



ISSN (E): 2277-7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2023; 12(3): 564-566

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www.thepharmajournal.com

Received: 02-01-2023

Accepted: 13-02-2023

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Sensory profile of whey protein concentrate (WPC) enriched extruded paneer

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Abstract

The present study was evaluate the new formula for WPC enriched extruded paneer. The sensory characteristics of the product was examined by trained judges using 9 point hedonic scale. The product was prepared by different levels of WPC at 5, 10 and 15 per cent. The use of different amount of WPC was significantly influence the sensory characteristics of the product. The superior score on the basis of sensory was recorded by 10 per cent whereas; lowest score was observed by 15 per cent of WPC. The 10% of WPC had body & texture score (8.29) and overall acceptability score (8.09); but in 15% WPC score was 6.18 in body & texture and overall acceptability score was 6.15.

Keywords: Extruded paneer, WPC, enriched, sensory

1. Introduction

A appealing, healthy, and delectable local dairy product called paneer is made by coagulating milk in an acid and heat environment. the majority of people are in India. Milk products are a primary source of protein and other critical elements for vegetarians who follow a plant-based diet (Rani *et al.*, 2014) ^[9]. A protein additive should hold or even beautify the fine and acceptability of the food to which it's far introduced. Thus, aside from having intrinsically exceptional residences which includes nutritive value, flavour, and shade, the protein concentrates have to own certain functional houses which lead them to compatible with the numerous food to which they may be added. Whey protein concentrates possess such brilliant practical properties which cause them to like minded with any type of merchandise (Berber *et al.*, 2015) ^[1]. WPC has been observed especially appropriate as a substitute (or partial substitute in a mixed product) for skim milk in a number of baking packages - consisting of prepared cake, biscuit and flour mixes. WPCs have additionally been used as a base material for the manufacture of espresso whiteners, whipped toppings, imitation bitter lotions and on the spot breakfast foods (Kumar *et al.*, 2018) ^[7]. Enriched food that may be purchased quickly are in demand today. A number of significant variables favouring the convenience of foods include urbanisation, industrialization, globalisation, an increase in the number of working women, and the number of bachelors who live away from home in huge numbers. People today are more aware of their health and concerned about it. Customers are looking for nutritious food products (Shahi *et al.*, 2014) ^[10].

The purpose of the research was to amplify the utilization of WPC in preparation WPC enriched extruded paneer with high in protein using extrusion technology. The effect of WPC on sensory characteristics i.e. color & appearance, flavor, body & texture and overall acceptability was investigated.

2. Materials and Methods

Nandini brand skim milk powder was procured from the KMF outlets, Bengaluru. Pectin was procured from Silvateam, Bengaluru. Good quality of refined wheat flour was procured from More Retail Limited, Mumbai. WPC-80 was procured from Arla food ingredients, Denmark.

2.1 Preparation of paneer from reconstituted skim milk

The reconstituted skim milk will be prepared as per outlined by Khan *et al.* (2012) ^[6]. The ratio of skim milk powder and water is 1:7 used for preparation of skim milk and then followed by heating to 90 °C without holding then cooled to 60 °C for coagulation separately and mixed with 1 per cent citric acid solution as coagulating agent. The coagulum thus obtained was left undisturbed for approximately 5 min.

Whey had drained through a fine muslin cloth and collected the paneer.

2.2 Preparation of WPC enriched extruded paneer

Refined wheat flour and pectin were added at 7.5 and 0.3% levels by weight of paneer for control sample and for WPC enriched extruded paneer sample was prepared by addition of the WPC at 5, 10 and 15 per cent level to make a dough and then the dough was extruded by using single screw extruder and followed by frying (110 °C).

2.3 Sensory evaluation

The sensory evaluation of WPC enriched extruded paneer has been evaluate at regular intervals by semi trained judges on a 9-point hedonic scale. The samples for evaluation was coded appropriately before serving the samples to the judges for sensory evaluation. Sensory evaluation of the samples is carried out in the sensory evaluation lab. The panelists are requested to grade the sample on the basis of sensory attributes: colour and appearance, flavour, body & texture and overall acceptability.

