milk. Among 3, 5 and 7% *Aloe vera* pulp extracts tested, 5 per cent was found to be ideal for herbal flavoured milk preparation based on sensory evaluation and was used as control (A_2) for further analysis. Dietetic herbal (5 % *Aloe Vera*) flavoured milk was prepared by replacing 25, 50, 75 and 100 per cent of sugar either with aspartame (TA_1 , TA_2 , TA_3 and TA_4 respectively) or sucralose (TS_1 , TS_2 , TS_3 and TS_4 respectively).

Physico-chemical properties and chemical composition of dietetic herbal flavoured milk were estimated using standard procedures viz. BIS: SP: 18 (Part XI) (1981), AOAC, Vol. II, 16th Edition (1995), AOAC, 18th Edition (2006) and Sommer (1951). The data were tabulated and subjected to statistical analysis by means of analysis of variance (ANOVA) as per the procedure given by Snedecor and Cochran (1994).

RESULTS

Physico chemical properties of dietetic herbal flavoured milk

The mean values of physico chemical properties viz. pH, titratable acidity, specific gravity and viscosity of different dietetic herbal flavoured milk with their statistical analysis were presented in Table 1.

Table 1: Physico chemical properties of different dietetic herbal flavoured milk with artificial sweeteners (Aspartame / Sucralose) (Mean \pm SE) @

Treatments	Physico chemical properties		
	pH	Titratable acidity (% L.A)	Specific gravity
A_2	6.71 \pm 0.009	0.14 \pm 0.003	1.065 ^a \pm 0.011
TA_1	6.72 \pm 0.012	0.14 \pm 0.002	1.058 ^b \pm 0.020
TA_2	6.72 \pm 0.006	0.14 \pm 0.005	1.052 ^c \pm 0.022
TA_3	6.73 \pm 0.014	0.15 \pm 0.005	1.048 ^d \pm 0.013
TA_4	6.73 \pm 0.002	0.15 \pm 0.005	1.043 ^e \pm 0.010
TS_1	6.71 \pm 0.007	0.14 \pm 0.003	1.057 ^b \pm 0.010
TS_2	6.73 \pm 0.002	0.15 \pm 0.004	1.052 ^c \pm 0.016
TS_3	6.74 \pm 0.021	0.15 \pm 0.006	1.048 ^d \pm 0.011
TS_4	6.74 \pm 0.003	0.15 \pm 0.002	1.042 ^e \pm 0.012
F value	1.49^{NS}	1.85^{NS}	111.28**

@ - Average of six trials (Different superscripts in a column differ significantly)

** - Highly significant; NS- Non significant

A_2 - Control (Flavoured milk with 5 % *Aloe vera* pulp extract)

TA_1 , TA_2 , TA_3 , TA_4 , TS_1 , TS_2 , TS_3 and TS_4 - Dietetic herbal (5 % *Aloe vera*) flavoured milk containing 25, 50, 75 and 100 per cent replacement of sugar with aspartame/ sucralose respectively.

Chemical composition of dietetic herbal flavoured milk

Table 2 shows the mean values of chemical constituents in control (A_2) as well as different dietetic herbal flavoured milk.

DISCUSSION

From the Table 1, it was clearly known that there was no significant ($P > 0.05$) difference in pH, titratable acidity of different dietetic herbal flavoured milk and control. Whenever the level of addition of aspartame or sucralose increases, the specific gravity and viscosity decreases. Statistical analysis showed that there was a highly significant ($P > 0.01$) difference in specific gravity between different dietetic herbal flavoured milk and control. The mean values of viscosity of different dietetic herbal flavoured milk were lower than the control.

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Table 2: Chemical composition of different dietetic herbal flavoured milk with artificial sweeteners (Aspartame/ Sucralose) (Mean±SE) @

