SHORT COMMUNICATION

Development and Assessment of Chicken Fortified Papad

Deepali T. Sakunde[1]*, Mukesh Gangwar[2], Chandrakant D. Bhong[3], Abhijit K. Barate[4], Sanjay M. Bhalerao[5]

Abstract

The present study was conducted to standardize formulation and processing conditions for chicken fortified papad. Deboned, pressure cooked chicken was dried in a hot air oven at 60°C for 12-15 h ground to powder, and used in this study. The formulation was standardized with cooked mashed potato, tapioca flour, cumin seeds, red chilli powder, oil and salt. Different levels of chicken powder (0, 10, 20, and 30%) were used to replace the cooked smashed potato and tapioca flour from the standard formulation. The papads were dried in a hot air oven at 50°C for 1 h. The quality of chicken fortified papad was evaluated based on proximate composition and sensory evaluation. Protein, fat, crude fibre and ash percentage of fortified papad recorded a significant increase with the increase in the level of chicken powder. Moisture percent recorded a significant increase in the chicken fortified papad to that of control. The sensory scores of deep-fried papads for all attributes, *i.e.,* appearance, flavour, crispiness and overall acceptability of control and chicken fortified papad with 20% chicken powder were comparable.

Key words: Chicken fortified Papad, Chicken powder, Crude fibre , Potato, Tapioca flour.

Ind J Vet Sci and Biotech (2024): 10.48165/ijvsbt.20.2.22

Introduction

Dough primarily made of tapioca and black gram flour, together with salt and spice powders, is used to make the snack food known as papad. Snacks are ready-to-eat or ready-to-prepare food items often eaten in between meals to satiate a momentary hunger while also supplying energy and nutrients. Papads are typically eaten as a side dish to a complete dinner after roasting or frying and have a crunchy, wafer-like flavour. The majority of the traditional culinary accompaniments in India are created via deep-fat frying (Basak *et al*., 2023). In India, it is made from a variety of pulses and cereals that are low in vital fatty acids, B-complex vitamins, and minerals like zinc and iron on the other hand, all of these crucial components are readily available from animal sources. Meat and meat products are good sources of proteins, vitamins, minerals, and vital fatty acids with a high biological value. In terms of meat products, efforts are mostly focused on reformulating them by changing their functionality by incorporating a variety of functional components (fiber, antioxidants, vegetarian proteins, monounsaturated or polyunsaturated fatty acids, vitamins, calcium, phytochemicals, etc) (Jimenez-Colmenero *et al*., 2001). The development of shelf-stable meat products is essential because meat and meat products are perishable and have a short shelf life. Shelf stable meat products may offer consumers high-quality proteins in developing nations like India where the absence of cold storage facilities and frequent power outages are typical. Extenders and binders are added to meat products to improve their quality, thus creating chicken meat papad with smashed potatoes and tapioca flour is a creative idea since it can efficiently provide consumers with the right amount of nutrient-dense, shelf-stable, delectable meat products. The aim of this study was therefore to develop and assess chicken fortified papad.

[1]Department of Livestock Products Technology, K.N.P. College of Veterinary Science, Shirwal-41280, Maharashtra Animal and Fishery Sciences University (MAFSU), Maharashtra, India

[2]Department of Livestock Products Technology, College of Veterinary and Animal Science, Kishanganj, BASU, Patna, India

[3]Department of Veterinary Public Health, K.N.P. College of Veterinary Science, Shirwal-412801, MAFSU, Maharashtra, India

[4]Department of Veterinary Biochemistry, K.N.P. College of Veterinary Science, Shirwal-412801, MAFSU, Maharashtra, India

[5]Department of Animal Nutrition, K.N.P. College of Veterinary Science, Shirwal-412801, MAFSU, Maharashtra, India

Corresponding Author: Deepali Tanaji Sakunde, Department of Livestock Products Technology, K.N.P. College of Veterinary Science, Shirwal-412801, Maharashtra Animal and Fishery Sciences University, Maharashtra, India, e-mail: deepalivet2012@gmail.com

How to cite this article: Sakunde, D. T., Gangwar, M., Bhong, C. D., Barate, A. K., & Bhalerao, S. M. (2024). Development and Assessment of Chicken Fortified Papad. Ind J Vet Sci and Biotech. 20(2), 103-106.

Source of support: Nil

Conflict of interest: None.

