



ISSN (E): 2277- 7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2021; SP-10(11): 728-731  
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[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 19-09-2021  
Accepted: 21-10-2021

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## Formation of whey based banana beverage with lemon grass distillate

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### Abstract

The present study entitled “Formulation of whey based banana beverage with Lemon Grass Distillate” to optimize the levels of banana extract and lemongrass distillate in whey beverage, to investigate the sensory qualities of whey based banana beverage. The levels of banana extract, sugar and lemongrass distillate for final experimental trials were finalized in pre-experimental trials.

On the basis of sensory evaluation the levels of 11, 13, 15 and 17 percent banana extract 0.1 percent lemon grass distillate and 8 percent sugar were selected for further study.

The sensory evaluation carried out by the panel of semi-trained judges, showed that the different levels of banana extract had a significant effect on improving the quality regarding colour and appearance, consistency, flavour and overall acceptability of beverage. The sensory evaluation indicated that, the beverage prepared by using 13 per cent banana extract (T<sub>2</sub>) had highest score for colour and appearance 8.50, consistency 8.12, flavor 8.50 and overall acceptability of product was 8.55 by using 9 point hedonic scale and ranked as the most acceptable treatment.

**Keywords:** whey beverage, banana pulp, lemon grass, sensory quality

### Introduction

Now a days milk based and their byproducts are reproducing it into various innovative products with improving its characteristics and dietetic properties. Whey based products gives positive response to this innovative group. It is highly nutritious by product produced during coagulation of milk by using acid or physico-chemical processes for the preparation of *cheese*, *chhana*, *chakka* and *casein* is called as whey.

Whey is a greenish translucent liquid, watery part of milk remaining after coagulation and removal of the curd. Recently milk whey is a major problematic disposal in the dairy industry. It contains nutrients which gives benefits and indispensable values as a food such as lactose, proteins (alpha-lactoalbumin, beta-lactoglobulin, serum albumin and immunoglobulin) minerals as well as vitamins also. Whey contains 70 percent lactose, 70 to 90 percent of minerals which is present in milk, 45 to 50 percent of total solids, 20 percent milk proteins and mainly, all water soluble vitamins present in milk. (Horton, 1995) [3].

Banana is an important fruit in the world especially of tropics including India. It is nutritious and easily digestible than many other fruits. Banana is a rich source of potassium and its main claims is the maintenance or control of blood pressure, due to its role as a vasodilator. Banana having most important benefits such as boosting energy levels, increasing immunity, soothing stress and anxiety, detoxifying the body, strengthening bones, lowering blood pressure, improving sleep quality, improving digestion and speeding the recovery process.

Lemongrass herb is also an excellent source of vitamins i.e. thiamin (vitamin B-1), pantothenic acid (vitamin B5) and pyridoxine (vitamin B-6). Fresh Lemongrass having small amount of vitamin-A (Retinol) and vitamin-C (Ascorbic acid) with its antioxidant properties. Lemon grass herb, is a rich in minerals like calcium, potassium, iron, manganese, zinc, copper and magnesium. Manganese has superoxide dismutase, antioxidant enzyme, Potassium is a component of cell and body, which helps control blood pressure and heart rate.

By considering all the facts and importance of banana fruit and LGD and looking to the scanty information available with this regards attempt was done to prepare the whey beverage.

### Materials and Methods

#### Materials

The fresh, clean, composite samples of cow milk was used for preparation of *channa* whey procured from Research cum-Development Project on Cattle (RCDP), Department of Animal

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Husbandry and Dairy Science, M.P.K.V., Rahuri, Maharashtra, India. Good quality, ripe banana fruits were purchased from local market and extract was prepared by grinding in the mixer, LR grade citric acid was used for coagulation of milk, Good quality cane sugar (crystalline), was procured from local market.

Suitable size muslin cloth piece used for draining, The Corning/Borosil brand glassware's were used for analytical work, Two hundred milliliter capacity glass bottles with lead were used for filling whey.

**Methods**

**Preparation of whey based banana beverage with LGD**

**Phase I – Preliminary trials**

Preliminary trial was conducted to finalize the levels of banana extract in the whey beverage. Following levels of banana extract was tried.

**Optimization of levels of banana**

**Addition of banana powder**

Three preliminary trials were conducted using *chhana* whey having 8% sugar. Banana powder was tried in whey with 5%, 10%, 15%, 20% and 25%. During the sensory evaluation desirable flavour was not noticed in the product hence the panel of judges rejected the use of banana powder trial.

