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Quality evaluation of chicken patties incorporated with proso millet flour

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Abstract

In this study, we investigated the the sensory, dietary, and physicochemical qualities of chicken patties made with prosomillet flour as an extender. Two treatments, 1.5% and 3% prosomillet flour were formulated. The physico-chemical, mineral composition, proximate along with sensory qualities of the cooked patties were identified using conventional techniques. Through proximate analysis, decrease in moisture content (45.43-32.56%) and crude fat (18.11-16.80%) as chicken was partially replaced with prosomillet flour. Decrease in crude protein (32.77-31.06%) which was observed yet which did not differ from the control category statistically ($p>0.05$). The patties that were extended with 3% prosomillet flour had a higher crude fiber content. There was a significant increase in calcium (1.71-2.23 mg/100 g) and phosphorus (2.60 – 2.82) among minerals in chicken incorporated with prosomillet flour compared with different treatments, chicken meat patties incorporated with prosomillet at 3 per cent possessed superior physico-chemical, organoleptic qualities and improved the mineral composition.

Keywords: Chicken patties, proso millet, physico-chemical

Introduction

The physical and chemical constitution of meat makes it a food that is very sensitive to oxidation. The ratio and interaction between endogenous anti- and pro-oxidant chemicals, and also the mix of substrates susceptible to oxidation such as polyunsaturated fatty acids (PUFA), cholesterol, proteins, and pigments, influence the oxidative stability of meat.

The poultry industry employs more than 4 million people directly or indirectly and contributes over 70,000 crores of rupees to the national GDP. India is the third-largest producer of eggs and chicken meat in the world. In India, 3 billion broilers are used to create about 3.8 million tonnes of poultry meat per year. According to recent data for the year 2021-2022, the total meat in the country is 9.29 million tonnes with an annual growth rate of 5.62%. The total per capita availability of meat is 6.82 kg/annum during 2021-2022 increased by 0.30 kg/annum.

Prosomillet (*Panicum miliaceum*) is a beneficial cereal and an essential part in the human diet, its grains are mainly consumed in decorticated form. Prosomillet quality has been evaluated on the basis of nutritional value, Mainly as starch content which may vary from 59-80% (Yanez *et al.*, 1991) ^[15] and significantly higher in leucine, isoleucine, and methionine, three important amino acids. Prosomillet had more (51%) EAI (Essential Amino Acid Index) for protein as wheat. Additionally, foxtail and prosomillet proteins stimulate the metabolism of cholesterol (Choi *et al.*, 2005) ^[4].

Materials and Methods

The broiler birds were slaughtered hygienically dressed, deboned, packed and kept in freezer for further use. The emulsion was prepared by mincing the deboned chicken meat with fat, condiment mix, ice flakes, spice mix thoroughly. To the above prepared meat emulsion, proso millet flour is added at different levels (1.5% and 3%). Weighed quantity of emulsion was taken and made into patties. Then physico chemical, sensory quality of chicken patties were evaluated to select the optimum level of inclusion.

Physico-Chemical Properties

Mean pH

Mean pH of the chicken patties was studied by following the method of Trout *et al.* (1992) ^[13] using deluxe digital pH meter (model 101E).

Per cent cooking yield

Cooking yield per cent was calculated taking the difference in weight of chicken meat nuggets before and after cooking in a water bath for 20 min.

Cholesterol content

Cholesterol content was determined according to the procedures described by Turhan *et al.* (2007) ^[14].

Proximate Composition

Proximate composition of product *viz*, moisture, fat, protein, ash was determined following the standard procedure of AOAC (2016) ^[2].

Sensory evaluation

The sensory quality of samples was evaluated using 8 point hedonic scale.

Results and analysis

Physical and Chemical Characteristics

Mean pH

The effects of various formulations on the mean pH values of chicken meat patties were not statistically ($p > 0.05$) significant (table 1). These results corresponded with Kumar *et al.* (2015) ^[3] in quality assessment of dietary fiber-enhanced chevon patties.

Cooking yield

The effects of various formulations on the cooking yield values of chicken meat patties were statistically ($p > 0.05$) significant (table 1). Chicken meat patties incorporated with 3 per cent prosomillet was significantly ($p < 0.05$) higher in cooking yield than 1.5 per cent prosomillet and control. These results corresponded with Naveena *et al.* (2006) ^[9] in chicken meat patties with finger millet flour. This may be related to millet flour's high level of dietary fiber (Chatli *et al.* 2015) ^[3].

Cholesterol

Chicken meat patties incorporated with 3 per cent prosomillet were statistically ($p < 0.05$) lower cholesterol than 1.5 per cent level prosomillet chicken meat patties and control (table 1). This may be related to presence of phylates, polyphenols, tannins, anthracyanins, phytosterol, pinacosanoids. These results were in accordance with those of Siddiqui and Khan (2011) ^[12] in buffalo meat slices with finger millet flour, Nayak *et al.* (2015) ^[10] in carrageenan extended chicken nuggets.