Submitted 11/08/2023 **Accepted** 01/10/2023 **Published** 10/03/2024

Materials and Methods

Chemicals and Material

The chemicals and reagents of analytical grade were used and procured from Hi-Media Laboratories (P) Ltd (Mumbai, Maharashtra, India), CDH (New Delhi, India), and Sisco Research Private Ltd (Mumbai, Maharashtra, India).

Freshly dressed broiler chicken was procured from the local market of Shirwal, Maharashtra, India. Deboned meat

was packed in clean polyethylene bags and frozen at -20°C until used. Refined table salt (Tata Chemicals Ltd., Mumbai), potatoes, tapioca flour, salt, oil, and spices were brought from the local market.

Preparation of Chicken Papad

Thawed meat was manually cleaned, defatted, and minced in a mincer using a 4 mm plate. Meat powder was made by steam-cooking broiler meat followed by hot air drying at 60 °C for 12-15 h. Other than meat powder, ingredients like steam-cooked peeled potatoes, tapioca starch flour, salt, spice mix, cumin seed, vegetable oil, red chilli powder, and condiments were utilized in the formulation (Table 1), which was finalized after repeated preliminary trials. Three different types of fortified papad were prepared with the addition of 10% (T1), 20% (T2), and 30% (T3) broiler meat powder. All ingredients were thoroughly combined and the dough was prepared. About 10-11 g of dough was taken and hand-rolled into thin, circular discs of about 1 mm thickness and 6 cm in diameter, using a wooden roller and polythene sheet. For 1-2 h, the papads were dried in a hot air oven set to 50°C. The dried papad at this stage contained about 16-18% moisture, which indicates complete drying. After that, the dried papads were placed in LDPE bags and stored at room temperature. For the preparation of the control papad sample (without broiler meat powder), the same procedure was used.

Physiochemical Analysis of Fortified Papad

The pH of fortified chicken meat papad dough samples were dissolved in distilled water and measured as per Trout *et al*. (1992). The digital pH meter (Model 420A, Orion Research, Inc., Beverly, MA, USA) was used to measure the pH of the meat by directly submerging the glass electrode and temperature probe into the sample .

Moisture, crude protein, fat and crude fibre of dried papads were determined by standard procedures of the Association of Official Analytical Chemists (AOAC, 1995).

Sensory Evaluation

Sensory evaluations of control and treated fortified broiler meat papads were performed, utilizing an eight-point descriptive scale (Keeton, 1983) with slight modifications, where 8=excellent and 1=extremely poor. The sensory panel consisted of faculty members and postgraduate students of the different departments of the College. Papads were deep-fried and served immediately to the panelists. The panelists evaluated the samples for attributes such as general appearance, flavour, crispiness, texture, and overall acceptability.

Statistical Analysis

The experiment was replicated three times, and the data generated were analyzed by statistical methods of one-way ANOVA, Mean ± SE using the SPSS software package (Snedecor and Cochran, 1995), and means were compared using Dunkan's multiple range test (Dunkan, 1995).

Results and Discussion

The effects of added chicken powder on the physicochemical properties of chicken fortified papad and control product are presented in Table 2

Table 1: Formulation of chicken papad

Ingredients	Control	T1 (10 %)	T2 (20%)	T3 (30%)
Cooked potato (%)	77	69	61	53
Tapioca flour (%)	19.25	17.25	15.25	13.25
Chicken powder (%)	00	10	20	30
Cumin seeds (%)	0.75	0.75	0.75	0.75
Red chilli powder (%)	1.0	1.0	1.0	1.0
Salt (%)	2.0	2.0	2.0	2.0
Oil (% to that of the total dough prepared)	5.0	5.0	5.0	5.0

