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Research Note

Development of Snacks (*Murukku*) by Incorporation of Broiler Skin

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ABSTRACT

About 505 millions of broiler chickens are annually slaughtered in India of which skin contribute 14% of the dressed weight. Proper utilization of skin will open avenue for its economic disposal. Therefore, this study was planned to prepare snacks by using broiler skin to assess their comparative quality. A recipe for snacks (*muruku*) was standardized containing rice flour, black gram, salt, dry spices, sesame seed (*till*), oil at 90, 10, 1.75, 1, 1, and 3%, respectively. The standardized recipe was taken as control and raw chicken skin was incorporated in that at 15 and 30 % levels. The snacks were prepared by hand mixing of all the ingredients with water and deep oil fried at 130°C for 5 min. The physico-chemical and sensory quality of the snacks were assessed. The moisture, protein, fat were 6.60, 5.33, 6.77; 13.18, 13.34, 13.49; 6.98, 8.35, 11.24 percent, respectively. Fat content was significantly ($p<0.05$) higher in snacks prepared with 30% broiler skin. Organoleptically the snack with 15% broiler skin was found to be more acceptable than the other two products. Preparation of snacks by incorporation of broiler skin could be a novel approach for economic utilization of poultry skin.

INTRODUCTION

Broiler chicken production in India has increased significantly in last few decades and reached to 505 million (FAO, 2008). Poultry processing has also increased significantly in recent years with the establishment of large modern processing plants in the country. Skin contributes 14% of the dressed weight of broiler birds and it contains approximately13% protein (Stadelmen *et al.*, 1988). Though, chicken skin is edible, in some parts of the country, this does not have much consumer preference. Hence, disposal of broiler skin is becoming a challenge. The skin has potential for using in food products to increase their nutrient contents.

Broiler skin can be utilized efficiently in the formulation of different meat products for reducing the cost of production. Use of chicken skin in chicken frankfurters (Baker *et al.*, 1968) and chicken sausages (Biswas *et al*., 2007) have been reported. Reduced-fat bologna manufactured with poultry skin connective tissue gel (Osburn *et al*, 1998) and chicken meat patties containing skin and giblets (Lingaiah *et al*, 2001) were also reported. Kondaiah *et al*, (1993) reported the use of chicken byproducts in mutton nuggets.

Starch based snack foods are very popular in India and mostly getting commercialized but they contain very little protein. Incorporation of skin could be a novel approach for improving the protein quality of snack foods. We have not come across any literature on incorporation of broiler skin in non-meat food products.

Hence, an attempt has been made to study the physico-chemical and sensory quality characteristics of snacks (*murukku*) product prepared by incorporation of minced broiler skin.

Broiler skin Broilers of 6 weeks age were slaughtered hygienically in the semi-automatic poultry processing plant in the Department of Livestock Products Technology, RAGACOVAS. Dressed carcasses were chilled in the walk-in-cooler for 3-5 hours and the skin was removed manually. External fat of skin was removed manually and then washed with saline water followed by washing in portable tap water to remove the salt and packed in polyethylene bags for storage in freezer at -20° C till further use.

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Process schedule A recipe was standardized through several preliminary trials for preparation of muruku, a household snacks prepared in South India. Dough was prepared by hand mixing all the ingredients, in the following order (Table.1) Rice flour was mixed with the black gram powder and salt followed by addition of finely minced broiler skin (in control, minced broiler skin was not added), sesame seed (*till*) , oil, dry spices mixture (DMS) and condiments. Water was added followed by kneading for getting dough which was extruded through a manually operated stainless steel extruder. The product was then deep fried in oil at a temperature of about 130^0C till the desirable golden yellow color obtained. The product was served immediately to a panel for evaluation of various sensory attributes on an 8 point hedonic scale after keeping samples for physico-chemical analysis. The process schedule is depicted in Fig-1.

Figure 1: Flow chart for preparation of snacks (*murukku*) by incorporation of broiler skin

Collection of broiler skin
!
Removing the external fat from skin
!
Mincing
!
Keep separately
!
Take rice flour, black gram powder, common salt
!
Mixing
!
Addition of spice mix, sesame seeds, oil
!
Mixing
!
Addition of minced skin and water
!
Kneading
!
Dough
!
Extrusion through manually operated extruder
!
Deep oil fried till golden yellow color

Proximate analysis The proximate composition viz. moisture, protein, fat of chicken skin incorporated *muruku* was analyzed as per the method of AOAC (1995). Thio- barbituric acid (TBA) and tyrosine value for muruku were evaluated on 30^{th} day of storage of the product packed in polyethylene pouches and stored at ambient temperature. TBA value was estimated using method of Tarladgis *et al.*, (1960) and expressed as mg of malonoldehyde / kg of sample and tyrosine value was determined by Strange *et al*, (1977).

