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Effect of flaxseed flour on sensory characteristics of functional extruded paneer

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Abstract

A study was conducted to develop functional extruded paneer. The study evaluated the effect of blending flaxseed flour in extruded paneer on sensory characteristics. Functional extruded paneer was blended with flaxseed flour T₀ (7.5% refined wheat flour and 0.3% pectin), T₁ (5% flaxseed flour), T₂ (10% flaxseed flour) and T₃ (15% flaxseed flour) respectively. The sensory scores showed with regards to color & appearance, flavor, body & texture and overall acceptability, T₂ were found to be best. The flavor (8.18), body & texture (8.25) and overall acceptability (8.16) for T₂ sample whereas; control sample had flavor (7.43), body & texture (7.49) and overall acceptability (7.47).

Keywords: Paneer, flaxseed flour, sensory characteristics, refined wheat flour and pectin

Introduction

Extrusion technology has become an important technique in food processing industries as it one of the cost effective method. Extrusion processing is defined as the process by which moistened, starchy and proteinaceous food materials are plasticized through a die by a combination of moisture, pressure, heat and mechanical shear (Choton *et al.*, 2020) [2]. Paneer, a popular indigenous dairy product of

India, is similar to an unripened variety of soft cheese which is used in the preparation of a variety of culinary dishes and snacks. It is obtained by heat and acid coagulation of milk, entrapping almost all the fat, casein complexed with denatured whey proteins and a portion of salts and lactose (Kumar *et al.*, 2014) [9]. Flaxseed is rising as a critical purposeful food element due to its wealthy contents of omega (ω)-3 fatty acid (α - linolenic acid), lignans and fiber. Flaxseed oil, fibres and flax lignans have capacity fitness advantages which includes in discount of cardiovascular ailment, atherosclerosis, diabetes, cancers, arthritis, osteoporosis, autoimmune and neurological disorders. Flax protein aid in the prevention and remedy of heart sickness and in helping the immune device. As a functional meals factor, flax or flaxseed oil has been incorporated into baked foods, juices, milk and dairy products, desserts, dry pasta merchandise, macaroni and meat merchandise (Goyal *et al.*, 2014) [6].

Materials and Methods

Nandini brand skim milk powder was procured from the KMF outlets, Bengaluru. Pectin was procured from Silvateam, Bengaluru. Flaxseed flour was procured from APEX LINKS, Chennai.

Preparation of extruded paneer from reconstituted skim milk

The reconstituted skim milk will be prepared as per outlined by Khan *et al.*, (2012) [8]. 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. Refined wheat flour and pectin were added at 7.5 and 0.3% levels by weight of paneer for control sample and for treated sample the refined wheat flour and pectin was replaced by flaxseed flour 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).

Sensory evaluation

The organoleptic quality of extruded paneer has been evaluate at regular intervals by semi

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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.

Results and Discussion

Effect of blending different levels of flaxseed flour on sensory characteristics of extruded paneer

Color and appearance

From fig. 1 the color and appearance scores for T₃ at 15 per cent flaxseed flour was lowest (6.35) and highest score was recorded by control sample (7.69). Among the all treatments, as the per cent incorporation of flaxseed flour increased, the color and appearance score was decreased. However, statistical analysis says that there was a significant difference between control and T₃ treatment at ($P \leq 0.05$) level. The decreasing of color and appearance score might be due to the fact that the color of flaxseed flour itself brown in color which impart more brownish color during frying. Similar results was observed by Devi *et al.* (2018) [3] found 4 per cent flaxseed powder had secure significantly highest color and appearance score (7.19) further increasing of flaxseed powder the score was decreased. Similar results was observed by (El-Demery *et al.*, 2015) [4].

