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***Research Article***

# EVALUATION OF DIETETIC *ALOE VERA* ENRICHED FLAVOURED MILK FOR ITS MICROBIAL QUALITY

**S. Jothylingam[1] and *T. R. Pugazhenthi[2]**
*[1]Department of Dairy Science, Madras Veterinary College,*
*Tamil Nadu Veterinary and Animal Sciences University, Chennai -600 007, Tamil Nadu*
*[2]Department of LPT, VC&RI, TANUVAS, Tirunelveli – 627 358*
** Author for Correspondence*

## ABSTRACT
By incorporating *Aloe vera* pulp extract at 3, 5 and 7 % levels to flavoured milk, herbal flavoured milk was prepared, of which 5 per cent was found to be ideal based on sensory evaluation. Further, dietetic herbal (*Aloe vera* enriched) flavoured milk up to 75 % replacement of sugar with aspartame and 100 % replacement of sugar with sucralose were concluded as the best based on the sensory evaluation. Microbial analysis of the prepared product during storage at 5 $^0$ C in different packaging materials were analysed. The suitability of *Aloe vera* with artificial sweeteners and their effect on microbial quality of *Aloe vera* enriched dietetic flavoured milk have also been evaluated. There was no coliform in all the samples analysed. The mean total viable count of both control and dietetic herbal flavoured milk samples were within the normal range and there was no significant difference at different storage periods as well as packaging materials.

***Key Words:*** *Aloe Vera, Flavoured Milk, Artificial Sweeteners, Microbial Quality*

## INTRODUCTION
Flavoured milk is a beverage in which sugar, flavouring and coloring agents are added and it contains all the constituents of milk. It is a good source of protein, carbohydrate and minerals. Provides energy and water to digest the food, regulate body temperature and prevent dehydration. Today, the *Aloe vera* industry is flourishing and is used in many products in various formulations such as fresh gel, pulp and juice for health and medicinal purposes (Eshun and He, 2004). The juice and food supplement of *Aloe vera* is highly useful in digestive tract irritations such as colitis and peptic ulcers. Moreover, people choose low sugar for health reasons owing to prevailing diabetic conditions or motivated by calorie consciousness. Artificial sweeteners are the compounds that mimic the effect of sugar on tongue. They generally pass through the human body unmetabolized without possessing any calorie (Bhardwaj and Beniwal, 2009). In the present study, the suitability of *Aloe vera* treated with artificial sweeteners and its effect on microbial effect of flavoured milk has been evaluated.

## MATERIALS AND METHODS
Fresh cow milk obtained from the Model Dairy Plant, Department of Dairy Science, Madras Veterinary College was used for this study. Immediately after receiving at dairy plant, the milk was separated using a cream separator to obtain skim milk. Commercially available good quality cane sugar was used. Apple green colour (Bush Boak Allen - IH 8925) and Cardamom flavour (Bush Boak Allen - MC 1919) were used. Fresh, clean and leafy *Aloe vera* purchased from the local vegetable market was used as a source of *Aloe vera* pulp extract. Artificial sweeteners viz. Aspartame (Sugar Free Natura, Cadila Health Care Ltd., Ahmadabad, India) and Sucralose (Ensigns Health Care Pvt. Ltd., Pune, Maharastra, India) were substituted at different levels.

### *Procedure for the Preparation of Aloe Vera Pulp Extract*
*Aloe vera* pulp extract was prepared as per the procedure outlined by **(**Ramachandra and Rao, 2008). Fresh *Aloe vera* leaves were washed for 3-4 times and lower 1 inch of the leaf base, the tapering point

(2 - 4 inches) of the leaf top and the short spines located along the margins were removed. They were then cut into small pieces and pulp removed from the cuticle and blended so as to get homogenous *Aloe vera* pulp extract.

***Procedure for the Preparation of Herbal Flavoured Milk***

Trials were conducted to assess the level of addition of *Aloe vera* pulp extract to prepare herbal flavoured milk. Based on sensory evaluation, 5 per cent *Aloe vera* pulp extract was found to be ideal for the preparation of herbal of flavoured milk, since no bitterness was noticed up to that concentration level and the same ($A_2$) was used as control for further analysis. The flow chart indicated by Sukumar De (1980) was followed in the preparation of herbal flavoured milk.

