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Sensory Attributes of Chicken Meat Rolls and Patties Incorporated with the Combination Levels of Rice Bran and Psyllium Husk

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ABSTRACT

The present study was conducted to prepare dietary fiber rich chicken meat rolls and patties. The combination of two different sources of dietary fiber has been used viz. rice bran and psyllium husk. Three different levels of rice bran and psyllium husk viz. 10% rice bran and 2% psyllium husk, 10% rice bran and 4% psyllium husk and 10% rice bran and 6% psyllium husk were tried. The sensory characteristics such as colour, flavour, tenderness, juiciness, texture and overall acceptability of fiber added chicken meat rolls and patties were studied. The sensory scores showed a decreasing trend with increasing levels of incorporation but 10 % rice bran and 4% psyllium husk combination was found to be suitable organoleptically.

Keywords: Psyllium husk, rice bran, meat rolls, patties, sensory attributes

With increasing consciousness among consumers about their nutrition and well being, there is a growing concern over nutritional diseases of affluence. Changes in socioeconomic factors in recent years has increased the consumer's preference for ready to eat foods (Perez- Alvarez, 2008) including meat products. Most of those foods are rich in fat and sugars but deficient in complex carbohydrates like dietary fiber (Sanchez-Zapata *et al*., 2010). Designer foods, also known as health foods are described as one tailored to certain specific concentration and proportion of nutrients that are necessary for healthy livings. This can be either achieved by

modifying the composition of food, limiting the concentration of certain components that might be potentially harmful and incorporating certain desirable ingredients that are present in specific foods in less concentration either naturally or by addition.

Epidemiological research has 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). Therefore an increase in dietary fiber inclusion in daily diet has been recommended (Anderson *et al*., 2009). For adults, the recommended acceptable intakes of dietary fiber are 28- 36 g/day, 70-80 per cent of which must be insoluble fiber (Anderson *et al.*, 2009).The insoluble fraction of dietary fiber has been related to intestinal regulation whereas soluble fiber is associated with decrease in cholesterol level and absorption of intestinal glucose (Rosell *et al*., 2009). Meat and meat products are generally recognized as good sources of high biological value proteins, minerals, trace elements and bioactive compounds (Mehta *et al*., 2013). Also the energy supplied by meat is adequate but it is highly deficient in dietary fiber. So incorporation of dietary fibres from different sources in meat products would help to enhance their desirability. Dietary fibre sources are generally agricultural byproducts which are comparatively cheap and incorpation in meat products reduces its overall cost of production. Whole grains and cereal brans are the rich source of insoluble fiber and pectins, gums, starch and other storage polysachharides have high content the soluble fraction (Anderson *et al*., 1994; Slavin *et al*., 1997). 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; 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 rice bran and psyllium husk as per Mehta (2012). On basis of proximate composition and sensory evaluation, rice bran at 10 % level and psyllium husk at 4% level was found to be

optimum (Mehta, 2012). The combination of Rice bran and psyllium husk was done at three levels viz. 10+2, 10+4 and 10+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 10 per cent rice bran 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 levels of rice bran + psyllium husk combination i.e. 10% rice bran and 2% psyllium husk, 10% rice bran and 4% psyllium husk and 10% rice bran and 6% psyllium husk were tried. 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 rice bran + psyllium husk combination. This could be due to reduction in intensity of red colour of meat products on addition of rice bran and psyllium husk. Similar findings has been reported by Yasarlar *et al.*(2007) in meat balls added with wheat bran. A significant ($p \leq 0.05$) decline as compared to control was observed at 10+4 per cent level and at 10+2 per cent level , the scores were non-significantly different.

Table 1: Effect of rice bran and psyllium husk incorporation on the sensory attributes of chicken meat rolls and patties.

