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Storage study of bael & whey protein enriched nutritional whey beverage

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Abstract

The research work on “Storage study of bael & whey protein enriched nutritional whey beverage” was conducted during 2018-2019 in the department of Animal Husbandry and Dairy Science laboratory at Post Graduate Institute, M.P.K.V. Rahuri. The different level of bael fruit syrup T₁(10), T₂(15), T₃(20), T₄(25), T₅(30) and 0.7 per cent WPC added in chhana whey to prepare bael & whey protein enriched nutritional whey beverage. Samples of treatments were analyzed for sensory and chemical qualities on day 0 (fresh), 5th day, 10th day, 15th day and 20th day. The bael syrup enriched nutritional whey beverage samples were stored at refrigerated temperature (± 5 °C) during storage period upto 20 days. The standard methods of analysis were followed and the data were statistically analyzed. Bael and WPC enriched nutritional whey beverage was prepared by addition of 80 per cent chhana whey, 0.7 per cent WPC and 20 per cent bael fruit syrup (T₃) was sensorily most acceptable having overall acceptability (8.69) with fat (0.54), protein (1.22), lactose (4.08), acidity (0.62), pH (4.22), ash (0.80), TS (19.22), moisture (80.81). The good quality nutritional whey beverage was stored upto 21 days at freezing temperature ± 5 °C.

Keywords: whey, bael fruit syrup, storage study, sensory evaluation, chemical evaluation etc

Introduction

Whey is a watery portion of milk remained after milk coagulation and removal of the curd. It is a greenish translucent liquid, viewed until recently as one of the major problematic disposal in the dairy industry. Whey is a nutritious byproduct from cheese, chhana and paneer industry containing valuable nutrients like lactose, proteins, minerals and vitamins etc. which have indispensable value as human food. Whey constitutes 45-50% of total milk solids, 70% of milk sugar (lactose), 20% of milk proteins and 70-90% of milk minerals and most importantly, almost all the water soluble vitamins originally present in milk (Horton, 1995) [3]. The whey contains nutritious proteins like α -lactalbumin, β -lactoglobulin serum albumin, immunoglobulin's plus lactose, milk salts etc. (Purnik,1996).

Bael (*Aegle marmelos* Corr.) is an indigenous fruit of India belongs to family Rutaceae and it is commonly known as Bengal quince, Indian quince, Golden apple, Holy fruit, Bel, Belwa, Sripthal and Maredo in India (John and Stevenson, 1979; and Maity *et al.*, 2009) [8, 9]. Nutritional value of the bael fruit contains 64.2 per cent moisture, 31.8 per cent carbohydrates, 31.8 per cent fibre, 1.8 per cent protein, 0.3 per cent fat and 8 mg/100g total ascorbic acid (Parinchha, 2004) [14]. The fruit's medicinal value is very high when it just begins to ripen. The bael fruit pulp contains many functional and bioactive compounds such as carotenoids, phenolics, alkaloids, coumarins, flavonoids, terpenoids, and other antioxidants which may protect us against chronic diseases.

Total dietary fiber found in this fruit can be divided into insoluble dietary and soluble dietary fiber (mucilage and pectin). In addition, it also contains many vitamins and minerals including vitamin C, vitamin A, thiamine, riboflavin, niacin, calcium, and phosphorus (Parmar and Kaushal, 1982; Roy and Khurdiya, 1995) [15, 18].

The most important commercial whey protein products are whey protein concentrates (WPCs) with protein levels ranging from 34% to 85%. Whey protein isolate (WPI) contains at least 90% protein on a dry weight basis (w/w) and contains little fat, lactose and mineral content (Morr *et al.*, 1993) [11]. Whey drinks are light, refreshing and less acidic than fruit juices as well as nutritious. Beverages based on fruits and milk products are currently receiving considerable attention due to their growing market potential (Beristain *et al.*, 2006) [2].

Materials and Methods

The present study was conducted on storage study of bael & whey protein enriched nutritional whey beverage at Department of Animal Husbandry and Dairy Science laboratory, M.P.K.V. Rahuri during the year 2018-19. The material used and methods employed for conducting the experiments are as follows.

