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Organoleptic Quality of Chicken Meat Rolls and Patties Added with the Combination Levels of Black Gram Hull and Psyllium Husk

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ABSTRACT

The present study was envisaged to prepare dietary fiber rich chicken meat rolls and patties. The combination of two different sources of dietary fiber viz. black gram hull and psyllium husk has been used. They were added in three different levels viz. 5% black gram hull and 2% psyllium husk, 5% black gram hull and 4% psyllium husk and 5% black gram hull and 6% psyllium husk. The sensory characteristics such as colour, flavour, tenderness, juiciness, texture and overall acceptability of fiber added chicken meat rolls and patties were studied. In general, the sensory scores showed a decreasing trend with increasing levels of incorporation but 5% black gram hull and 4% psyllium husk combination was found to be suitable organoleptically.

Keywords*:* Black gram hull, Psyllium husk, chicken meat rolls, patties, sensory quality

The food has long been used to improve health; our knowledge of health is now being used to improve foods (Fergus, 2004). An increasing awareness among the people and changes in socioeconomic factors in recent years has increased the consumer's preference for ready to eat foods (Perez- Alvarez, 2008) including meat products. But this has led to many problems throughout the world. Most of those foods are rich in fat and sugars but deficient in complex carbohydrates like dietary

fiber (Sanchez-Zapata *et al.*, 2010). The understanding of relationship between nutrition and health has resulted in the development of concept of functional foods (Bhat and Bhat, 2011). It contains the technologically developed ingredients with a specific health benefit (Niva, 2007). Meat is an excellent source of some essential fat soluble vitamins and minerals of high degree of bioavailability, but recently a negative campaign about the possible health hazards by meat consumption had resulted the consumers' orientation towards functional meat products (Biswas *et al.*, 2011, Mehta *et al.*, 2013). Meat and meat products are deficient in dietary fiber and its incorporation in the meat products from health point of view has been emphasized a lot. Epidemiological research has also demonstrated the relationship between diet deficient in dietary fiber and other complex carbohydrates and increase of a number of chronic diseases, including colon cancer, obesity and cardiovascular diseases (WHO/FAO, 2003). The dietary fiber inclusion in diet has been recommended for adults to the amount of 28- 36 g/day and 70-80 per cent of which must be insoluble fiber (Anderson *et al.*, 2009). Dietary fibre sources are generally agricultural byproducts which are comparatively cheap and incorpation in meat products reduces its overall cost of production. In meat products, fiber is now being used as the most common functional ingredients as fat replacer, volume enhancer, binder and stabilizer (Nuria *et al.*, 1999; Borderias *et al.*, 2005; Hur *et al.*, 2009 and Kumar *et al.*, 2011). Other than the nutritional properties, dietary fiber is used for technological upgradation like improvement in cooking yields and rheological properties, reducing formulation costs and enhancing the texture in meat products (Alesson-Carbonell *et al.*, 2005a, b; Garcia *et al.*, 2006; Besbes *et al.*, 2008; Sanchez-Zapata *et al.*, 2010).

MATERIALS AND METHODS

The birds were slaughtered and dressed as per the standard procedure in the slaughter house of the Department of LPT, LLRUVAS, Hisar. Carcasses were washed thoroughly and deboned manually after trimming of fat and connective tissue. Deboned meat was frozen for 24 hours and then minced in an electrical mincer and used for preparation of chicken meat rolls and patties.

Procedure for preparation of rolls and patties

Following ingredients were added to minced meat for control and treatments. Control rolls contained sodium chloride (2%), sodium tripolyphosphate (0.5%), sodium nitrite (150 ppm), spice mix (2%), garlic paste (3%) and sunflower oil (3%). Treatments consisted of addition of combination of selected levels of black gram hull and psyllium husk as per Mehta (2012). On basis of proximate composition and sensory evaluation, Black gram hull at 5 % level and psyllium husk at 4% level was found to be optimum (Mehta, 2012). The combination of black gram hull and psyllium husk was done at three levels viz. 5+2, 5+4 and 5+6 percent in rolls and patties. The fiber sources were addded besides other additives which were used in control in similar concentrations. After mixing of additives and dietary fiber sources, meat mince was thoroughly chopped in bowl chopper to prepare emulsion.

