



EFFECT OF DIFFERENT LEVELS OF WHEY PROTEIN CONCENTRATES ON ORGANOLEPTIC ATTRIBUTES OF RASGULLA

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Abstract

Rasgulla is a juicy and spongy sweet meat and prepared from cow and buffalo milk chhana, but good Rasgulla is prepared from cow milk chhana. A study was conducted to utilize whey protein concentrates (WPC) for the preparation of Rasgulla using different ratios of cow milk and WPC i.e., cow milk + 0.5% WPC (T₁), cow milk + 1.0% WPC (T₂), and cow milk + 1.5% WPC (T₃). Milk was heated at 90°C and cooled at 70°C. 1% citric acid was used to coagulate the milk to obtain chhana, chhana was kneaded for making balls. Balls were cooked in sugar syrup. Thus Rasgulla was manufactured. The products were analyzed for organoleptic attributes (flavour and taste, texture, colour and appearance and overall acceptability) by trained panelist using 9 point hedonic scale. Physicochemical (Fat, Total Solids, acidity, protein and moisture) and microbiological (SPC, yeast and mould, coliform) analysis was done for estimating its nutritional content and safety. Based on the statistical analysis of data obtained from various parameters using different ratios of mixture, it was found experimental Rasgulla was at per control as far as organoleptic attributes are concerned. Yield value also increased. The highest yield value was found in T₃ (433.02%), followed by T₂ (423.40%), T₁ (405.22%) and T₀ (341.51%). 0.5% WPC proved to be best among all treatments. Thus the product acceptability can be rated as T₀>T₁>T₃>T₂.

Key Words: cow milk, chhana, WPC, Rasgulla.

INTRODUCTION

Whey protein is one of the major proteins found in cow's milk comprising of 20% of total milk protein. Whey protein referred to as a group of individual proteins contains water, lactose, protein, minerals (Calcium, Phosphorous, and Magnesium) and fat (1). The best known effect of whey protein are its ability to increase lean muscle mass and to boost the immune system. Whey protein contains minerals for bone strength, plus essential, semi-essential and non-essential amino acid for tissue formation. Common WPC available in the market are WPC-35, WPC-60, WPC-70, and WPC-80. Whey protein concentrate is largely used for development of texture in food products, food formulation and for clinical diets. It is also used for health beverages, meat products, bakery products, confectionaries and protein supplement of various coagulated milk products like chhana, paneer (2). Whey proteins are highly functional and nutritional used in a variety of products. The most commonly used value added forms of Whey protein in industry are Whey protein isolates (W.P.I.), WPC contains 34-80% proteins and WPI contains at least 90% protein. Whey protein concentrate (WPC) has the highest biological value and protein efficiency ratio as compared to other protein, which make it suitable for wide range of nutraceutical and functional food system. Whey protein ideally has a bland flavour to facilitate application in foods(3). Rasgulla regarded as the king of Indian milk sweets are prepared by kneaded chhana balls under control cooking in boiling sugar syrup. In appearance it is snow white, soft and succulent sphere shaped(4&5). Keeping in mind the functional properties and other use of WPC, an attempt has been made to explore the use of WPC in rasgulla making using the method of manufacture as laid down by (6).

METHOD AND MATERIALS

First of all, cow milk was standardized to 4% fat and 8.5% SNF. Three different levels of WPC now added i.e. T₁ (0.5% WPC), T₂ (1% WPC) and T₃ (1.5% WPC) with cow milk. It was then heated at 90°C and cooled at 70°C. 1% citric acid was used to coagulate the milk. The chhana obtained then kneaded for making Rasgulla balls. Balls are then cooked in sugar syrup to get Rasgulla. The samples were tested for physicochemical parameters (fat, proteins, total solids, moisture, acidity & yield) and microbiological parameters (SPC, yeast and mould count, coliform count) as per procedure given in the food chemistry manual of Allahabad Central University. Organoleptic attributes (colour and appearance, body & texture, flavour and taste) were judged by trained panelist using 9 point hedonic scale.