Materials

The fresh, clean, composite cow milk was procured from Research cum Development Project on Cattle, Department of Animal Husbandry and Dairy Science, M.P.K.V., Rahuri. Fresh and clean chhana whey is obtained from coagulation of fresh, whole, clean cow milk by using citric acid. The milk sample was analyzed for different milk constituent's viz., fat, protein, total solids, moisture and ash. Bael fruit syrup was prepared in Post Harvest Technology Unit, Horticulture Department, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri. Good quality Whey Protein Concentrate (80%), LR grade citric acid, sugar was purchased from market. The Corning/Borosil brand glasswares, Electronic precision balance, thermometer, glass bottles with lead, muffle furnace, pH meter, Whatman type No. 40 filter papers

were used for analytical work was available in the laboratory of Dairy Science M.P.K.V., Rahuri. Analytical reagent grade chemicals were used for the chemical analysis.

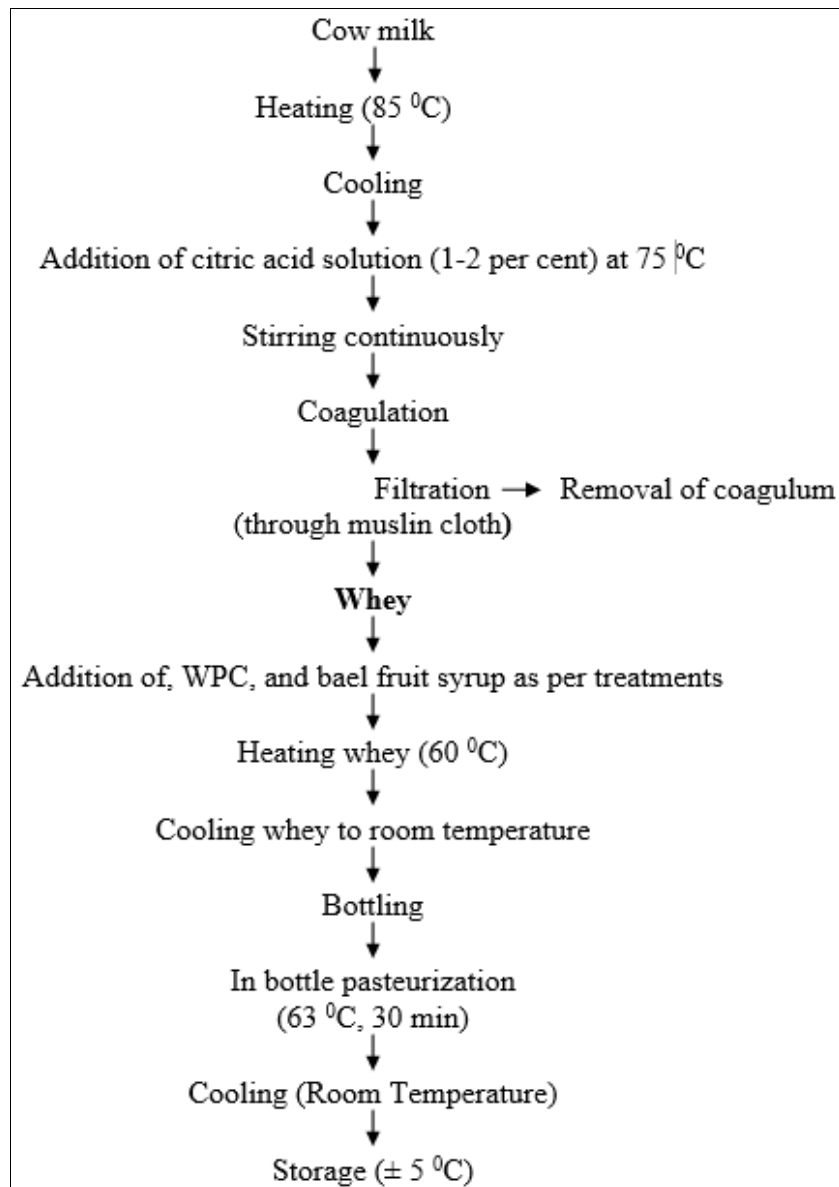
Methods

Treatments included different combinations like;

1. T₁ = 90ml whey+0.7% WPC + 10% bael syrup
 2. T₂ = 85ml whey+0.7% WPC+ 15% bael syrup
 3. T₃ = 80ml whey+0.7% WPC+ 20% bael syrup
 4. T₄ = 75ml whey+0.7% WPC+ 25% bael syrup
 5. T₅ = 70ml whey+0.7% WPC+30% bael syrup
- Constant level of 0.7% WPC maintained.