Two types of cooking was done i e steam cooking for preparation of rolls and baking for preparation of patties. In steam cooking, Emulsion was stuffed is autoclavable beakers and cooked in pressure cooker at 121ºC for 15 min. In baking, emulsion was hand moulded into patties with the help of petridish. The raw patties were cooked in a preheated conventional electrical oven at 180 ºC for 25 minutes (15 minutes first and 10 minutes second side) till an internal temperature of around 75 ºC was reached. It was ascertained by recording at geometric centre with the help of a thermometer Both meat rolls and patties were subjected to sensory quality evaluation.

Sensory Analysis

Standard sensory evaluation method using 9 point hedonic scale (Keeton, 1994) was followed where 9= Extremely desirable and 1= Extremely Poor. The experienced panel consisted of Scientists and post- graduate students of Department of LPT, LLRUVAS, Hisar. The panellists were trained and well acquainted with different sensory attributes during their post graduate/ doctoral programme. They were briefly explained about nature of experiment without disclosing the identity of samples. Samples were warmed initially to serve the panellists. The data obtained was analysed statistically using Statistical Software Packages developed by following the procedure of Snedecor and Cochran (1989). Data was subjected to ANOVA and means were compared by critical difference test.

RESULTS AND DISCUSSION

On the basis of sensory evaluation carried out in the earlier part of the study the incorporation levels of 5 per cent black gram hull and 4 per cent psyllium husk were found acceptable as dietary fiber sources for addition in chicken meat rolls and patties (Mehta, 2012). On the basis of these selected levels, three different combination levels of black gram hull and psyllium husk was made i.e. 5% black gram hull and 2% psyllium husk (5+2), 5% black gram hull and 4% psyllium husk (5+4) and 5% black gram hull and 6% psyllium husk (5+6). The mean sensory scores and effect of two types of cooking viz. steam cooking (SC) for rolls and baking (B) for patties has been presented in Table 1.

The sensory scores for colour of meat rolls and patties were highest for control and showed a decreasing trend with an increase in the incorporation levels of black gram hull + psyllium husk combination. This could be due to reduction in intensity of red colour of meat products on addition of black gram hull and psyllium husk. Similar findings has been reported by Bilek and Turhan (2009) in beef patties added with flax seed flour. A significant ($p \leq 0.05$) decline as compared to control was observed only at 5+ 6 percent level. Baking resulted in slightly better sensory scores for colour than steam cooking in all treatments along with the control. The flavour scores showed a significant ($p \leq 0.05$) decrease as compared to control on incorporation of combination of black gram hull + psyllium husk. The highest score for flavour was for control rolls and patties. At 5 + 2 per cent level, the scores were

Table 1: Effect of black gram hull and psyllium husk incorporation on the sensory attributes of chicken meat rolls and patties

Sensory attributes	Method of cooking	Control	Levels of black gram hull + psyllium husk incorporation		
			5+2%	5+4%	5+6%
Colour	SC	8.17 ± 0.98^{a}	7.83 ± 0.75^{a}	7.33 ± 0.82^{a}	7.00 ± 0.63^{b}
	B	8.33 ± 0.82^{a}	8.00 ± 0.89^{a}	7.50 ± 0.55^{a}	7.33 ± 0.52^{b}
Flavour	SC	8.50 ± 0.55^{a}	7.50 ± 0.55^{b}	7.17 ± 0.75^{b}	6.83 ± 0.75^{b}
	B	8.17 ± 0.75^{a}	7.33 ± 0.82^{b}	7.00 ± 0.89^{bc}	6.50 ± 0.55^{c}
Tenderness	SC	8.33 ± 0.82^{a}	7.50 ± 0.54^{ab}	7.00 ± 0.89^{bc}	6.33 ± 0.82^{c}
	B	8.00 ± 0.63^{a}	7.00 ± 0.89^{b}	6.83 ± 0.41^{bc}	6.00 ± 0.89^{c}
Juiciness	SC	8.00 ± 0.89^{a}	7.50 ± 1.05^{a}	7.17 ± 1.17^{a}	6.83 ± 0.75^{b}
	B	7.50 ± 0.55^{a}	7.17 ± 0.41^{a}	6.83 ± 0.75^{a}	6.33 ± 0.52^{b}
Texture	SC	7.67 ± 0.82^{a}	7.00 ± 0.63^{ab}	6.50 ± 0.55^{bc}	5.83 ± 0.75^{c}
	B	8.17 ± 0.75^{a}	7.50 ± 0.55^{ab}	7.00 ± 0.63^{bc}	6.33 ± 0.52^{c}
Overallacceptability	SC	8.17 ± 0.98^{a}	7.67 ± 0.82^{ab}	7.17 ± 0.98^{b}	6.17 ± 0.75^{c}
	B	8.00 ± 0.85^{a}	7.50 ± 0.55^{ab}	7.00 ± 0.89^{b}	6.00 ± 0.89^{c}