Table-1: Details of different treatments of Control and WPC Rasgulla

Materials	Different treatments(Control and WPC Rasgulla)			
	T ₀	T ₁	T ₂	T ₃
WPC	-	0.5%	1%	1.5%

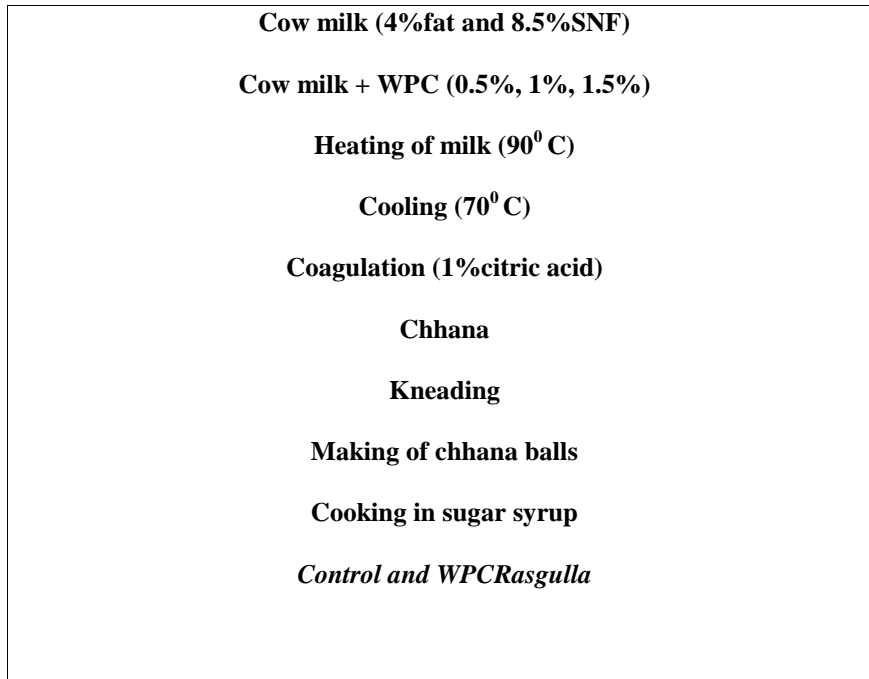


Figure 1:Flow chart for preparation of Control and WPCRasgulla

Organoleptic Evaluation of the prepared product

Freshly prepared rasgulla were served for evaluation to panel members consisting of 5 experienced persons. 9 point hedonic scale proforma was used as suggested by (7).

Statistical analysis

The data obtained on different aspects as per plan were tabulated and statistically analyzed as per (8).

RESULTS AND DISCUSSION

Organoleptic attributes of Control and WPC Rasgulla

Table-2 shows organoleptic attributes of control and paneer whey carrot halwa.

Colour and Appearance

There were non-significant difference observed in different treatments for colour and appearance. The highest value was found in T₀ (7.92), followed by T₁ (7.48), T₂ (7.48) and T₃ (7.32). F Value was 3.34, indicating no significant effect of treatment on colour and appearance (Fig.2).

Table-2: Organoleptic attributes of Control and WPC Rasgulla

Parameters	Control and WPC Rasgulla				F Value	CD
	T ₀	T ₁	T ₂	T ₃		
Colour and Appearance	7.92	7.48	7.48	7.32	3.34**	-
Body and Texture	7.98	7.68	7.42	7.38	2.19**	-
Flavour and Taste	8.24	7.90	7.94	7.92	1.44**	-

* Significant at 5 % level

** Non-significant at 5 % level

Body and texture



Body and texture of the product did not differ significantly. The highest value was found in T₀ (7.98), followed by T₁ (7.68), T₂ (7.42) and T₃ (7.38). F Value was 2.19, indicating no significant effect of treatment on body and texture (Fig.2).