**Addition of banana extract**

Three preliminary trials were conducted using *chhana* whey having 8% sugar and use of banana extract from 5 per cent to 25 per cent. After sensory evaluation the use of banana extract levels at 11 per cent, 13 per cent, 15 per cent and 17 per cent were finalized for the final experimental trials.

**Optimization levels of LGD**

**Addition of LGD**

Beaker trials were conducted to determine the rate of addition of Lemon grass distillate in the whey beverage. The LGD level 0.1%, 0.2%, 0.3% were used. Finally on the basis of sensory evaluation, it was decided that constant 0.1% LGD should be added during the experimental trials.

**Phase II - Experimental trials**

On the basis of sensory evaluation, the following treatment combinations were finalized for preparation of whey based banana beverage with LGD (Lemmon Grass Distillate).

T<sub>1</sub> - 89% whey by weight + 11% banana extract + 0.1% LGD

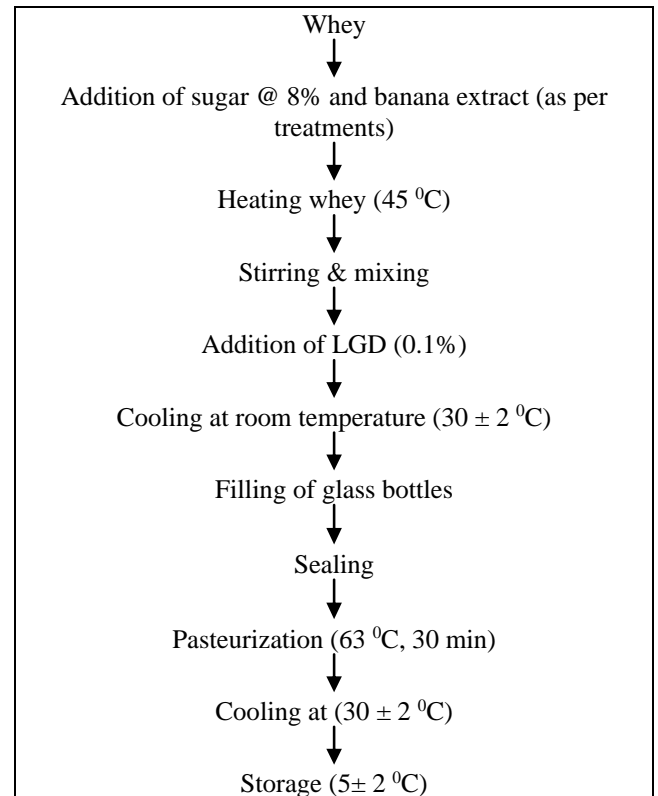
T<sub>2</sub> - 87% whey by weight + 13% banana extract + 0.1% LGD

T<sub>3</sub> - 85% whey by weight + 15% banana extract + 0.1% LGD

T<sub>4</sub> - 83% whey by weight + 17% banana extract + 0.1% LGD

From the above treatments, on the basis of sensory evaluation the acceptable treatment was selected for further study. (Sugar @ 8per cent was kept constant).

**Preparation of whey based banana beverage with LGD**



**Fig 1:** Flow chart for preparation of whey based banana beverage with LGD

**Sensory quality**

The organoleptic evaluation for overall acceptability of the product was carried out by adopting 9 point hedonic scale as per IS: 6273 part I and part II (1971) [4].

**Statistical Analysis**

Data obtained was analyzed with the help of statistical design i.e. Completely Randomized Design (CRD). The data was tabulated and analyzed according to Snedecor and Cochran (1994) [7].

**Result and Discussion**

**Sensory evaluation of banana beverage with LGD**

**Table 1:** Mean sensory score of whey based banana beverage with LGD

Treatment/Parameters	Sensory evaluation			
	Colour and Appearance	Consistency	Flavour	Overall acceptability
T <sub>1</sub>	8.27 <sup>b</sup>	7.92 <sup>c</sup>	8.10 <sup>c</sup>	8.00 <sup>c</sup>
T <sub>2</sub>	8.50 <sup>a</sup>	8.12 <sup>b</sup>	8.50 <sup>a</sup>	8.55 <sup>a</sup>
T <sub>3</sub>	8.05 <sup>c</sup>	8.30 <sup>a</sup>	8.45 <sup>b</sup>	8.20 <sup>b</sup>
T <sub>4</sub>	7.90 <sup>d</sup>	7.77 <sup>d</sup>	8.01 <sup>d</sup>	7.90 <sup>d</sup>
CD @ 5%	0.144	0.157	0.149	0.196
SE+	0.045	0.051	0.048	0.063

**Colour and appearance**

The colour and appearance may be considered as first indication of perception to the particular product. Visual appearance has direct impact on product acceptability. The

colour and appearance score of the whey based banana beverage with LGD depicted in Table 1.