Procedure for preparation of bael and whey protein enriched nutritional whey beverages.

Fresh, clean cow milk was initially preheated. Then milk was filtered by using clean and dry muslin cloth. Heating of milk was done to 80 °C for 05 min. Coagulation of milk was done by adding citric acid at 75 °C temperature; Milk was cooled to 30 °C. Then bael syrup and WPC were added as per the treatments. This content was blended and then cooled and stored in refrigerator at 5 °C.



Flow chart for preparation of bael and whey protein enriched nutritional whey beverage

The observations were recorded for flavour, body and texture, colour and appearance and overall acceptability by using 100-point scale (Pal and Gupta, 1985) [13] and on the basis of 9 point hedonic scale (Nelson and Trout, 1964) [12].

Fat content was estimated by Gerber method of fat estimation method as per IS: 1224 (Part-I), 1977 [4]. Protein was estimated by semi-micro Kjeldal's method of Manefee and Overman (1940) as described in IS: 4079 (1960) [6]. Lactose per cent was estimated by Lane and Eynon method as per IS: 1479 (PART-II), 1961 [5]. Total solid was determined by using the method described in IS 1479 (PART-II) 1961 [5]. Titrable acidity estimated as per the procedure given in IS: 1479(PART-I) 1960. pH as per IS: 1479 (PART-II) 1961 [5] by using Elico digital pH meter. Moisture content of whey beverage was determined by subtraction method i.e. Moisture (%) =100-Total solids (%). Ash content was estimated by (Anonymous, 1967) [1]. Data obtained was analyzed with the help of statistical design i.e. Completely Randomized Design (CRD).

Results and Discussion

A) Storage study of bael and whey protein enriched nutritional whey beverage

1. Chemical composition of nutritional whey beverage during storage:

1.1 Fat

The data presented in Table 1.1 revealed that, experimental treatments significantly ($P<0.05$) influenced irrespective of the addition of bael and WPC in the chhana whey during all the days of storage. The mean fat content in the sample under experimental treatments far day 0, day 5, day 10, day 15, and day 20th were 0.57 (T₁) to 0.52 (T₅), 0.55 (T₁) to 0.50 (T₅), 0.53 (T₁) to 0.48 (T₅), 0.51 (T₁) to 0.46 (T₅) and 0.49 (T₁) to 0.44 (T₅), respectively. All the treatments on all the days of storage differed significantly among themselves. Treatment T₁, and T₂, were on par on day 0 and 5th day of storage

Table 1.1: Influence of addition of bael syrup and WPC on fat of nutritional whey beverage during storage.

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	0.57 ^a	0.55 ^a	0.53 ^a	0.51 ^a	0.49 ^a
T ₂	0.55 ^b	0.53 ^b	0.51 ^b	0.49 ^b	0.48 ^b
T ₃	0.54 ^{bc}	0.52 ^{bc}	0.50 ^b	0.48 ^b	0.46 ^b
T ₄	0.53 ^{cd}	0.51 ^{cd}	0.49 ^{bc}	0.47 ^{bc}	0.45 ^{bc}
T ₅	0.52 ^d	0.50 ^d	0.48 ^c	0.46 ^c	0.44 ^c
S.E. +	0.005	0.005	0.006	0.006	0.006
CD at 5%	0.016	0.016	0.017	0.017	0.017

On a 20th day of storage treatment T₂, T₃, and T₄ were on par and treatment T₁ treatment T₅ differed significantly among all treatments. Chavan *et al.*, (2015) reported slight reduction in fat content during storage i.e. on day 0 fat was 0.14 and on 10th day it reduces slightly upto 0.11 per cent, while studying the development of whey based mango beverage.

1.2 Protein

The addition of different levels of bael syrup in chhana whey significantly influenced the protein content of the product during all the days of storage period. The result predicted that protein decreased gradually upto day 20 during storage. All the sample treatments also significantly differed among each other during day 0, day 5, day 10, day 15 and 20th day of storage. Chavan *et al.*, (2015) reported slight reduction in protein content during storage i.e. on day 0 protein was 0.75

percent and on 10th day it reduces slightly upto 0.72 per cent, while studying the development of whey based mango beverage. Singh *et al.*, (2014) observed 0.33% protein content on day 0 and 0.32% on 10th day of storage period, while studying development, quality evaluation and shelf life studies of whey guava beverage.