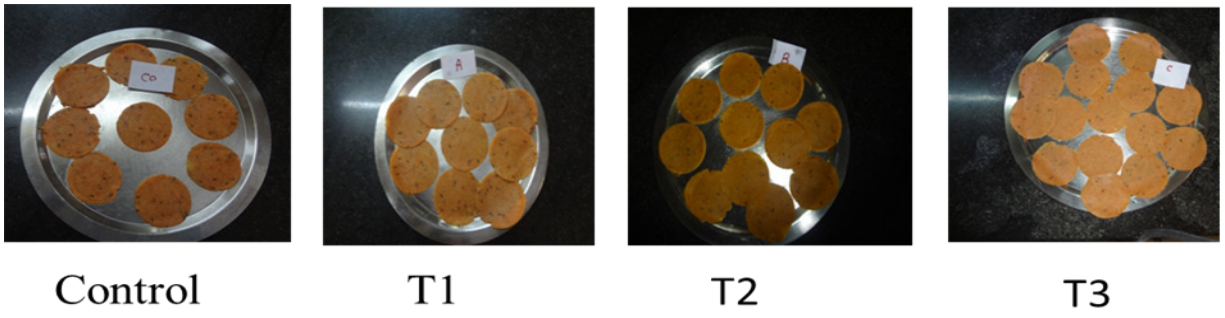

Fig. 1: Chicken meat incorporated papad, Control- without chicken meat, T1- 10% chicken meat, T2- 20% chicken meat, T3- 30% chicken meat

Table 2: Effect of added chicken powder on physico-chemical properties of chicken fortified papad

Properties	Control	Effect of levels of chicken powder		
		10%	20%	30%
pH	6.17^{d}±0.001	6.20^{c}±0.000	6.22^{b}±0.006	6.23^{a}±0.000
Moisture (%)	12.13±0.022	12.21±0.336	12.33±0.361	12.47±0.197
Protein (%)	2.56 ^{d}±0.166	7.10 ^{c}±0.086	13.13 ^{b}±0.021	18.15^{a}±0.073
Fat (%)	6.73^{d}±0.016	9.68^{c}±0.023	10.48^{b}±0.014	11.98^{a}±0.047
Crude fibre (%)	0.99^{a}±0.009	0.94^{b}±0.004	0.91^{c}±0.004	0.73^{d}±0.001

Mean ± SE with different superscripts in a row differ significantly (p< 0.05).

Table 3: Effect of added chicken powder on sensory attributes of chicken fortified papad (scores on 8 point descriptive Hedonic scale)

Sensory attributes	Control	Effect of different levels of chicken powder		
		10%	20%	30%
Appearance	7.33^{a} ±0.218	7.00^{a} ±0.00	6.83^{a} ±0.166	5.67^{b} ±0.218
Flavour	7.00 ±0.000	7.33 ±0.218	7.50 ±0.226	7.50 ±0.218
Crispiness	7.67^{a} ±0.218	7.33^{a} ±0.218	7.16^{a} ±0.166	5.33^{b} ±0.218
Texture	7.00^{a} ±0.000	6.83^{a} ±0.166	6.67^{a} ±0.218	5.17^{b} ±0.166
Overall palatability	7.50^{a} ±0.226	7.17^{a} ±0.303	7.33^{a} ±0.218	5.67^{b} ±0.426

Mean ± SE with different superscripts in a row differ significantly (P< 0.05).

The pH value of the control sample was significantly (p<0.05) lower than that of the treatment samples. Similarly, Devalakshmi *et al*. (2010) recorded lower pH values in the chicken meat chips which were prepared with the addition of cooked and smashed potatoes (15%) to that of the control chips. The pH value of treatments increased when the quantity of broiler meat powder was increased for the preparation of fortified papad. Soni *et al*. (2013) recorded the pH of a meat ring prepared from poultry meat as 5.66. The moisture content of chicken-fortified papads varied from 12.21% to 12.47%; however, in the control product, the moisture content was 12.13% as against the maximum 15% recommended. The moisture content recorded a non-significant increase in the chicken-fortified papads compared to that of the control. Muthulakshmi and Muthukumar (2020) prepared papad with the addition of spent hen meat (65%), skin, heart, and gizzards (15%) and found the moisture content in spent hen meat papad as 10.30%. Turkey meat papad prepared with a 50:50 and 100:0 blend of rice flour and heat-treated turkey meat had moisture contents of 12.77% and 16.28%, respectively (Berwal *et al*., 1996). All the treatment samples showed significantly (p<0.05) higher protein content in comparison to the control sample (Table 2). The higher crude protein content in treatment products might be due to the addition of high-protein broiler meat powder. Malav *et al*. (2017) found that papad prepared with the addition of black gram flour along with spent hen meat powder contained more protein (31.25%) than papad prepared with corn flour addition (27.63%). Muthulakshmi and Muthukumar (2020) also found 48.72% protein content in spent hen meat papad.

