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EFFECT OF DIFFERENT LEVELS OF WATERMELON FRUIT JUICE ON ACCEPTABILITY OF *WHEY BEVERAGE*

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ABSTRACT

Whey is the liquid residue of cheese and casein production and it is one of the biggest reservoirs of food protein still remaining largely outside human consumption channels. The studies on whey based RTS beverages from fruit extract were carried out at Department of Dairy science of Mahatma Basweshwar Mahavidyalaya, Latur. The whey based ready to serve (RTS) beverage is prepared by using Watermelon fruit extract juice with different levels of watermelon juice in which sugar was added and composition of whey is decreased by increasing the content of watermelon fruit extract juice on the basis of whey in the treatment T_1, T_2 and T_3 respectively. Control treatment (T_0) was the whey. Sensory evaluation was carried out by panelists on the basis of 9 point hedonic scale. The result are compared between the treatments T_1, T_2 and T_3 for overall acceptability.

Keywords: Whey; Beverage; Watermelon juice; RTS; Sensory characteristics.

INTRODUCTION

Whey is the watery component removal after cutting of the curd in cheese manufacturing. After the drainage of curd while shrikhand making and when acid coagulated dairy products like Paneer and Channa are prepared.(Aneja et al., 2002). Whey is generally classified as sweet, sour or acidic. It is depend on its titrable acidity and pH. Whey is containing almost all water soluble nutrients present in milk, particularly lactose, whey proteins, vitamins and minerals (Goyal and

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Gandhi, 2009). Most of the dairy plants are draining it as a sewage. By adding some simple ingredients in the whey like sugar, colour, flavor it improves the nutritive value, taste and acceptability. Dairy waste is major issue in the dairy industry. Therefore various techniques are they using to convert such waste into valuable products. So utilization of such whey for the conversion into best beverage would be one of the important ways to utilize it. Nutritive value of whey may be increased by the addition of some simple ingredients. Many attempts have been reported on utilization of whey in the formulation of various dairy products (Singh et al., 1994; Cruz et al, 2009; Naik et al., 2009). There is a lot of scope to explore the possibility of its utilization in beverage industries (Sakhale et al., 2012). Beverages are very popular across the country and people from all age groups drink either hot or cold beverages regularly.

India is the second largest producer of the fruits in the world after China, as it shares the 1.2% of the total production of fruits in the world. Watermelon (*Citrullus lanatus* var. *lanatus*, family-Cucurbitaceae). Watermelon pulp contains carotenoids, including lycopene. In a 100 gram serving, watermelon fruit supplies 30 calories and low amounts of essential nutrients (table). Only vitamin C is present in appreciable content at 10% of the Daily Value (table). Watermelon fruit is 91% water, contains 6% sugars, and is low in fat (table). Watermelon juice can be made into wine or blended with other fruit juices or dairy wastes like whey to prepare whey beverage. Beverages are very popular across the country and people from all age groups drink either hot or cold beverages regularly.

Therefore present investigation was carried out by keeping both views that utilization of whey and utilization of such for best quality production of watermelon fruit juice and sugar for preparation of whey beverage.

MATERIALS AND METHODS

Materials: The fresh, clean buffalo milk, citric acid, clean muslin cloth, sugar, a good quality watermelon fruit and stainless steel vessel, stirrer, knife.

Methods:

Treatment combinations

For the preparation of watermelon juice based *whey beverage,* the following treatment combinations were taken for study.

T_0= 100 Parts of whey (control sample)
T_1= 80 Parts of whey + 10 parts of watermelon juice + 10 parts of grind sugar