3. Result and Discussion

3.1 Effect of addition different levels of WPC on sensory profile of WPC enriched extruded paneer

3.1.1 Color and appearance

The highest colour and appearance score was secured by control sample (7.69) but no significant ($p \leq 0.05$) different to other treatments T₁ (7.46), T₂ (7.28) and T₃ (7.17) samples. The slight decreasing of colour and appearance score with increasing WPC levels in the product could be due to the formation of large grains because of gelation property of whey proteins as shown in fig.1. Camire (2000)^[2] noticed that the formation of complex between k-casein and α -lactoglobulin and other protein-protein interaction leads to the formation of larger grains upon cooking. Dilrukshi *et al.* (2020)^[3] found significantly highest color score (6.19) with 5.0 per cent WPC due to browning reactions during the extrusion process.

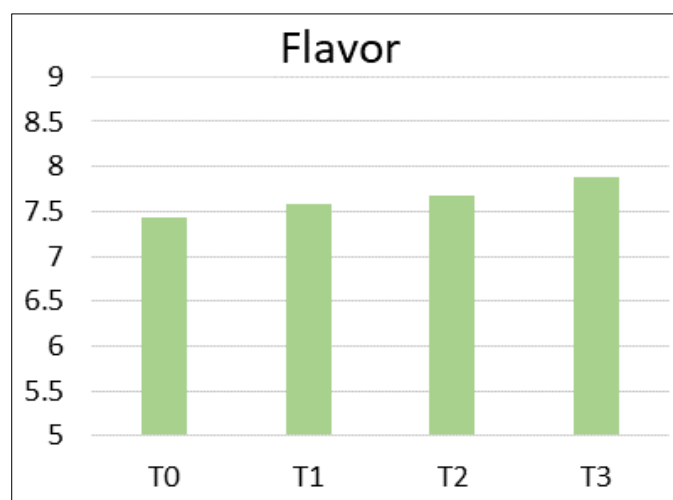


Fig 1: Effect of addition different levels of WPC on color and appearance of WPC enriched extruded paneer

3.2 Flavor

From table 1 the T₃ sample had 7.89 flavor score with non significant ($p \leq 0.05$) to control (7.43) and other treatments T₁ (7.58), T₂ (7.67). The flavor score increased non significantly

with increasing WPC due to bland taste of WPC not effecting on the final extruded paneer. Similar observation was done by Kusio *et al.* (2020)^[8] reported in dessert with 9 per cent WPC.

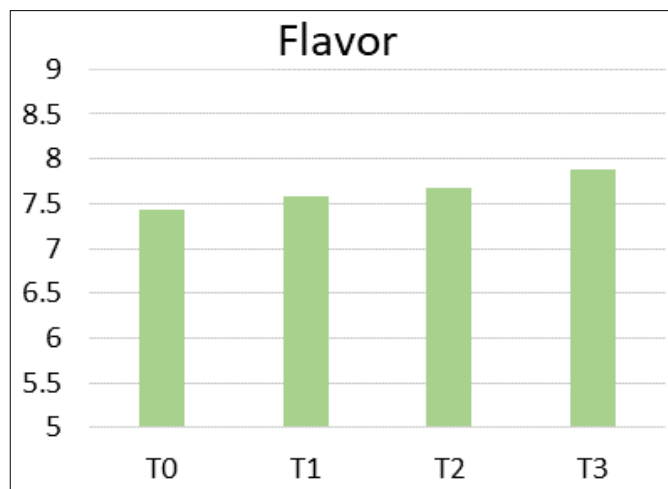


Fig 2: Effect of addition different levels of WPC on flavor of WPC enriched extruded paneer

3.3 Body and texture

From (Table 1), the highest body and texture score was secured by T₂ (8.29) and the lowest body and texture score was recorded by T₃ (6.18). The significant increase in level of WPC in the product significantly increased body and texture scores up to 10 per cent level. Further it was decreased significantly. Statistical analysis revealed that there was a significant difference between control and treatments as well as within treatments T₁, T₂ and T₃ samples ($p \leq 0.05$) level. Similar finding was done by The data was matched with (Yadav *et al.*, 2014; Harinivenugopal *et al.*, 2018)^[11,4].