Mean ± S.D. with different superscripts in a row differ significantly ($p \leq 0.05$); n = 6;
SC = steam cooking; B = baking

significantly ($p \leq 0.05$) lower than control but were comparable to scores obtained at 5 + 4 per cent incorporation level. At the highest combination level (5+6 per cent), an adverse effect on flavour was observed as scores fell below 7.00 in both rolls and patties. A decrease in flavour scores of fiber source combination rolls and patties could be due to dilution of meaty flavour by replacement of lean with fiber source combination. Similar findings has been reported by Huang *et al.* (2005) in emulsified pork balls added with rice bran. Steam cooking resulted in slightly better flavour scores than baking in control and all treated products.

The scores for tenderness followed a decreasing trend with an increase in incorporation of combination levels. Highest tenderness score was obtained in control rolls and patties and it significantly ($p \leq 0.05$) decreased at 5+4 per cent combination level of black gram hull and psyllium husk. No significant difference was observed between 5+ 2 and 5+4 per cent incorporation level but 5+ 6 percent level of combination resulted in lowest tenderness scores for both meat rolls and patties. This could be due to softening of the products on incorporation of soluble dietary fiber. Mendoza *et al.* (2001) and Caceres *et al.* (2004) reported a similar decresing trend on addition of inulin and fructooligosaccharides, respectively. Steam cooking was rated slightly better in tenderness attribute than baking in control and all treatment products. Juiciness of control meat rolls and patties was scored highest by sensory panelists but the scores declined significantly ($p \leq 0.05$) with increase in incorporation of combination levels. A significant ($p \leq 0.05$) decline was observed only at 5+6 per cent level and for other two levels (5+2 and 5+4 per cent), scores were comparable to control in both rolls and patties. The steam cooking was scored higher for juiciness attribute than baking for control and all treatments. This might be due to better moisture retention in steam cooked products than baked one

The texture scores for 5+4 per cent combination level for meat rolls and patties were significantly ($p \leq 0.05$) lower than control. Though at 5+2 per cent level, texture scores were better than 5+4 per cent level, but the difference was found to be non-significant. At highest combination level incorporation, the texture scores of both meat rolls and patties were not acceptable by sensory panelists. Decrease in texture scores has been reported by Garcia *et al.* (2006) in Mortadella incorporated with inulin. Baking resulted in better texture scores than steam cooking for control and all treatments. The scores for overall acceptability were recorded highest for control meat rolls and patties followed by 5+2 and 5+4 percent combination levels. At 5+4 per cent level, the scores were significantly ($p \leq 0.05$) lower than that of control but there was no significant difference between scores at 5+2 and 5+ 4 per cent level of incorporation of fiber combination source. However, 5+6 per cent combination addition showed a significantly ($p \leq 0.05$) lower overall acceptability scores as compared to control and other two combination treatments. Though the scores at 5+4 per cent level were significantly ($p \leq 0.05$) lower than control, but they were well in moderate acceptability range and comparable to scores at 5+2 per cent level.

Hence on basis of sensory scores, 5 per cent black gram hull + 4 per cent psyllium husk combination was rated suitable for incorporation in both rolls and patties as a source of dietary fiber. Also, the type of cooking method had a little influence over sensory attributes but steam cooking was slightly better than baking in flavour, tenderness, juiciness and overall acceptability.

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