Table 1.2: Influence of addition of bael syrup and WPC on protein content of nutritional whey beverage during storage

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	1.07 ^e	1.05 ^e	1.03 ^e	1.02 ^e	0.98 ^e
T ₂	1.14 ^d	1.13 ^d	1.11 ^d	1.09 ^d	1.05 ^d
T ₃	1.23 ^c	1.20 ^c	1.18 ^c	1.16 ^c	1.14 ^c
T ₄	1.29 ^b	1.27 ^b	1.25 ^b	1.23 ^b	1.21 ^b
T ₅	1.36 ^a	1.34 ^a	1.33 ^a	1.31 ^a	1.24 ^a
S.E. +	0.006	0.006	0.007	0.006	0.025
CD at 5%	0.019	0.018	0.021	0.018	0.076

1.3 Lactose

The addition of different levels of bael syrup in the chhana whey, the lactose content of bael and whey protein enriched nutritional whey beverage was significantly ($P<0.05$) influenced on day 0, day 5, day 10, day 15 and 20th day of storage period. All the sample treatments significantly differed among each other on all the days of storage. On a day 0 lactose content was ranged from 4.60(T₁) to 3.80 (T₅). The corresponding values were 4.59 (T₁) to 3.80 (T₅), 4.58 (T₁) to 3.79 (T₅), 4.58 (T₁) to 3.78 (T₅) and 4.56 (T₁) to 3.76 (T₅) per cent, respectively. It is also seen that as the level of bael syrup increased the lactose content decreased.

Table 1.3: Influence of addition of bael syrup and WPC on lactose content of nutritional whey beverage during storage.

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	4.60 ^a	4.59 ^a	4.58 ^a	4.58 ^a	4.56 ^a
T ₂	4.34 ^b	4.34 ^b	4.33 ^b	4.32 ^b	4.30 ^b
T ₃	4.08 ^c	4.07 ^c	4.07 ^c	4.06 ^c	4.04 ^c
T ₄	4.05 ^d	4.04 ^d	4.04 ^d	4.03 ^d	4.01 ^d
T ₅	3.80 ^e	3.80 ^e	3.79 ^e	3.78 ^e	3.76 ^e
S.E. +	0.006	0.004	0.003	0.003	0.003
CD at 5%	0.018	0.013	0.010	0.010	0.009

1.4 Ash

The influence of addition of bael syrup in the chhana whey significantly influenced the ash content of bael and whey protein enriched nutritional whey beverage during all the days of storage period. The values of ash content were ranged from 0.68 (T₁) to 0.99 (T₅) per cent during storage period. Mohamed *et al.*, (2014) [10] studied physico-chemical and microbiological properties of papaya functional whey beverage and noted the ash content 0.65% on day 0 and reduce upto 0.64% on 30th day of storage.

Table 1.4: Influence of addition of bael syrup and WPC on ash content of nutritional whey beverage during storage.

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	0.68 ^e	0.70 ^e	0.71 ^e	0.73 ^e	0.75 ^e
T ₂	0.75 ^d	0.77 ^d	0.77 ^d	0.81 ^d	0.82 ^d
T ₃	0.80 ^c	0.82 ^c	0.84 ^c	0.86 ^c	0.87 ^c
T ₄	0.86 ^b	0.87 ^b	0.89 ^b	0.90 ^b	0.92 ^b
T ₅	0.93 ^a	0.95 ^a	0.97 ^a	0.98 ^a	0.99 ^a
S.E. +	0.006	0.005	0.005	0.006	0.005
CD at 5%	0.018	0.015	0.017	0.017	0.016

1.5 Acidity (% LA)

The influence of addition of bael syrup and WPC on acidity content of bael and whey protein enriched nutritional whey beverage was significant ($P<0.05$) on all the days of storage period. All the sample treatments significantly differed among themselves due to addition of bael syrup in the chhana whey during day 0, day 10, day 15, and 25th day of storage. It is seen that the acidity content increased with increase in the levels of bael syrup in the chhana whey and storage period progressed. All the sample treatments also significantly differed among each other during day of storage.