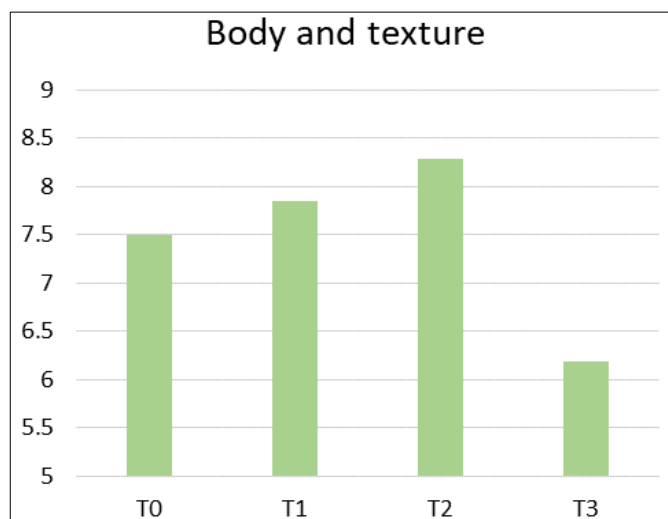


Fig 3: Effect of addition different levels of WPC on body and texture of WPC enriched extruded paneer

3.4 Overall acceptability

From the fig.4 it was noticed that the body and texture and overall acceptability scores were significantly ($p \leq 0.05$) increased as the WPC level increased to 10 per cent level. Further increasing in WPC level to 15 per cent in product the sensory score with respect to overall acceptability decreased significantly. From table 1 the significant ($p \leq 0.05$) highest overall acceptability score was found in T₂ sample (8.09)

compared to control (7.47) and T₃ (6.15) samples. The significant increase in overall acceptability score could be due to functional properties of WPC which affect the extruded paneer textural and also light brown color obtained during frying of the product. Soumyashree *et al.* (2017) reported 2 per cent WPC in misti dahi was higher overall acceptability (8.03) score compare than other treated samples. The data was matched with (Yadav *et al.*, 2014; Harinivenugopal *et al.*, 2018 and Hashim *et al.*, 2021)^[11, 4, 5].

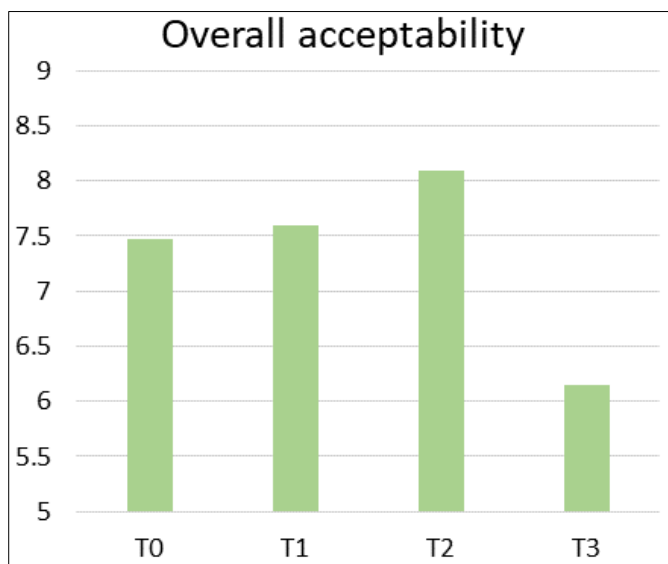


Fig 4: Effect of addition different levels of WPC on overall acceptability of WPC enriched extruded paneer

Table 1: Effect of addition different levels of WPC on sensory characteristics of extruded paneer