***Procedure for Preparation of Dietetic Herbal Flavoured Milk***

For the preparation of herbal flavoured milk, the procedure given by De (1980) was followed.

Receiving whole milk and skim milk
↓
Standardization (2 % Fat)
↓
Preheating (60 °C)
↓
Homogenization (2500 psi)
↓
Addition of 5 % *Aloe vera* pulp extract, sugar / artificial sweetener (aspartame/ sucralose), colour and flavour
↓
Blending and filtration
↓
Pasteurization (71 °C for 30 minutes)
↓
Cooling (5 °C)
↓
Packaging in different packaging materials (Polyethylene and oxo biodegradable sachets)
↓
Storage (5 °C)

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

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

***Packaging Materials***

Polyethylene and oxo biodegradable sachets (Symphony Polymers, Chennai) were used for evaluating the keeping quality of dietetic herbal flavoured milk in this study.

***Total Viable Count and Coliform Count***

For enumeration of total viable bacteria in prepared product, standard plate count was done as per the procedure described in BIS: 11. SP: (Part XI) – 1981 and the presence of coliforms as per the procedure described in BIS: 10. SP: (Part XI) – 1981.

***Statistical Analysis***

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

Based on the sensory evaluation, dietetic herbal flavoured milk up to 75 % replacement of sugar with aspartame ($TA_3$) and 100 % replacement of sugar with sucralose ($TS_4$) were concluded as the ideal, as they attained maximum score for overall acceptability. There was no difference in over all acceptability among the control and different dietetic herbal flavoured milk with artificial sweeteners due to storage effect.

***Microbial Analysis of Ideal Dietetic Herbal Flavoured Milk during Storage at 5 $^0$ C***

The table shows the mean ± SE of total viable bacterial count in control ($A_2$) and different ideal dietetic herbal flavoured milk ($TA_3$ and $TS_4$) in polyethylene and oxo-biodegradable sachets during 0, 3 and 5 days of storage at $5^0$ C along with their analysis of variance.

**Table 1: Total viable count ($log_{10}$ cfu/ml) of ideal dietetic herbal flavoured milk during storage (5 $^0$C) (Mean±SE)$^@$**

| Storage Periods | $A_2$ | | $TA_3$ | | $TS_4$ | | F value |
|---|---|---|---|---|---|---|---|
| (days) | Poly | Oxo | Poly | Oxo | Poly | Oxo | |
| **0** | 4.30±0.011 | 4.28±0.014 | 4.27±0.020 | 4.36±0.012 | 4.31±0.018 | 4.27±0.020 | |
| **3** | 4.31±0.018 | 4.37±0.039 | 4.34±0.013 | 4.26±0.015 | 4.35±0.014 | 4.30±0.011 | **0.67$^{NS}$** |
| **5** | 4.34±0.013 | 4.35±0.014 | 4.26±0.015 | 4.35±0.014 | 4.36±0.012 | 4.36±0.012 | |
| **F value** | **0.67$^{NS}$** | | | | | | |

@- Average of six trials (Different superscripts in a column differ significantly)
NS- Non significant
$A_2$- Control (Flavoured milk with 5 % Aloe *vera* pulp extract without artificial sweetener)
$TA_3$- Dietetic herbal flavoured milk with 5 % Aloe *vera* & 75 % replacement of sugar with aspartame
$TS_4$- Dietetic herbal flavoured milk with 5 % Aloe *vera* & 100 % replacement of sugar with sucralose
Pol- Polyethylene sachet; Oxo- Oxo biodegradable sachet

## DISCUSSION

On statistical analysis, there was no significant ($P > 0.05$) difference between control and different ideal treatments of dietetic herbal flavoured milk with regard to total viable count at different storage periods as well as packaging materials and absence of coliforms was observed in all the samples analysed.

As per BIS specifications (1981), the standard plate count and coliform count should not exceed 50,000 cfu /ml and 10 cfu /ml respectively. The prepared flavoured milk showed the total viable count and coliform count within the normal range. There was no increase in bacterial count even during storage periods which might be due to the antimicrobial activity of *Aloe vera* which correlated with the report of Alves (2004) who opined that anthraquinones isolated from the exudate of *Aloe vera* have shown wide antimicrobial activity.

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