Sensory evaluation Muruku incorporated with skin were evaluated for sensory attributes (appearance, flavour, crispiness, acceptability, hardness) using 8-point hedonic scale. (1 is extremely undesirable and 8 is extremely desirable) by semi trained panelists consisting of faculty member and PG students of the college.

Statistical analysis All the experiments were repeated thrice and the data obtained were subjected to ANOVA as per Snedecor and Cochran, (1989).

The results of sensory evaluation for colour, appearance, flavour, hardness, crispiness, acceptability of the product are presented in Table 2. The score for colour, appearance, crispiness, flavour, and acceptability were highest for product containing 15% chicken skin, whereas hardness score was highest in 30% inclusion. No significant difference was noticed between the control and treatments or between the treatments. The sensory studies revealed that all the product were quite acceptable and the differences between the products are insignificant. However the overall acceptability of *murukku* with 15% inclusion of broiler skin was found to be more acceptable than the other two products.

The results of proximate composition of snacks (*muruku*) are presented in Table 3. The values for proximate principle increased linearly and no significant difference were observed between control and treatments. Moisture content ranges from 5.33 to 6.77%. Jean *et al*., (1996) reported that snacks foods should have moisture content of less than 15% to make the product brittle. Though the skin incorporated snacks of this study showed slightly higher moisture content, the products were

Table 1: Standardized recipe for snack (*muruku*) with the incorporation of chicken skin

Ingredients	Control%	Treatment-I	Treatment-II
Rice flour	90	90	90
Black gram	10	10	10
Minced broiler skin	0	15	30
Salt	1.75	1.75	1.75
Spices	1	1	1
Till	1	1	1
Oil	3	3	3

Table 2: Effect of incorporation of chicken skin on the sensory quality of snacks (*murukku*)

Parameters	Control	15%skin	30%skin
Colour & appearance	6.95±0.12	6.98±0.14	6.72±0.13
Hardness	6.55±0.15	6.68±0.12	6.70±0.14
Crispiness	6.75±0.15	6.93±0.13	6.72±0.14
Flavour	6.59±0.14	6.79±0.12	6.54±0.13
Acceptability	6.61±0.14	6.90±0.12	6.63±0.12

crispy. Protein percentage of snacks (*muruku*) was 13.18±0.16, 13.34±0.17 and 13.49±0.33 in control, 15% and 30% respectively. Ten percent skin incorporated muruku showed higher fat percentage (11.24±2.18) than control (8.35±1.86) and 15% (6.98±1.87) level, but no significant differences were noticed. This increase in fat percent must be contributed by the fat from the skin. The results of TBA and TV values on 30th day of the extruded products are presented in T able 3.The TBA value for the control, 15% inclusion and 30% inclusion were 0.25 ± 0.01, 0.36±0.02 and 0.39±0.02 mg/kg of malonoldehyde respectively. Significant difference ($p<0.05$) was noticed between the control and the treatment where as no significant difference was noticed between the two treatment groups. The increase in the TBA value indicated the higher oxidation of the skin incorporated products due to higher fat content.

The TV for control, 15% inclusion and 30% inclusion were 0.44±0.01, 0.48±0.01 and 0.55±0.01 mg/100g, respectively and significant differences ($p<0.05$) were noticed in all three samples. The significant increases in the TV indicate that incorporation of skin results in an increase in TV content of the products..

The TBA/TV values were higher for 30% inclusion than other products which indicated higher rancid changes in the product with 30% skin incorporation. However, the values were much lower than threshold value of 2mg/kg (Greene and Cumuze, 1982) by 30thday, indicating that the products are acceptable.

It can be concluded from the findings of this study that the broiler skin can be utilized for the preparation of snacks *(murukku)* to improve the nutritional quality of the product and to have better economic return from this edible byproduct. Further details studies are required to know the other option incorporation of skin and the storage stability of the product.

Table 3: Proximate composition, TBA and Tyrosine value of snacks (*murukku*) containing broiler skin

Parameter	Control	15% skin	30% skin
Moisture	6.60±0.39	5.33±0.75	6.77±0.92
Protein	13.18±0.16	13.34±0.17	13.49±0.33
Fat	6.98±1.87	8.35±1.86	11.24±2.18
TBA Value (mg/kg)	0.25±0.01^{a}	0.36±0.02^{b}	0.39±0.02^{b}
Tyrosine Value (mg/kg)	0.44±0.01^{a}	0.48±0.01^{b}	0.55±0.01^{c}

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