Treatments	Sensory characteristics			
	Color and appearance	Flavor	Body and texture	Overall acceptability
T ₀	7.69	7.43	7.49 ^a	7.47 ^a
T ₁	7.46	7.58	7.85 ^b	7.59 ^{ab}
T ₂	7.28	7.67	8.29 ^c	8.09 ^b
T ₃	7.17	7.89	6.18 ^d	6.15 ^c
CD ($p \leq 0.05$)	NS	NS	0.35	0.58

Note:

All values are average of three trials

Similar superscripts indicate non-significant (NS) at corresponding critical difference (CD)

T₀ = Control

T₁ = Product was prepared by addition of WPC at 5.0% level

T₂ = Product was prepared by addition of WPC at 10.0% level

T₃ = Product was prepared by addition of WPC at 15.0% level

4. Conclusion

From the experiment, it can be concluded that the use of different amount of WPC was significantly influence the sensory characteristics of WPC enriched extruded paneer. The increasing of WPC level in the product the sensory score with respect to body & texture and overall acceptability score was increased up to 10 per cent further addition of WPC at 15 per cent of WPC in product the body & texture and overall acceptability score was decreased. The best score of sensory of WPC enriched extruded paneer at 10 per cent could be due to the WPC have functional properties such as solubility, foaming, emulsification and gelation, which could be help to get the product more crunchy and light brown in color. The

conducted research was conclude that WPC can be used in the formulation of WPC enriched extruded paneer due their functional properties and also have protein rich source which can benefit to the consumer.

5. References

- Berber M, Gonzalez-quijano GK, Alvarez VB. Whey Protein Concentrate as a substitute for non-fat dry milk in Yogurt. *J Food Process Technol.* 2015;6(12):222-228.
- Camire ME. Extrusion cooking. In: *The Extrusion Handbook for Food Processors* Edt HENRY, C.J.K., and CHAPMAN, C., Edn, CRC Press, Boca Raton, FL; c2000. p. 314–330.
- Dilrukshi HNN, Torrico DD, Brennan MA, Brennan CS. Instrumental and sensory properties of cowpea and whey protein concentrate-fortified extruded rice snacks. *Proceedings.* 2020;70(1):1-8.
- Harinivenugopal, Jayaprakasha HM, Arun Kumar H. Whey Protein Concentrate (WPC) –a nutraceutical ingredient in the formulation of finger millet based RTE food. *Int. J Recent Scientific Res.* 2018;9(7):28235-28238.
- Hashim MA, Nadtochii LA, Muradova MB, Proskura AV, Alsalem KA, Hammam ARA. Non-fat yogurt fortified with whey protein isolate: physicochemical, rheological, and microstructural properties. *Foods.* 2021;10(8):1762-1772.
- Khan SU, Pal MA, Malik AH, Sofi AH. Process optimization for paneer production from milk powder. *International J Food Nutri. Safety.* 2012;2(2):62-71.
- Kumar R, Chauhan SK, Shinde G, Subramanian V, Nadasabapathi S. Whey proteins: a potential ingredient for food industry- a review. *Asian J Dairy Food Res.* 2018;37(4):283-290.
- Kusio K, Szafranska JO, Radzki W, Sołowiej BG. Effect of whey protein concentrate on physicochemical, sensory and antioxidative properties of high-protein fat-free dairy desserts. *Appl. Sci.* 2020;10(20):1-16.
- Rani M, Dabur RS, Garg SR, Jadhav V. Preparation, storage and microbiological quality of ready-to-serve low cholesterol masala paneer. *Veterinary World.* 2014;7(6):443-447.
- Shahi JK, Chauhan G, Roy SK, Mendiratta SK, Sharma BD. Quality evaluation of low fat milk nuggets prepared with skim milk coagulum and finger millet flour. *International J Food Nutri. Sci.* 2014;3(6):166-169
- Yadav DN, Anand T, Navnidhi, Singh AK. Co-extrusion of pearl millet-whey protein concentrate for expanded snacks. *International J Food Sci. Technol.* 2014;49(3):840–846.