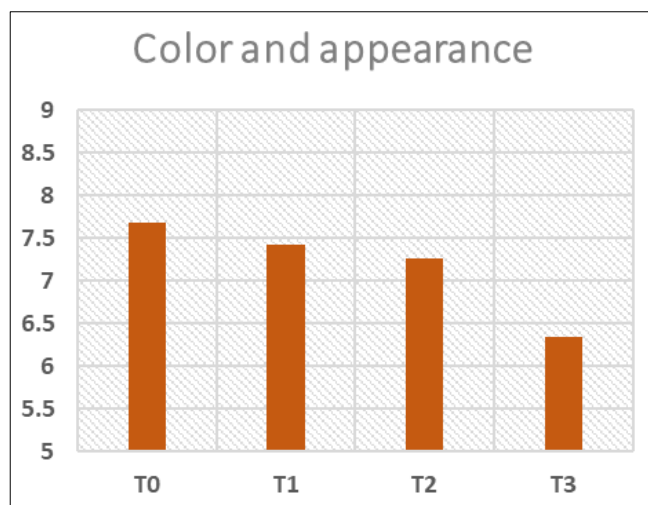


Fig 1: Effect of blending different levels of flaxseed flour on color and appearance of extruded paneer

Flavor

From table 1 the flavor score of control was 7.43 against 7.58, 8.18 and 7.71 out of 9.0 point hedonic scale with respect to T₁, T₂ and T₃ respectively. The significant increase in the flaxseed flour showed significant increase in the flavor scores. Statistical analysis says that there was a significant difference between control and T₂ sample as well as within other treatments (T₁ and T₃). The significant increasing in flavor score with increasing the flaxseed flour could be due to flaxseed flour rich in omega-3 fatty acids which make the pleasant flavor of extruded paneer. Similar results was also observed by Patil *et al.*, (2013) [10] prepared biscuit by flaxseed flour (5, 10 and 15 per cent) and found 10 per cent flaxseed flour based biscuit had good color (7.3), appearance (7.6), flavor (7.6) and texture (7.4).

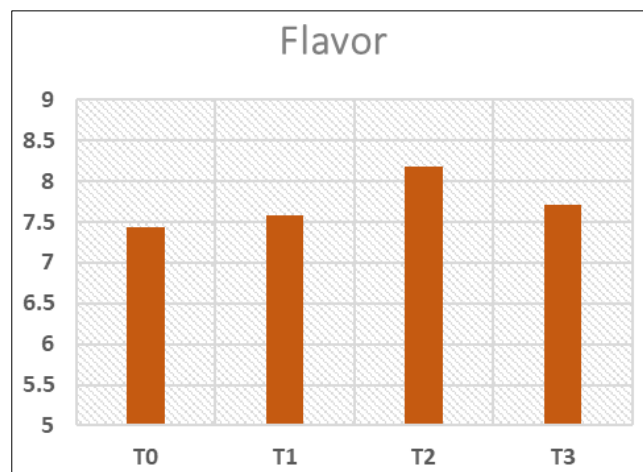


Fig 2: Effect of blending different levels of flaxseed flour on flavor of extruded paneer

Body and texture

The sensory scores with respect to body and texture as shown fig.3 for control sample, T₁, T₂, T₃ were 7.49, 7.83, 8.25 and 6.25. There was significant increase in body and texture scores with significant increase flaxseed flour level in the product. It was observed from the table 1, that there was a significant difference between control and treatments as well as within treatments T₁, T₂ and T₃ samples. The results showed that blending of flaxseed flour up to 10 per cent level product developed crunchy with optimum body and texture score but at high levels product found less crispyness. Similarly results was founded by Patil *et al.* (2013) [10] with respect to body and texture score 10 per cent flaxseed flour was significantly optimum to other treated samples.