Treatments	Chemical constituents										
	Fat	SNF	Protein	Lactose	Total solids	Total ash	Calcium	Phosphorus	Sodium	Potassium	Iron
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(mg/100g)	(mg/100g)	(µg/l)
A ₂	2.02±0.018	14.22 ^a ±0.024	3.22 ^e ±0.025	4.88±0.018	16.59 ^a ±0.041	0.75±0.008	0.20±0.003	0.11±0.003	55.24±0.023	130.76±0.212	290.27±0.03 3
TA ₁	2.03±0.022	14.07 ^b ±0.003	3.42 ^d ±0.023	4.91±0.012	16.00 ^b ±0.019	0.76±0.007	0.21±0.008	0.11±0.004	55.44±0.222	130.40±0.214	289.82±0.024
TA ₂	2.03±0.033	13.05 ^c ±0.008	3.63 ^c ±0.046	4.85±0.016	15.26 ^c ±0.020	0.76±0.011	0.21±0.002	0.12±0.002	55.34±0.018	130.41±0.220	290.21±0.304
TA ₃	2.07±0.055	12.62 ^d ±0.015	3.83 ^b ±0.024	4.86±0.127	14.50 ^d ±0.057	0.78±0.007	0.20±0.002	0.12±0.004	55.23±0.041	130.48±0.214	290.37±0.33 4
TA ₄	2.11±0.057	11.70 ^e ±0.036	4.03 ^a ±0.036	4.85±0.016	13.75 ^e ±0.034	0.77±0.011	0.22±0.003	0.13±0.004	55.17±0.032	130.51±0.224	290.23±0.024
TS ₁	2.12±0.039	14.06 ^b ±0.003	3.22 ^e ±0.026	4.84±0.126	16.01 ^b ±0.028	0.76±0.007	0.21±0.001	0.12±0.007	54.89±0.022	130.28±0.244	290.31±0.250
TS ₂	2.11±0.061	13.04 ^c ±0.017	3.23 ^e ±0.016	4.91±0.013	15.29 ^c ±0.025	0.75±0.005	0.21±0.002	0.12±0.001	55.02±0.036	130.22±0.237	290.27±0.104
TS ₃	2.08±0.023	12.62 ^d ±0.003	3.23 ^e ±0.016	4.85±0.014	14.49 ^d ±0.049	0.78±0.004	0.20±0.002	0.11±0.004	55.03±0.019	129.76±0.217	289.86±0.126
TS ₄	2.01±0.027	11.68 ^e ±0.040	3.23 ^e ±0.015	4.87±0.119	13.74 ^e ±0.020	0.75±0.008	0.22±0.005	0.13±0.001	55.17±0.029	129.77±0.227	290.32±0.046
F value	1.21^{NS}	2670.11^{**}	3001.17^{**}	1.92^{NS}	609.25^{**}	2.61^{NS}	1.50^{NS}	1.10^{NS}	1.62^{NS}	1.28^{NS}	1.63^{NS}

@ - Average of six trials (Different superscripts in a column differ significantly)

** - Highly Significant; NS- Non significant

A₂ - Control (Flavoured milk with 5 % Aloe vera pulp extract)

TA₁, TA₂, TA₃, TA₄, TS₁, TS₂, TS₃ and TS₄ - Dietetic herbal (5 % Aloe vera) flavoured milk containing 25, 50, 75 and 100 per cent replacement of sugar with aspartame / sucralose respectively.

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This was in concurrence with the findings of Mittal and Bajwa (2011) who studied on low calorie milk drinks. The mean values of pH and acidity of dietetic herbal flavoured milk were ranged from 6.71 to 6.75 and 0.14 - 0.15 % L.A respectively. These results were in accordance with the findings of De (1980). Statistically, there was no significant ($P > 0.05$) difference between various dietetic herbal flavoured milk and control with regard to fat, lactose, total ash and mineral content (Table 2). On the contrary, highly significant ($P > 0.01$) difference was noticed in SNF and total solids content. The values obtained were within the legal standards of flavoured milk as stated by De (1980). The highest SNF and total solids in control were due to high sugar level, which were similar to the findings of Bhardwaj and Beniwal (2009). They also reported that the increased levels of sweeteners decreased the SNF and total solids of the low calorie flavoured milk.

The mean protein content of dietetic herbal flavoured milk was ranged from 3.02 to 4.03 %. This variation might be due to the various levels of added aspartame which is protein in nature. As the level of aspartame increases, the protein content also increased which was in agreement with Lasekan *et al.* (2007). Statistical analysis represents that there was a highly significant ($P > 0.01$) difference in dietetic herbal flavoured milk containing aspartame, whereas, no significant difference was observed in sucralose with that of the control.

The mean lactose content of the prepared products was ranged from 4.8 to 4.9 per cent. Lactose is a constituent available only in the milk which imparts the same level in prepared flavoured milk also. Hence, there was no significant ($P > 0.05$) difference with regard to lactose content. Mittal and Bajwa (2011) observed almost similar range in control as well as low calorie flavoured drinks, they prepared. The mean values of total ash, calcium, phosphorus, sodium, potassium and iron levels were within the normal range. But, there was a slight increase in the contents of almost all minerals, which may be due to the minerals present in *Aloe vera* pulp itself. Mittal and Bajwa (2011) found that the total ash content of control as well as low calorie flavoured drink was 0.67 per cent which confirms the results obtained in this study.

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