From above table Colour and appearance mean score of banana beverage obtained for different treatment combination

was it was observed that the colour and appearance score obtained for different treatment had T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> were 8.27, 8.50, 8.05 and 7.90. Treatment T<sub>2</sub> obtained highest score (8.50) for colour and appearance while T<sub>4</sub> obtained lowest score (7.90). The treatment T<sub>2</sub> was significantly superior over treatments T<sub>1</sub>, T<sub>3</sub> and T<sub>4</sub>. Different levels of banana extract in prepared beverage influenced colour and appearance of product. Level of banana extract increased upto 13 percent the sensory score increased but the level goes on increasing above 13 percent the sensory score for colour and appearance decline. Colour of treatments becomes more-dense with increased banana extract levels.

The data obtained from the present investigation compared very well with the findings of Satpute *et al.*, (2018) <sup>[6]</sup>, developed herbal beverage on the basis of whey using menthol reported colour and appearance varied from 8.00 to 8.60. Waghmare *et al.*, (2020) <sup>[8]</sup> prepared nutmeg (Myristica fragrance) based whey beverage reported colour and appearance of the product varied from 7.5 to 7.9. Nutmeg powder increased colour and appearance of product gets decline.

### Consistency

The consistency score of banana beverage on the basis of whey with LGD depicted in Table 1. From above table Consistency score of banana beverage obtained for different treatment combination was 7.92, 8.12, 8.30 and 7.77 for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> respectively. Treatment T<sub>3</sub> obtained highest score (8.30) for consistency while T<sub>4</sub> obtained lowest score (7.77). Treatment T<sub>3</sub> have good consistency followed by T<sub>2</sub>, T<sub>1</sub> and T<sub>4</sub>. Consistency of the banana beverage significantly influenced due to addition of banana extract. Level of banana extract increased consistency of beverage treatments became thicker.

The obtained results are correlated with the results of Bothe *et al.*, (2013) <sup>[1]</sup> prepared mango herbal (lemongrass) beverage on the basis of whey, reported consistency of the product treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> was 7.60, 7.80, 8.17 and 7.90 respectively. Satpute *et al.*, (2018) <sup>[6]</sup> developed herbal beverage based on whey and using menthol reported consistency of product treatments was T<sub>1</sub> (8.00), T<sub>2</sub> (8.35), T<sub>3</sub> (8.40) and T<sub>4</sub> (8.60) respectively. Waghmare *et al.*, (2020) <sup>[8]</sup> prepared nutmeg (Myristica fragrance) based whey beverage reported consistency of product varied from 7.40 to 8.00.

### Flavour

Flavor is the sensory impression of food or other substance, and is determined primarily by the chemical senses of taste and smell. This characteristic is considered as a base of food products and beverages. Banana beverage with LGD having

flavor score depicted in table 1.

From above table 1 the average sensory score for flavors was 8.10, 8.50, 8.45, 8.01 for the treatment T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> respectively. The flavor of the prepared beverage significantly influenced due to the addition of banana extract and LGD. Treatment T<sub>2</sub> obtained highest sensory score (8.50) for flavor while T<sub>4</sub> obtained lowest score (8.01). Treatment T<sub>2</sub> superior over treatments T<sub>1</sub> and T<sub>4</sub> and treatment T<sub>3</sub> were at par. The treatment T<sub>2</sub> had most acceptable flavor which was reflected by judge panel, because of perfect combination of banana extract and LGD flavor which was felt pleasant aroma and attractive color over the rest of treatments.