Table 1.5: Influence of addition of bael syrup and WPC on acidity (% LA) content of nutritional whey beverage during storage.

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	0.54 ^e	0.55 ^e	0.56 ^e	0.57 ^e	0.58 ^e
T ₂	0.58 ^d	0.59 ^d	0.59 ^d	0.60 ^d	0.61 ^d
T ₃	0.62 ^c	0.63 ^c	0.63 ^c	0.64 ^c	0.65 ^c
T ₄	0.65 ^b	0.66 ^b	0.67 ^b	0.67 ^b	0.68 ^b
T ₅	0.69 ^a	0.70 ^a	0.70 ^a	0.71 ^a	0.72 ^a
S.E. +	0.004	0.004	0.003	0.004	0.003
CD at 5%	0.013	0.011	0.010	0.013	0.009

Chavan *et al.*, (2015) reported increase in acidity content during storage i.e. on day 0 acidity was 0.40 per cent and on 10th day it increases upto 0.41 per cent, while studying the development of whey based mango beverage.

1.6 pH

Table 1.6: Influence of addition of bael syrup and WPC on pH content of nutritional whey beverage during storage.

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	4.56 ^a	4.57 ^a	4.56 ^a	4.56 ^a	4.55 ^a
T ₂	4.42 ^b	4.41 ^b	4.41 ^b	4.40 ^b	4.39 ^b
T ₃	4.22 ^c	4.21 ^c	4.20 ^c	4.19 ^c	4.19 ^c
T ₄	4.06 ^d	4.05 ^d	4.04 ^d	4.03 ^d	4.02 ^d
T ₅	3.95 ^e	3.95 ^e	3.94 ^e	3.93 ^e	3.92 ^e
S.E. +	0.008	0.006	0.005	0.005	0.005
CD at 5%	0.023	0.018	0.015	0.014	0.015

Similarly, pH values were also significantly differed on all the days of storage but in the reverse direction. The mean pH values ranged from 3.92 (T₅) to 4.56 (T₁) during all the stages of storage period.

Ismail *et al.*, (2011) reported the acidity content was 4.86 on day 0 and 4.85 on 10th day of storage period in the cheese whey based mango beverage while studying microbial and chemical evaluation of whey based mango beverage. Mohamed *et al.*, (2014) [10] studied physic-chemical and microbiological properties of papaya functional whey beverage and noted the pH content 5.30 on day 0 and reduce upto 4.90 on 10th day of storage.

1.7 Total solids

The addition of different levels of bael syrup in the chhana whey, the total solid content of bael and whey protein enriched nutritional whey beverage was significantly ($P<0.05$) influenced on day 0, day 5, day 10, day 15 and 20th day of storage period. All the sample treatments significantly differed among each other on all the days of storage. On a day 0 total solid content was ranged from 13.38 (T₁) to 25.00 (T₅). The corresponding values were 13.42 (T₁) to 25.04 (T₅), 13.46 (T₁) to 25.08 (T₅), 13.50 (T₁) to 25.12 (T₅) and 13.53 (T₁) to

25.16 (T₅) per cent, respectively. It is also seen that as the level of bael syrup increased the total solid content also increased. It is due to Total solid content of bael syrup.

Table 1.7: Influence of addition of bael syrup on total solids content of bael syrup enriched nutritional whey beverage during storage

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	13.38 ^e	13.42 ^e	13.46 ^e	13.50 ^e	13.53 ^e
T ₂	16.29 ^d	16.33 ^d	16.37 ^d	16.41 ^d	16.45 ^d
T ₃	19.22 ^c	19.26 ^c	19.30 ^c	19.36 ^c	19.40 ^c
T ₄	22.09 ^b	22.12 ^b	22.16 ^b	22.20 ^b	22.24 ^b
T ₅	25.00 ^a	25.04 ^a	25.08 ^a	25.12 ^a	25.16 ^a
S.E. +	0.18	0.18	0.18	0.18	0.18
CD at 5%	0.55	0.55	0.55	0.55	0.55

Mohamed *et al.*, (2014) [10] studied physic-chemical and microbiological properties of papaya functional whey beverage and noted the TS content 18% on day 0 and reduce upto 17.70% on 30th day of storage.