Sensory attributes	Method of cooking	Control	Levels of rice bran + psyllium husk incorporation		
			10+2%	10+4%	10+6%
Colour	SC	8.00 ± 0.89^{a}	7.33 ± 0.82^{ab}	6.83 ± 0.75^{b}	6.50 ± 0.55^{b}
	B	8.33 ± 0.82^{a}	7.50 ± 0.55^{ab}	7.00 ± 0.89^{b}	6.83 ± 0.75^{b}
Flavour	SC	8.33 ± 0.82^{a}	7.50 ± 0.55^{b}	7.00 ± 0.63^{b}	6.00 ± 0.63^{c}
	B	8.00 ± 0.63^{a}	7.00 ± 0.89^{b}	6.50 ± 0.55^{b}	5.50 ± 0.84^{c}
Tenderness	SC	8.50 ± 0.55^{a}	7.50 ± 1.05^{b}	7.00 ± 0.89^{b}	6.00 ± 1.09^{c}
	B	8.00 ± 0.89^{a}	7.33 ± 0.82^{ab}	6.83 ± 0.75^{b}	5.50 ± 0.84^{c}
Juiciness	SC	8.50 ± 0.55^{a}	7.50 ± 0.84^{b}	7.00 ± 0.63^{b}	6.00 ± 0.63^{c}
	B	8.00 ± 0.89^{a}	7.00 ± 0.89^{b}	6.50 ± 0.55^{b}	5.50 ± 0.55^{c}
Texture	SC	8.00 ± 0.63^{a}	7.00 ± 0.89^{b}	6.67 ± 0.82^{bc}	6.00 ± 0.89^{c}
	B	8.33 ± 0.82^{a}	7.50 ± 0.55^{ab}	7.00 ± 0.63^{bc}	6.17 ± 0.98^{c}
Overallacceptability	SC	8.33 ± 0.82^{a}	7.50 ± 0.84^{ab}	7.00 ± 0.63^{b}	6.00 ± 0.89^{c}
	B	8.00 ± 0.89^{a}	7.33 ± 0.82^{ab}	6.83 ± 0.75^{b}	5.67 ± 0.82^{c}

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

Baking resulted in better sensory scores for colour than steam cooking in all treatments along with the control.

The flavour scores were highest for control followed by 10+2, 10+4 and 10+6 per cent treated meat rolls and patties. A significantly ($p \leq 0.05$) lower flavour scores than control were obtained at 10+2 per cent and 10+4 per cent level but the difference among both levels was non-significant for both meat rolls and patties. At highest combination level (10 +6 per cent), flavour scores were adversely affected for meat rolls and patties as compared to control. 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) and Andres *et al.*(2006) in emulsified pork balls and chicken sausages added with rice bran and hydrocolloids, respectively. Steam cooking was rated slightly better in flavour attribute by sensory panelists as compared to baking.

The scores for tenderness were highest for control rolls and patties and decreased significantly ($p \leq 0.05$) on incorporation of combination of rice bran + psyllium husk. At 10+4 per cent level, the tenderness scores were lower than 10+2 per cent level but the difference was statistically non-significant. At highest level of incorporation, tenderness scores were below the acceptable range. 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 decreasing 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. At 10+2 and 10+4 per cent levels, the scores for juiciness were not significantly different and were well in acceptable range by the sensory panelists. 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 10+2 and 10+4 per cent combination levels of rice bran + psyllium husk were significantly ($p \leq 0.05$) lower than control but were comparable to each other and the difference among both of them was non-significant. At highest combination level, texture scores were well below moderate acceptability range for both meat rolls and patties. 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 overall acceptability scores were highest for control rolls and patties and a decrease in scoring pattern was observed with the increase in incorporation of rice bran + psyllium husk combination. The overall acceptability scores at 10+2 and 10+4 per cent levels for both rolls and patties were not significantly different and were comparable to each other but at 10+6 per cent level, it was far below acceptable range.

Thus, on sensory score analysis, 10+4 per cent level of rice bran + psyllium husk combination was found suitable for incorporation in meat 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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