Flavour and Taste

Flavour and taste of the product was found significant. The highest value was found in T₀ (8.24), followed by T₁ (7.90), T₂ (7.94) and T₃ (7.92). F Value was 1.44, indicating no significant effect of treatment on flavour and taste (Fig.2).

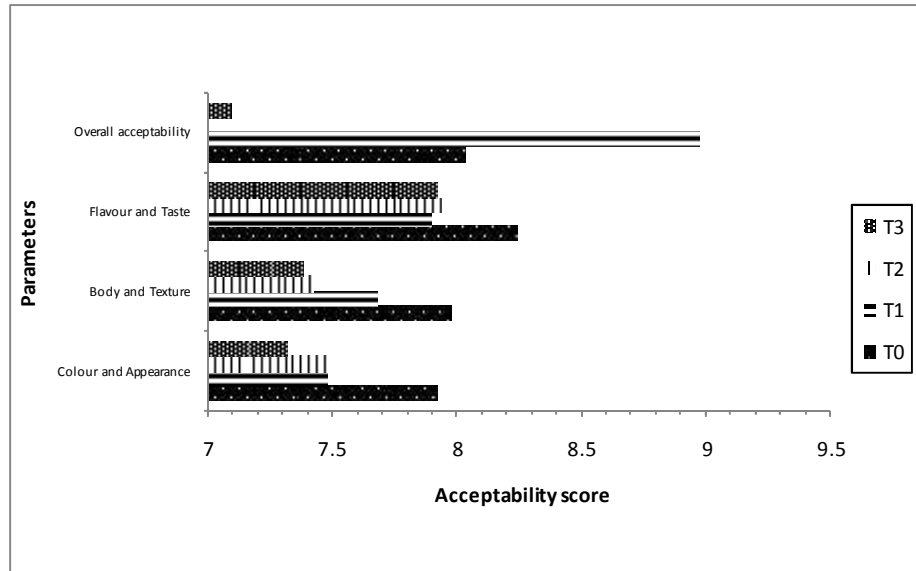


Figure 2: Average of Sensory Properties and overall acceptability score control and WPC Rasgulla

Overall acceptability scores for Control and WPC Rasgulla

There were no significant differences found among the treatments for overall acceptability score. The highest score was found in T₁(8.97), followed by T₀(8.03), T₃(7.09) and T₂(6.52). Thus, the data showed the experimental product was a good as control.

Table-3. Overall acceptability of the Control and WPC Rasgulla

Replication	Control and WPC Rasgulla				F Value	CD
	T ₀	T ₁	T ₂	T ₃		
R ₁	7.46	8.5	4.7	6.93	2.64**	-
R ₂	7.60	9.0	8.29	6.97		
R ₃	8.27	9.32	4.75	7.13		
R ₄	8.40	9.14	7.56	7.36		
R ₅	8.46	8.9	7.30	7.10		
Mean	8.03	8.97	6.52	7.09		

* Significant at 5 % level

** Non-significant at 5 % level

Microbial Parameters Control and WPC Rasgulla

There were non-significant differences found among the treatments for SPC. The highest value was found in T₃ (8.4), followed by T₂ (8.2), T₁ (7.8) and T₀ (6.8). Yeast and mould count were non-significant also. The highest value found in T₃ (5.20), followed by T₂ (4.80), T₁ (3.00) and T₀ (2.80). Coliform count were negative in all the treatments.



Table-4: Microbial parameters Control and WPC Rasgulla

Parameters	Control and WPC Rasgulla				F Value	CD
	T ₀	T ₁	T ₂	T ₃		
SPC	6.8	7.8	8.2	8.4	2.78**	-
Yeast and mold	2.8	3.0	4.8	5.2	3.14**	-
Coliform count	Nil	Nil	Nil	Nil	Nil	Nil

* Significant at 5 % level

** Non-significant at 5 % level

CONCLUSION

On the basis of the results obtained it can be concluded that the WPC powder can be successfully used for improving sensory quality of Rasgulla, without sacrificing its palatability. 0.5% WPC proved to be best among all treatments.

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