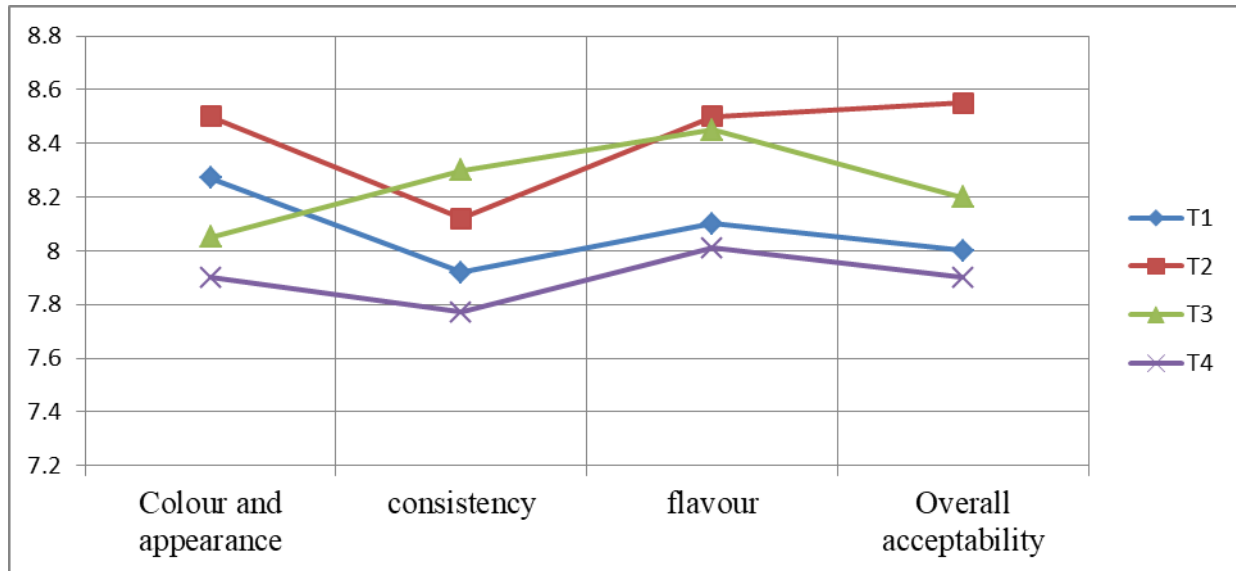
The data obtained from present investigation compared very well with the findings of Satpute *et al.*, (2018) <sup>[6]</sup> developed a herbal whey beverage using menthol, reported flavour mean score for beverage varied from 8.10 to 8. Dande *et al.*, (2018) <sup>[2]</sup> prepared whey beverage by using different levels of grape juice, reported flavour mean score of beverage varied from 6.75 to 8.62.

### Overall Acceptability

The Overall acceptability mean score of the whey based banana beverage with LGD depicted in Table 1.

Colour and Appearance, Body and Texture, Consistency, Flavour and Taste are the sensory attributes to decide the food product overall acceptability. From above table on the sensory basis all the treatment combination of banana beverage are acceptable by the judges. Overall acceptability mean score for treatments were T<sub>1</sub> (8.00), T<sub>2</sub> (8.55), T<sub>3</sub> (8.20) and T<sub>4</sub> (7.90). All the four treatments of banana beverage are significantly differed between themselves. Treatment T<sub>2</sub> was superior over the other treatments and secured highest score (8.55) which was most acceptable treatment combination. Treatment T<sub>1</sub> not given mouthfeel and treatment T<sub>4</sub> having dense colour and more sweet taste than other treatments.

The result of the present investigation are agreed with the findings of Khupse *et al.*, (2019) reported that overall acceptability of Drumstick (*Moringaoleifera L.*) whey based beverage 7.5 (T<sub>0</sub>), 7.9 (T<sub>1</sub>), 8.2 (T<sub>2</sub>) and 7.4 (T<sub>3</sub>), respectively. Dande *et al.*, (2018) <sup>[2]</sup> prepared whey beverage by using different levels of grape fruit juice, reported overall acceptability of prepared beverage was ranged from 6.96 to 8.62. Waghmare *et al.*, (2020) <sup>[8]</sup> developed a nutmeg (Myristica fragrance) based whey beverage, reported overall acceptability of the prepared beverage ranged from 7.5 to 8.2. Judges were appreciated and accepted prepared banana beverage with LGD on the basis of sensory evaluation because all the treatments T<sub>1</sub> to T<sub>4</sub> acquired more than 8 score out of 9 point of hedonic scale.



**Fig 2:** Mean sensory score of banana beverage with LGD

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