1.8 Moisture

The influence of addition of bael syrup in the chhana whey significantly influenced the moisture content of bael and whey protein enriched nutritional whey beverage during all the days of storage period. The values of total solid content were increased during storage period. From it is also seen that the moisture content decreased significantly due to addition of bael syrup in the sample treatments during storage.

Table 1.8: Influence of addition of bael syrup and WPC on moisture content of nutritional whey beverage during storage.

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	86.62 ^a	86.58 ^a	86.54 ^a	86.50 ^a	86.46 ^a
T ₂	83.71 ^b	83.68 ^b	83.63 ^b	83.59 ^b	83.55 ^b
T ₃	80.81 ^c	80.77 ^c	80.74 ^c	80.70 ^c	80.66 ^c
T ₄	77.91 ^d	77.87 ^d	77.84 ^d	77.80 ^d	77.76 ^d
T ₅	75.09 ^e	75.06 ^e	75.03 ^e	75.00 ^e	74.97 ^e
S.E. +	0.047	0.051	0.055	0.060	0.064
CD at 5%	0.14	0.15	0.167	0.18	0.19

2. Sensory quality of nutritional whey beverage during storage

2.1 Colour

The influence of addition of bael syrup in the chhana whey significantly ($P<0.05$) influenced the colour of the product during storage period. The mean values for colour score ranged from 6.74 (T₁) to 8.25 (T₅). The colour of the product varied from light orange to dark orange. The colour of the treatment T₅ was more attractive than other treatment on day 0, but the colour of the product on 5th, 10th, 15th and 20th day disappeared as storage period progressed. The colour score of nutritional whey beverage samples differed significantly ($P<0.05$).

Yadav *et al.*, (2010) [19] noted colour score 7.60 on day 0 and 6.80 on 10th day of storage while studying the development and storage studies on whey based banana herbal (*Mentha arvensis*) beverage. Chavan *et al.*, (2015) reported that colour and appearance score 8.5 on day 0 and also 8.5 on 10th day of storage in development of whey based mango beverage.

Table 2.1: Influence of addition of bael syrup and WPC on colour of nutritional whey beverage during storage

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	6.90 ^d	6.86 ^b	6.82 ^e	6.78 ^e	6.74 ^e
T ₂	7.15 ^c	7.10 ^b	7.06 ^d	7.02 ^d	6.96 ^d
T ₃	8.02 ^b	7.98 ^a	7.94 ^c	7.91 ^c	7.86 ^c
T ₄	8.15 ^a	8.11 ^a	8.07 ^b	8.03 ^b	7.99 ^b
T ₅	8.25 ^a	8.22 ^a	8.18 ^a	8.14 ^a	8.09 ^a
S.E. +	0.014	0.016	0.016	0.015	0.016
CD at 5%	0.042	0.049	0.049	0.045	0.049

2.2 Flavour

The flavour is one of the important component of sensory quality, from the Table 2.2 it is revealed that, influence of addition of bael syrup on flavour of the bael and whey protein enriched nutritional whey beverage samples was significant ($P<0.05$), during all the days of storage. The mean sensory score of the samples under different experimental treatments were ranged from 6.90 (T₁) to 7.34 (T₅), 6.86 (T₁) to 7.30 (T₅), 6.81 (T₁) to 7.30 (T₅), 6.81 (T₁) to 7.27 (T₅) and 6.75 (T₁) to 7.24(T₅) respectively during storage period. All the treatments have significantly differ among themselves during storage, result revealed that during storage sensory score for flavour was decreased gradually upto day 20.

Yadav *et al.*, (2010) ^[19] noted sensory score for flavor was 7.20 on day 0 and 6 on 10th day of storage while studying the development and storage studies on whey based banana herbal (*Mentha arvensis*) beverage. Chavan *et al.*, (2015) reported that sensory score for flavor was 8.5 on day 0 and also 8.5 on 10th day of storage in development of whey based mango beverage.

Table 2.2: Influence of addition of bael syrup and WPC on flavour of nutritional whey beverage during storage.

