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Research Article

STUDY ON DEVELOPMENT OF CHICKEN MEAT KABAB BY USING SHATAVARI ROOTS POWDER AND ITS AQUEOUS EXTRACT

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ABSTRACT

The present study was conducted with an objective to investigate the effect of BHT (150ppm), Shatvari root powder and its aqueous extract on quality characteristics of chicken meat kabab. Chicken meat kabab were prepared with incorporation of 1% Shatavari root powder (SRP) and 2% Shatavari root powder aqueous extract (SRAE) and their physico-chemical properties were studied. No significant difference was observed in moisture and fat percentage of all treatment kabab but SRAE 2% and SRP 1% had significant difference in protein and ash percentage, respectively as compared to control group of kabab. SRP 1% crude fiber was significantly different from control group of kabab. However, emulsion of SRAE 2% had significantly different pH and water holding capacity from control group of kabab but there was no significant difference by incorporation of BHT, SRP 1% and SRAE 2% in cooked chicken meat kabab. Addition of Shatavari root powder increased the cooking yield and emulsion stability of meat but it was statistically comaparable with other group of treatment. Firmness and toughness of kababs did not show any much variation due to incorporation of root powder and its aqueous extract. It was concluded that addition of Shatavari root powder at 1% and Shatavari root powder aqueous at 2% level improved the nutritional and physiochemical properties of chicken meat kabab.

Keywords: Aqueous extract, Chicken meat, Emulsion, Kabab, Shatavri root powder

Poultry meat is the fastest growing component of global meat demand and India is experiencing a rapid growth in poultry sector. Chicken meat has become a very popular food commodity due to its high biological value animal proteins, essential amino acids, fatty acids, vitamins and other nutrients (Mulla *et al.*, 2017). Oxidation of lipids, auto oxidation and microbial proliferation are the major causes of quality deterioration in meat and meat products (Noor *et al.*, 2018). Meat processing like mincing, cooking and other processing steps disrupt muscle cell membranes and results in increased lipid oxidation leading to rapid quality deterioration and development of rancidity (Tichivangana and Morrissey, 1985). Many synthetic preservatives have been successfully used to prevent the spoilage in meat products. Since concern over the safety of chemical additives has arisen in recent years, consumers increasingly demand the use of natural products as alternative preservatives in foods (Govaris *et al.*, 2010).

Natural antioxidants work against lipid–protein oxidative deterioration in meat and meat products (Falowo *et al.*, 2014). *Asparagus racemosus* also known as Shatavari, Satamuli and Abhiru is a climbing shrub or creeper belonging to the family Liliaceae (Sun *et al.*, 2005). Food fortification with these plants or their active principles is a fertile field for further research and development. Hence, the present study was conducted to evaluate the physico-chemical qualities of chicken meat kabab incorporated with Shatavari (*Asparagus racemosus*) roots powder and their aqueous extracts.

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MATERIALS AND METHODS

The present study was conducted in the Department of Livestock Products Technology, College of Veterinary Sciences, LUVAS, Hisar. Healthy birds of 6 weeks of age, weighing around 1.5 Kg, reared under similar conditions of management and feed were procured from the Livestock farm, College of Veterinary Sciences, LUVAS, Hisar.

Shatavari roots were collected from CCSHAU agriculture farm. Roots were thoroughly washed and dried in the air drier at temperatures of about 50±5 °C. After complete drying, the roots were ground to fine powder. Each powder was used separately for preparation of aqueous extract. For preparing aqueous extract, 10 g of each root powder was mixed with 100 ml of distilled water separately. The mixture containing water and plant material was incubated for 6 h at room temperature with frequent mixing in between and then mixture was filtered through muslin cloth separately to obtain the respective root powder aqueous extract. Fresh aqueous extracts were prepared each time for use during product development and test procedures. Fresh spice ingredients were procured from local market of Hisar. After cleaning, spices were oven dried at 45±2 ºC for 2 h. Spices were mixed in standardized proportion and ground in a domestic grinder (Sujata, J.K. Electricals Pvt. Ltd., Noida). Spice powder was stored in PET jar for further use.

Birds were slaughtered and dressed as per standard procedure in the experimental slaughter house of the Department. The dressed chicken were washed thoroughly and packaged in LDPE bags and stored at -18±2 ºC till

further use. Deboned frozen meat was cut into small pieces on a wooden block and minced in an electrical mincer (3 mm plate) (Mado Primus Meat Mincer, MEW-613; Dr. Froeb India Pvt. Ltd.). In control kababs, 100 g of minced meat was taken to which sodium chloride (2 g), sodium tripolyphosphate (0.4 g), sodium nitrite (150 ppm), spice mix (2 g), condiments (3 g) (onion and garlic in ratio of 2:1), 2 gm bread crumb powder, water (10 g) and fat (15 g) were added and blended with the minced meat in a mixer for 4 to 5 minutes. In treated kabab, 1% (gm) of Shatavari root powder and its aqueous extract 2% of Shatavari root powder was added separately. One product from each type of root powder was selected on the basis of sensory evaluation. Emulsion of about 50 g of was moulded on the center of a skewer (iron rod) and cigar shaped kababs made and that were baked in preheated oven at temp 160 ºC for 35 min.