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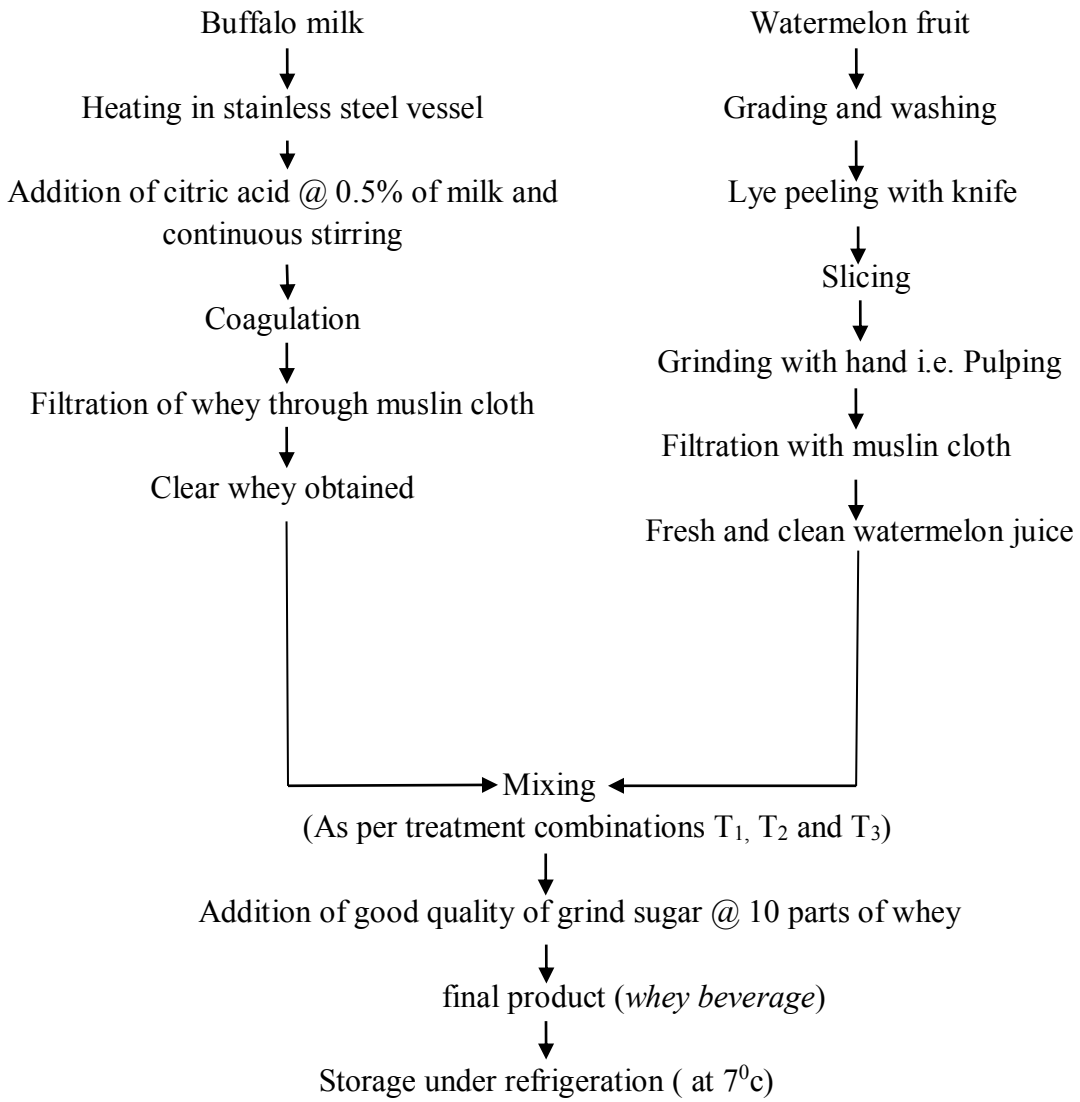
T_2= 60 Parts of whey + 20 parts of watermelon juice + 10 parts of grind sugar
T_3= 40 Parts of whey + 30 parts of watermelon juice + 10 parts of grind sugar

Fig. 1. Flow-diagram for manufacture of milk *whey* and watermelon juice based *whey beverage*



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Sensory evaluation of watermelon *whey beverage* :

Sensory evaluation of watermelon *whey beverage* was carried out by a panel of judges so as to grade the product and to know the acceptability. It was judged for, flavour, colour and appearance, body and texture and overall acceptability.

The scoring was done using 9-point Hedonic scale developed by Quarter Master Food and Container Institute, USA (Gupta 1976) the numerical, values were given from 1 to 9 as shown below.

Quality grade distribution	**Score**
Like extremely	9
Like very much	8
Like moderately	7
Like slightly	6
Neither like nor dislike	5
Dislike slightly	4
Dislike moderately	3
Dislike very much	2
Dislike extremely	1

The score of various treatments in respect of flavour, colour and appearance and body and texture were pooled and mean score for overall acceptability was worked out.

Statistical Analysis

The results obtained during the course of investigation were subjected to statistical analysis by using completely randomized block design as described by Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

Sensory evaluation of watermelon *whey beverage*

The acceptability of the watermelon based *whey beverage* was measured in terms of sensory attributes such as flavour, colour and appearance and body and texture using 9 point hedonic scale by a panel of five expert judges. The data so obtained were analyzed by using Completely Randomized Block Design (CRBD). The overall acceptability of the product was also worked out.

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- **Flavour score for watermelon *whey beverage* :**

Table 1- Flavour score for watermelon *whey beverage*

Replication / Treatment	R_1	R_2	R_3	R_4	Mean
T_1	8.5	8.5	9.0	8.5	8.62
T_2	8.0	8.5	9.0	8.5	8.50
T_3	7.5	7.0	8.0	7.5	7.50
T_0	7.0	6.5	7.0	6.5	6.75
S.E. ± 0.176		**C.D. at 5% 0.532**			

Table 1 showed that, the overall score of watermelon *whey beverage* in treatment T_1, T_2, T_3 and T_0 were 8.62, 8.50, 7.50 and 6.75 respectively. The treatment T_1 was significantly superior over the treatments T_2 and T_3. It may be concluded that, blending of 10 parts of watermelon juice in whey was preferred by the judges than the control sample as far as flavour character are concerned because it contain lowest acid content in whey as increasing sugar level from watermelon.