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	6.90 ^e	6.86 ^e	6.81 ^e	6.81 ^e	6.75 ^e
T ₂	7.15 ^d	7.11 ^d	7.10 ^d	7.07 ^d	7.03 ^d
T ₃	8.84 ^a	8.80 ^a	8.78 ^a	8.75 ^a	8.72 ^a
T ₄	7.88 ^b	7.84 ^b	7.80 ^b	7.82 ^b	7.73 ^b
T ₅	7.34 ^c	7.30 ^c	7.27 ^c	7.27 ^c	7.24 ^c
S.E. +	0.005	0.005	0.014	0.009	0.015
CD at 5%	0.015	0.014	0.041	0.027	0.045

2.3. Taste

Table 2.3: Influence of addition of bael syrup and WPC on taste of nutritional whey beverage during storage.

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	7.44 ^d	7.44 ^d	7.40 ^d	7.36 ^d	7.32 ^d
T ₂	7.90 ^b	7.89 ^b	7.84 ^b	7.81 ^b	7.77 ^b
T ₃	8.50 ^a	8.49 ^a	8.40 ^a	8.36 ^a	8.32 ^a
T ₄	7.84 ^c	7.84 ^c	7.78 ^c	7.74 ^c	7.70 ^c
T ₅	7.11 ^e	7.10 ^e	7.06 ^e	7.02 ^e	6.98 ^e
S.E. +	0.007	0.005	0.011	0.011	0.012
CD at 5%	0.021	0.016	0.032	0.034	0.035

The taste is one of the important component of sensory quality, from the Table 2.3 it is revealed that, influence of addition of bael syrup on taste of the bael and whey protein enriched nutritional whey beverage samples was significant ($P<0.05$), during all the days of storage. The mean sensory score of the samples under different experimental treatments were ranged from 7.44 (T₁) to 7.11 (T₅), 7.44 (T₁) to 7.10 (T₅), 7.40 (T₁) to 7.06 (T₅), 7.36 (T₁) to 7.02 (T₅) and 7.32(T₁)

to 6.98 (T₅) respectively during storage period.

All the treatments have significantly differ among themselves during storage, result revealed that during storage sensory score for taste was decreased gradually upto day 20.

2.4 Overall acceptability

Table 2.4: Influence of addition of bael syrup and WPC on overall acceptability of nutritional whey beverage during storage

Treatment	Day 0	Day 5	Day 10	Day 15	Day 20
T ₁	7.33 ^d	7.23 ^d	7.13 ^d	7.03 ^d	6.93 ^d
T ₂	7.94 ^b	7.84 ^b	7.74 ^b	7.64 ^b	7.54 ^b
T ₃	8.69 ^a	8.59 ^a	8.49 ^a	8.39 ^a	8.29 ^a
T ₄	7.58 ^c	7.48 ^c	7.38 ^c	7.28 ^c	7.18 ^c
T ₅	7.12 ^e	7.02 ^e	6.92 ^e	6.82 ^e	6.72 ^e
S.E. +	0.004	0.004	0.004	0.004	0.004
CD at 5%	0.012	0.012	0.012	0.012	0.012

From the Table. 2.4 and it is revealed that, the influence of addition of different level of bael syrup in the chhana whey samples significantly ($P<0.05$) influenced the overall acceptability of the product during all the days of storage. The mean sensory scores of the bael and whey protein enriched nutritional whey beverage samples under various treatments ranged from 7.33 (T₁) to 7.12 (T₅) on day 0. While 7.23 (T₁) to 7.02 (T₅) on day 5, 7.13 (T₁) to 6.92(T₅) on day 10, 7.03 (T₁) to 6.82 (T₅) on day 15 and 6.93 (T₁) to 6.72 (T₅) on day 20 of storage. The results suggest that after day 20 that on day 21 or day 22 the product becomes sensorily unacceptable because it gives off flavour and bad taste.

Yadav *et al.*, (2010) ^[19] noted sensory score for overall acceptability was 7.50 on day 0 and 6.60 on 10th day of storage while studying the development and storage studies on whey based banana herbal (*Mentha arvensis*) beverage. Chavan *et al.*, (2015) reported that sensory score for overall acceptability was 8.5 on day 0 and also 8.4 on 10th day of storage in development of whey based mango beverage.

Conclusion

The addition of different levels of bael syrup in the chhana whey significantly ($P<0.05$) influenced the chemical constituents of chhana whey beverage during storage i.e. fat, protein, lactose, titrable acidity (% L.A.), ash, pH, total solids and moisture. The good quality nutritional whey beverage was stored upto 21 days at freezing temperature $\pm 5^{\circ}$

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