The fat content in all treatment samples was significantly higher (p<0.05) than that of the control samples. The fat content of treatments increased when the quantity of broiler meat powder in the fortified papad was increased. It was obvious, due to the removal of moisture during drying and the replacement of vegetative binders (cooked mashed potatoes and tapioca starch flour) with lean meat having a higher amount of fat (Malav *et al*., 2017). Berwal *et al*. (1996) recorded 5.71 and 2.30% fat in the papad prepared with a 50:50 and 100:0 blend of rice flour and heat-treated turkey meat, respectively. Between the control and the various treatment samples, there was a significant variation in crude fibre content (p<0.05), with the highest value in control. When the amount of broiler meat powder was increased in the chicken meat enriched papad, the crude fibre level in the treatments decreased significantly (p<0.05). El-Anany *et al*. (2020) reported that 20% cauliflower-enriched chicken nuggets had the highest crude fibre (3.78%), followed by 10% cauliflower-enriched chicken nuggets (2.47%), and the control sample had the lowest crude fibre (0.92%).

Sensory Evaluation of Chicken Meat Fortified Papad

The mean sensory scores of the treatment broiler meat deep-fried papad and control product are presented in Table 3. Mean appearance, crispiness, texture, and overall palatability scores of deep-fried papad up to 20% chicken powder were comparable to that of control products, but not significantly lower than that of control products. The appearance, crispiness, texture, and overall palatability of deep-fried T3 papad were significantly lower than that of control and T1 and T2 products. There was also no significant (p>0.05) difference in the mean score of flavour between the control and all the treatments. Therefore, the chicken-fortified papad prepared with the incorporation of 20% chicken meat powder was determined to be the most acceptable based on sensory scores.

Conclusions

Chicken-fortified papads with 20% chicken powder were comparable to that of control in quality and acceptability specially enriched in protein to that of control.

Acknowledgement

We are thankful to the Associate Dean, K.N.P. College of Veterinary Science, Shirwal for providing the necessary facilities to undertake this work.

References

AOAC (1995) Official methods of analysis, 16th edn. *Association of Official Analytical Chemists*, Washington DC, pp 391-399.

Basak, S., Chakraborty, S., & Singhal, R.S. (2023). Revisiting Indian traditional foods - A critical review of the engineering properties and process operations. *Food Control*, *143,* 109286.

Berwal, J.S., Dhanda, J.S., & Berwal, R.K. (1996). Studies on rice and turkey meat blend papads. *Journal of Food Science and Technology (Mysore)*, *33*(3), 237-239.

Devalakshmi, N., Reddy, K.P., & Mallika, E.N. (2010). Physico-chemical, sensory and microbial quality of chicken meat chips. *Veterinary World*, *3*(4), 182-184.

Dunkan, D.B. (1995). Multiple range and multiple F test. *Biometrics*, *1,* 1-8.

El-Anany, A.M., Ali, R.F., & Elanany, A.M. (2020). Nutritional and quality characteristics of chicken nuggets incorporated with different levels of frozen white cauliflower. *Italian Journal of Food Science*, *32*(1), 45-59.

Jimenez-Colmenero, F., Carballo, J., & Cofrades, S. (2001). Healthier meat and meat products: Their role as functional foods. *Meat Science*, *59*(1), 5-13.

Keeton, J.T. (1983). Effects of fat and NaCl/phosphate levels on the chemical and sensory properties of pork patties. *Journal of Food Science*, *52*(3), 312-317.

Malav, O.M., Chatli, M.K., Kumar, P., & Mehta, N. (2017). Optimization and quality evaluation of spent hen meat papad incorporated with corn and black gram flour. *Indian Journal of Poultry Science*, *45*(2), 231-233.

Muthulakshmi, M. & Muthukumar, M. (2020). Shelf life of spent hen meat papad stored at ambient temperature. *International Journal of Current Microbiology and Applied Sciences*, *9*(10), 798-806.

Snedecor, G.W., & Cochran, W.G. (1995). *Statistical methods* (8th edn.), Iowa State Press, Ames, Iowa, USA, pp. 72-148.

Soni, B., Chauhan, G., Mishra, B.P., Mendiratta, S.K., Kumar, B., & Mohapatra, S. (2013). Development and quality evaluation of dehydrated meat rings from meat of poultry and fish. *Indian Journal of Poultry Science*, *48*(2), 182-186.

Trout, E.S., Hunt, M.C., Johnson, D.E., Claus, J.R., Kastner, C.L., & Kropf, D.H. (1992). Characteristics in low-fat ground beef containing texture modifying ingredients. *Journal of Food Science*, *57,* 19-24.