Per cent moisture, protein, fat and ash and fiber were estimated as per methods of AOAC (2005). Weight of chicken meat kababs before and after cooking was recorded and yield was calculated and expressed in percent. Per cent emulsion stability was estimated by standard method (Baliga and Madaiah, 1970) and the pH of the products was evaluated by following the method of Trout *et al.* (1992) using a digital pH meter (Oakton Instruments, USA). Meat sample (10 g) was blended with 50 ml distilled water for 1 min using pestle and mortar. The pH was recorded by dipping the electrodes of pH meter directly in the suspension. Water holding capacity (WHC) was estimated according to Wardlaw *et al.* (1973) with slight modification. Per cent emulsion stability of control and treated emulsions were determined using the method of Baliga and Madaiah (1970).

Shear force value (Firmness and toughness) of cooked chicken meat kabab was analyzed using Texture Analyzer (TA.HD plus), Stable Micro Systems Ltd., Surrey, England with the Texture Exponent Program. Warner-Bratzler shear probe was used to measure shear force value. Force required to shear a $1cm^2$ thick sample transversely was expressed in Newton (N).

The results were analyzed statistically using SPSS 16.0 software (IBM). Data were subjected to ANOVA and Duncan's test to find significant difference in treatments. A value of $P \leq (0.05)$ was used to indicate significant difference.

RESULTS AND DISCUSSION

The effect of different level of Butylated hydroxytoluene (BHT), Shatavari root powder and its aqueous extracts on physico-chemical properties of chicken meat emulsion are presented in table 1. The raw emulsion groups incorporated with SRAE (2%) and BHT showed significantly lower pH values as compared to control group but fresh cooked kabab had no significant difference between the treatment groups. The pH values of cooked chicken meat kabab were significantly higher than the raw chicken meat emulsion. The decrease in pH of Shatavari added kabab might be due to presence of acidic components (ascorbic acid) in the herbal extract (Veena *et al.*, 2015). These results are further supported by Ibrahim (2012) who observed reduction in the pH of the cooked nuggets prepared with incorporation of pomegranate rind powder compared to control sample.

Water holding capacity (%) in raw emulsion incorporated with Shatavari root powder aqueous extract was significantly lower as compared to control and other treated chicken meat emulsion. Non significant increased trend in water holding capacity (%) was observed in raw emulsion incorporated with Shatavari root powder. This might be due to the variation in the ratio of meat and other ingredients used for development of meat products. The differences in WHC of the processed poultry meat products may also be associated with the meat quality and age of the bird used for obtaining meat (Khan *et al.*, 2017).

Incorporation of BHT and extracts did not affect the cooking yield of the chicken meat kabab as control, BHT and extract treated chicken meat kabab had statistically comparable cooking yields. Emulsion stability was non significantly increased in Shatavari root powder incorporated at 1% level group as compared to control, BHT and Shatavari root powder aqueous extract incorporated at 2 percent level treated raw emulsion content groups. This result had been supported by Parkash *et al.* (2016) who found that Water holding capacity and emulsion stability of chevon rolls increased significantly as a result of fiber incorporation which also resulted in a significant increase in cooking yield. This might be due to an increase in viscosity of meat better on addition of fiber source which resulted in an increased elasticity to emulsion based products. An increase in viscosity is associated with increased emulsion stability as highly viscous emulsions are not easily broken. Aktas and Genccelep (2006) also reported similar findings in emulsion type meat products and incorporation of modified starches into sheep tail fat and making of bologna-type sausages improved the emulsion stability and reduced the jelly and fat separation, probably due to the formation of a more stable complex.

The proximate composition of chicken meat kababs are presented in table 2. Moisture content of BHT, SRP 1% and SRAE 2% was statistically similar as compared to control groups of kababs. Higher emulsion stability

Table 1

Effect of different level of BHT, Shatavari root powder and its aqueous extracts on physico-chemical properties of chicken meat emulsion (Mean±S.E.)