Proximate analysis

Between the treatment group and the control group, a significant difference ($p < 0.05$) was observed (table 2). In relation to 1.5 percent prosomillet, chicken meat patties incorporating 3% prosomillet had considerably ($p < 0.05$) decreased moisture content than control. These results corresponded with Malav *et al.* (2017) ^[7] in spent hen meat papad with corn and black gram flour, chicken meat cutlets.

This may be related to replacement of lean meat by millet flour formulation. (Mishra *et al.* 2014) ^[8], further coupled with moisture absorbing properties of dietary fibre rich millet flour.

The crude fat content reduced significantly ($P 0.05$) when proso millet flour amount increased. The highest amount of crude fat was found in the control product (table 2). These results corresponded with those of Chatli *et al.* (2015) ^[3] in emu meat nuggets with finger millet flour, Malav *et al.* (2017) ^[7] in spent hen meat prepared with corn and black gram flour. prosomillet at 1.5 per cent level incorporated patties were significantly ($p < 0.05$) higher than 3 per cent prosomillet incorporated chicken meat patties and control. These results corresponded with Malav *et al.* (2017) ^[7] in spent hen meat prepared with corn and black gram flour. This may be related to replacement of lean meat by millet flour which has comparably higher carbohydrates and lower protein content than lean meat (Mishra *et al.* 2014) ^[8].

As increase in level of proso millet flour there was a significant ($p < 0.05$) increase in crude fibre content. These results corresponded with those of Chatli *et al.* (2015) ^[3] in emu meat nuggets with finger millet flour.

Mineral estimation

Irrespective of the different levels of prosomillet incorporation, increased level of extender had statistically significant ($p < 0.05$) increase in calcium and phosphorus content (table 1). The results corresponded with Amadi and Ovuchimeru (2020) ^[1] stated that at levels of 10% full fat soya flour (FFSF), calcium and phosphorus content was observed to increase significantly ($p < 0.05$) higher than the control sausage.

Sensory attributes

As increasing of different levels of prosomillet flour on the colour of chicken meat patties had no significant ($p < 0.05$) effect was observed (table 3). This is in accordance with Hughes *et al.* (1997) ^[5] used carrageenan and oat fiber in their frankfurters.

Chicken meat patties wit 3 percent level of prosomillet secured significantly ($p < 0.05$) more flavour scores than the other treatments and control (table 3). The inclusion of prosomillet may have allowed for the release of a large amount of free water during the high-heat cooking process, which carried the flavour compounds. This result is in accordance with Yang *et al.* (2009) ^[16] used grain flours as an addition to duck meat sausages.

In comparison to control and other treatments, chicken flesh patties containing prosomillet at a 3 percent level recorded substantially ($p < 0.05$) greater tenderness scores (table 3). This might be the result of the collagen polypeptide chains' intra- and intermolecular crosslinkages being disrupted during the minced meat process. According to Yang *et al.* (2007) ^[17], adding hydrated oat meal to low-fat sausages produced the desired results.

Prosomillet flour was added to chicken meat patties at a 3 percent level, and these patties significantly ($p < 0.05$) than other patties in terms of flavor and tenderness in addition to overall acceptance (table 3). The study's findings support Para *et al.* (2015) ^[11] about the effect of bajra flour on a few sensory and qualitative attributes of chicken nuggets.

Table 1: Effect of incorporation of different levels of prosomillet on the physico-chemical properties of chicken meat patties (Mean \pm S.E)

	pH	Calcium (%)	Phosphorus (%)	Cooking yield (%)	Cholesterol (%mg)
Control	5.80 \pm 0.01 ^a	1.71 \pm 0.01 ^a	2.60 \pm 0.01 ^a	80.5 \pm 0.01 ^a	14.52 \pm 0.09 ^c
1.5% prosomillet	5.83 \pm 0.03 ^{ab}	2.12 \pm 0.05 ^b	2.71 \pm 0.05 ^b	82.99 \pm 0.02 ^b	13.34 \pm 0.05 ^b
3% prosomillet	5.85 \pm 0.01 ^{ba}	2.23 \pm 0.01 ^c	2.82 \pm 0.01 ^c	83.98 \pm 0.01 ^c	11.46 \pm 0.11 ^a

($p < 0.05$) Means bearing atleast one common superscript in the same column do not differ significantly.

Table 2: Effect of incorporation of different levels of prosomillet flour on the proximate composition of chicken meat patties (Mean \pm S.E)

Parameter (%)	control	1.5% prosomillet	3% prosomillet
Moisture	45.43 \pm 0.13 ^c	37.29 \pm 0.15 ^b	32.56 \pm 0.13 ^a
Crude fibre	1.35 \pm 0.01 ^a	1.32 \pm 0.01 ^a	1.56 \pm 0.01 ^b
Crude fat	18.11 \pm 0.06 ^a	16.94 \pm 0.04 ^b	16.80 \pm 0.03 ^b
Crude protein	32.77 \pm 0.04 ^a	32.32 \pm 0.18 ^b	31.06 \pm 0.17 ^c

($p < 0.05$) Means bearing atleast one common superscript in the same column do not differ significantly.