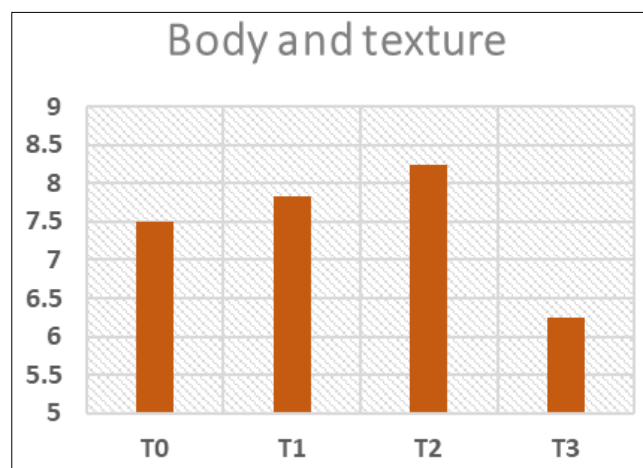


Fig 3: Effect of blending different levels of flaxseed flour on body and texture of extruded paneer

Overall acceptability

From table 1 the highest overall acceptability scores was recorded by T₂ sample (8.16) and lowest score was obtained by T₃ sample (6.07). The table showed that as the flaxseed flour levels significantly increased the overall acceptability scores also significantly increased at T₂ treatment. Statistically, significant difference was noticed between control and treatments as well as within treatments T₁, T₂ and T₃ samples with respect to its overall acceptability at ($P \leq 0.05$) level. The increasing in score could be due to the nutty flavor and crunchy body & texture. Similar data was reported by

Ganorkar and Jain (2014) [5] found above the 10 per cent of flaxseed level; the overall acceptability score decreased significantly could be due to unpleasurable after taste, dark brownish color, rough surface, less crisp and gritty mouth feel. Similar observation was observed by (Husain *et al.*, 2006 and Chetana *et al.*, 2010) [7, 1].

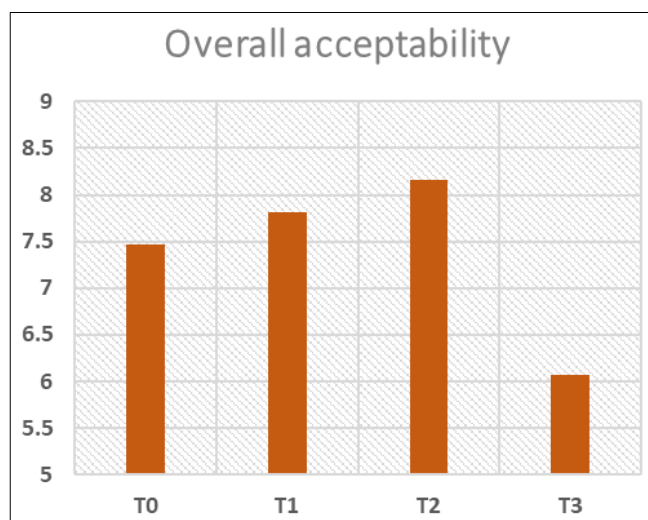


Fig 4: Effect of blending different levels of flaxseed flour on overall acceptability of extruded paneer

Table 1: Effect of blending different levels of flaxseed flour on sensory characteristics of extruded paneer

Treatments	Sensory characteristics			
	Color and appearance	Flavor	Body and texture	Overall acceptability
T ₀	7.69 ^a	7.43 ^a	7.49 ^a	7.47 ^a
T ₁	7.43 ^a	7.58 ^a	7.83 ^b	7.81 ^b
T ₂	7.27 ^a	8.18 ^b	8.25 ^c	8.16 ^c
T ₃	6.35 ^b	7.71 ^a	6.25 ^d	6.07 ^d
CD (P≤0.05)	0.65	0.45	0.33	0.34

Note:

All values are average of three trials

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

T₀ = Control sample was prepared by refined wheat flour and pectin at 7.5 and 0.3% level

T₁ = Product was prepared by blending flaxseed flour at 5.0% level

T₂ = Product was prepared by blending flaxseed flour at 10.0% level

T₃ = Product was prepared by blending flaxseed flour at 15.0% level

Conclusion

The finding of the research revealed that, the extruded paneer blended with flaxseed flour at 10 per cent level was best on basis of sensory characteristics. It might be due to flaxseed have omega 3 fatty acid which could help in the enhance flavor of the product and protein content of flaxseed flour could be help to get crunchy texture of functional extruded paneer.

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