- **Colour and appearance score for watermelon whey beverage :**

Table 2- Colour and appearance score for watermelon *whey beverage*

Replication / Treatment	R_1	R_2	R_3	R_4	Mean
T_1	9.0	8.5	8.5	9.0	8.75
T_2	8.0	8.5	8.0	8.5	8.25
T_3	7.5	8.0	7.5	8.0	7.75
T_0	7.0	7.5	7.5	7.0	7.25
S.E. ± 0.147		**C.D. at 5% 0.447**			

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Table 2 showed the overall acceptability of watermelon *whey beverage* in terms of colour and appearance. It was observed that, the overall score of watermelon *whey beverage* in terms of colour and apperance in treatment T_1, T_2, T_3 and T_0 were 8.75, 8.25, 7.75 and 7.25, respectively. All treatment significant with each other. It may be concluded that, blending of 10 parts watermelon juice in whey was preferred by the judges than the control sample as far as colour and apperrance character are concerned because blending of 10 parts of watermelon juice affect slightly on colour but it had highly affect by treatment T_2 and T_3.

- **Body and texture score for watermelon *whey beverage* :**

The average sensory score for body and texture in treatment T_1, T_2, T_3 and T_0 were 8.50, 8.25, 7.50 and 6.88, respectively. It was noticed that the treatment T_1 was significantly superior over treatments T_2 and T_3. The above observation clearly indicates that, the highest liking was towards the T_1. As far as body and texture concerned, treatment. T_2 and T_3 were also acceptable for panel of judges.

Table 3 - Body and texture score for watermelon *whey beverage*

Replication / Treatment	R_1	R_2	R_3	R_4	Mean
T_1	9.0	8.0	8.5	8.5	8.50
T_2	8.0	8.5	8.0	8.5	8.25
T_3	8.0	7.5	7.0	7.5	7.50
T_0	7.0	6.5	7.0	7.0	6.88
S.E. $\pm$ 0.174		**C.D. at 5% 0.532**			

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- **Overall score for watermelon *whey beverage* :**

Table 4 - Overall score for watermelon *whey beverage*

Treatments	Flavour	Colour and appearance	Body and Texture	Overall acceptability
T_1	8.62	8.75	8.50	8.62
T_2	8.50	8.25	8.25	8.33
T_3	7.50	7.75	7.50	7.58
T_0	6.75	7.25	6.88	6.96

Table 4 shows that the mean overall score of acceptability of watermelon *whey beverage* for treatments T_1, T_2, T_3 and T_0 was 8.62, 8.33, 7.58 and 6.96 respectively. It was observed that treatment T_1 was significantly superior over all treatment. T_3 which had the lowest mean score than treatment T_1. The treatment T_1 had comparatively highest mean overall score than the T_2 and T_3. The lowest overall acceptability score i.e. 6.96 was found in treatment T_0 which was due to lack of level of watermelon juice which decreased flavour, colour and appearance and body and texture, hence overall acceptability score was less as compared to T_1 treatment.

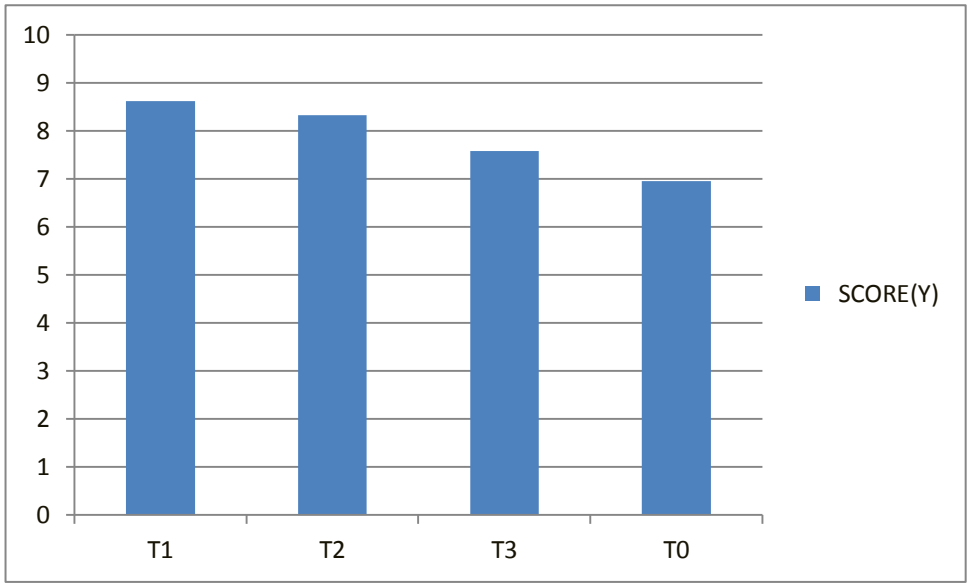

Fig 1 : Graphical Reprasentation Of Overall Acceptability Of Watermelon Based Whey Beverage

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CONCLUSIONS

1. The treatment T_1 scored highest score for all sensory attributes as compared to other treatments.
2. In general sensory score of treatment T_1 and T_2 with 10 and 20 parts watermelon juice was comparable and recommended by panelists.

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