Treatments	pH (Raw emulsion)	Water holding capacity (%)	Cooking yield (%)	pH (Cooked)	Emulsion stability (%)
Control	5.82^{bA} ±0.03	46.55^{b} ± 0.47	79.38^{abc} ±0.62	5.97^{aB} ±0.06	91.03^{bc} ±0.68
BHT	5.73^{aA} ±0.02	46.45^{b} ± 0.33	79.62^{abc} ±0.37	5.88^{aB} ±0.05	90.98^{bc} ±1.01
SRP 1%	5.83^{bA} ±0.02	47.55^{bc} ±0.50	79.96^{bc} ±0.50	5.98^{aB} ±1.06	91.23^{bc} ±0.22
SRAE 2%	5.73^{aA} ±0.01	45.16^{a} ±0.44	78.19^{ab} ±0.55	5.84^{aB} ±0.35	89.54^{ab} ±0.69

Means with different small letter superscripts in a column differ significantly and capital letter superscripts in a row differ significantly (P≤0.05)
BHT-100 ppm, SRP 1 % of Shatavari root powder, SRAE- 2 % of Shatavari root powder aqueous extracts

Table 2

Effect of different level of BHT, Shatavari root powder and its aqueous extracts on proximate composition of chicken meat kababs (Mean±S.E.)

Treatments	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Crude fiber (%)
Control	65.72^{a} ± 0.44	16.43^{a} ± 0.22	14.34^{a} ±0.23	2.28^{a} ±0.01	0.39^{a} ±0.04
BHT	65.83^{a} ±0.30	16.23^{a} ± 0.33	14.72^{a} ±0.40	2.30^{ab} ±0.03	0.40^{a} ±0.03
SRP 1%	65.17^{a} ±0.02	16.95^{ab} ± 0.28	14.78^{a} ±0.29	2.34^{c} ± 0.01	0.56^{c} ±0.01
SRAE 2%	65.00^{a} ± 0.47	17.41^{b} ± 0.31	14.74^{a} ±0.25	2.31^{b} ± 0.01	0.47^{b} ±0.04

Means with different small letter superscripts in a column differ significantly (P≤0.05)
BHT-100 ppm, SRP 1 % of Shatavari root powder, SRAE- 2 % of Shatavari root powder aqueous extracts

Table 3

Effect of different level of BHT, Shatavari root powder and its aqueous extracts on firmness and toughness value of chicken meat kabab (Mean± S.E.)

Treatments	Firmness (kg\cm3)	Toughness (kg-sec)
Control	1.49^{a} ±0.19	7.64^{ab} ±0.94
BHT	1.22^{a} ±0.04	5.92^{a} ±0.22
SRP 1%	1.59^{a} ±0.21	7.88^{ab} ±0.76
SRAE 2%	1.29^{a} ±0.04	6.77^{ab} ±0.33

Means with different small letter superscripts in a column differ significantly (P≤0.05)
BHT-100 ppm, SRP 1% of Shatavari root powder, SRAE-2% of Shatavari root powder aqueous extract

resulted into the lower moisture content (Khan *et al.*, 2017). Protein content was significantly higher in SRAE 2% group as compared to other groups whereas protein content of SRP 1% (16.95±0.28) group was non significantly different among the groups of kabab. Significant variation in protein content (P ≤ 0.05) in chicken products and such variation were mainly associated with the process of manufacturing of these products (Perlo *et al.*, 2005). Fat content of BHT, SRP 1% and SRAE 2% group was significantly similar with all the other groups. Control group had significantly lower ash content as compared to treated groups and SRP 1% was significantly higher than all other group of treatment. No significant difference was found in control and BHT but crude fiber content was significantly higher in other groups of treatment. The present findings are in agreement with the Sunita *et al.* (2015) who studied that the incorporation of fiber containing source significantly decreased moisture content however, there was significantly increase in fat, protein, ash and crude fiber content of all treated chevon meat patties.

The firmness and toughness values for developed chicken meat kabab have been presented in table 3. No significant difference was noticed in firmness values of control and treated chicken meat kabab as these values were not affected by the incorporation of extracts. Similar results were reported by Shah *et al.* (2015) for shear force values of raw beef control and treated samples and concluded that no dissimilarity was noticed between control and treated samples. Toughness value of control, SRP 1% and SRAE 2% treated groups were significantly higher as compared to BHT treated group. Significantly increased toughness of treated products might be due to excessive loss of moisture (Talukdar and Sharma, 2010).

It is concluded that the incorporation of root powder and its aqueous extract did cause significant effect on physico-chemical characteristics and proximate composition of the developed products. Firmness and toughness of kababs did not show any much variation due to incorporation of root powder and its aqueous extract. Whereas, Shatavari root powder incorporated at 1 percent level and Shatavari root powder aqueous extract 2% was found best for incorporation in chicken meat kabab.

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