Table 3: Effect of incorporation of different levels of prosomillet flour on the organoleptic properties of chicken meat patties (Mean \pm S.E)

Parameter (%)	Control	1.5% prosomillet	3% prosomillet
Colour	7.16 \pm 0.02 ^a	7.20 \pm 0.03 ^a	7.24 \pm 0.04 ^a
Flavour	6.61 \pm 0.05 ^a	7.45 \pm 0.06 ^b	7.75 \pm 0.09 ^c
Texture	6.31 \pm 0.04 ^a	7.22 \pm 0.03 ^b	7.44 \pm 0.05 ^c
Tenderness	6.44 \pm 0.09 ^a	7.34 \pm 0.04 ^b	7.40 \pm 0.05 ^c
Overall acceptability	6.43 \pm 0.08 ^a	7.49 \pm 0.06 ^b	7.83 \pm 0.02 ^c

($p < 0.05$) Means bearing atleast one common superscript in the same column do not differ significantly.

Conclusion

The chicken meat patties extended with prosomillet flour at 3 per cent level had statistically significant ($p < 0.05$) higher physico-chemical parameters such as cooking yield, pH, higher crude fibre, calcium and phosphorus content and better sensory scores than control.

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References

- Amadi AO. Nutritional effects of full-fat soy flour as an extender on cooked beef sausage quality. *Asian Food Sci J.* 2020;17:44-53.
- AOAC. Official Methods of Analysis of International 20th Ed., AOAC International, Rockville, MD, USA, Official Method 2008.01; c2016.
- Chatli MK, Kumar P, Mehta N, Verma AK, Kumar D, Malav OP. Quality characteristics and storage stability of emu meat nuggets formulated with finger millet (*Eleusine coracana*) flour. *Nutrition & food science.* 2015;45(5):740-752.
- Choi YY, Osada K, Ito Y, Nagasawa T, Choi MR, Nishizawa N. Effects of dietary protein of Korean foxtail millet [*Setaria italica*] on plasma adiponectin, HDL-cholesterol, and insulin levels in genetically type 2 diabetic mice. *Bioscience, Biotechnology, and Biochemistry (Japan)*; c2005.
- Hughes E, Cofrades S, Troy DJ. Effects of fat level, oat fibre and carrageenan on frankfurters formulated with 5, 12 and 30% fat. *Meat science.* 1997;45(3):273-281.
- Kumar Y, Yadav DN, Ahmad T, Narsaiah K. Recent trends in the use of natural antioxidants for meat and meat products. *Comprehensive Reviews in Food Science and Food Safety.* 2015;14(6):796-812.
- Malav OM, Chatli MK, Kumar P, Mehta N. Optimization and quality evaluation of spent hen meat papad incorporated with corn and black gram flour; c2017.
- Mishra BP, Chauhan G, Mendiratta SK, Rath PK. Storage stability of vacuum packaged extended dehydrated chicken meat rings at ambient temperature. *Indian Journal of Animal Sciences.* 2014;84(11):1222-1227.
- Naveena BM, Muthukumar M, Sen AR, Babji Y, Murthy TRK. Quality characteristics and storage stability of chicken patties formulated with finger millet flour (*Eleusine coracana*). *Journal of Muscle Foods.* 2006;17(1):92-104.
- Nayak NK, Pathak V, Singh VP, Goswami M, Bharti SK. Quality of Carrageenan Incorporated Low Fat Chicken Nuggets during Refrigerated Storage at 4 C. *Livestock Research International.* 2015;3(1):7-13.
- Para PA, Kumar S, Raja WH, Bhat ZF, Kumar A. Potential of green gram flour as an enrobing material for papaya-pulp enriched chicken nuggets. *Journal of Meat Science.* 2015;11(1):50-53.
- Siddiqui M, Khan MA. Comparative study on quality evaluation of buffalo meat slices incorporated with finger millet, oats and chickpea. In 11th International Congress on Engineering and Food; c2011.
- Trout ES, Hunt NC, Johnson DE, Claus JR, Kastner CL, Kropf DH, Stroda S. Chemical, physical and sensory characterization of ground beef containing 5 to 30% fat. *J Food Sci.* 1992;57(1):25-29.
- Turhan S, Temiz H, Sagir I. Utilization of wet okara in low-fat beef patties. *Journal of Muscle Foods.* 2007;18(2):226-235.
- Yanez GA, Walker CE, Nelson LA.. Some chemical and physical properties of proso millet (*Panicum milliaceum*) starch. *Journal of Cereal Science.* 1991;13(3):299-305.
- Yang HS, Ali MS, Jeong JY, Moon SH, Hwang YH, Park GB, *et al.* Properties of duck meat sausages supplemented with cereal flours. *Poultry Science.* 2009;88(7):1452-1458.
- Yang HS, Choi SG, Jeon JT, Park GB, Joo ST. Textural and sensory properties of low fat pork sausages with added hydrated oatmeal and tofu as texture-modifying agents. *Meat science.* 2007;75(2):283-289.