



Research Article

EFFECT OF DIFFERENT LEVEL OF NATURAL ANTIOXIDANT AS AN ENROBING MATERIAL ON THE QUALITY OF CHEVON MEAT BALL

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Abstract- The present study was conducted to evaluate the antioxidant property of Grape seed extract (GSE) used as enrobing material on the quality of chevon meat ball. The batter mixes were prepared by incorporating different levels of GSE (0.25%, 0.50% and 0.75%) and quality of meat ball was assessed with respect to different physico-chemical and sensory attributes. The results of present study indicated that Thiobarbituric acid (TBA) value, Free fatty acids (FFA) content and fat percent of meat were significantly ($P \leq 0.05$) decreased with addition of different levels of GSE. Whereas pH and moisture % of meat were significantly ($P \leq 0.05$) increased with addition of GSE, but the increasing trend was not consistent with different levels of GSE. Addition of 0.75% of GSE in batter mix significantly ($P \leq 0.05$) improved flavour and overall palatability.

Keywords- Enrobing, Chevon meat balls, Natural antioxidant, GSE (grape seed extract).

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Introduction

Deep-fat frying remains one of the most widely used methods of preparing food in India as well as over the world. Breaded fried foods, in particular, are popular among consumers due to their unique characteristics: crispy exterior and juicy interior. Enrobing is a process in which the foods are traditionally coated with edible materials in the form of batter which preserves and enhances the food quality. The consumer market for deep-fried coated foods has expanded rapidly in recent years. This is due to combinations of the distinctive flavour, aroma, and crunchy texture characteristics along with the flavour and the juices that are retained in the core and in the crispy crust of products. It minimizes monotony of certain food products and makes it more appealing in appearance [5] and taste. Enrobing also contributes to nutritional value of food products [5,11] by adding ingredients and protecting the product from direct contact with the cooking medium and moisture loss.

Consumers increasingly demand healthier meat products, if possible free of chemical additives. The use of natural preservatives to increase the shelf life of meat products is a promising technology since many vegetal substances have antioxidant and antimicrobial properties. Antioxidants are the substance that when present in low concentrations compared to those of an oxidizable substrate significantly delays or prevents oxidation of that substance [7]. Grapes (*Vitis vinifera*) as an antioxidants are of special interest due to their high content of flavonoids that can perform scavenging action on free radicals (superoxide, hydroxyl, and 1,1-diphenyl-2-picrylhydrazyl (DPPH), metal chelating properties, reduction of hydro-peroxide formation and their effects on cell signaling pathways and gene expression [8]. Therefore, keeping in view the aforementioned things, the present study was conducted to evaluate antioxidant property of Grape seed extract (GSE) used as enrobing material on the quality of chevon meat ball.

Materials and Methods

Boneless chevon was procured from local meat market and kept at refrigeration ($4 \pm 1^\circ\text{C}$) for ageing for overnight. After trimming of fat and tendons, mincing of meat was carried out. Emulsion was made by blending of minced and chopped meat with addition of various ingredients viz. Lean meat (60%), Mashed potato (15%), Vegetable oil (6%), Ice flakes (5%), Salt (1.5%), Refined wheat flour (5%), Spice mix (2%), Condiments (5%), Sodium nitrite (0.015%) and Full form STPP (0.50%), and then the balls were cooked in boiling water. Each ball was prepared from 7-10g of emulsion and put in boiling water for 15-20 min till the internal temperature of balls reached to $80 \pm 1^\circ\text{C}$. After cooling at room temperature, chevon balls were enrobed with batter mix containing different levels of natural antioxidant (GSE) and other ingredients like Gram flour (31%), Table salt (1.5%), Sugar (0.5%), Turmeric (1.5%), Capsicum (1.5%), Spice mix (1.5%), Whole egg (25%), Oil (1%), Water (36%), and then breaded (with bread crumbs) and fried. The enrobed chevon balls were cooled at room temperature and packaged in LDPE pouches and subsequently analyzed as per the experimental design. Acceptability of the product was judged on the basis of physico-chemical and sensory qualities characteristics.

Analytical Methods

Proximate analysis: Moisture (%) and fat (%) of chevon balls were determined as per the method of AOAC [1]. The pH of chevon balls were measured using digital pH meter (Systronics Digital pH meter 802) for which homogenized suspension was made by blending 10 g of sample with addition of 50 ml of distilled water. Thiobarbituric acid number of sample was determined as per [16] with slight modifications. Further, 20 g of minced enrobed chevon ball was blended with 50 ml of precooled 20% trichloroacetic acid (TCA) for 2 min. The blended content was transferred to a beaker by rinsing with 5 ml of cold distilled water and mixed

together. The mixture was filtered through Whatman filter paper No. 42. The filtrate was named as TCA extract. Then 5 ml of freshly prepared 0.01 M 2-TBA solution (stored not more than 10 days at 4°C in amber coloured bottle) were mixed with 5 ml of TCA extract in clean oven dried test tubes in boiling water bath for 30 min. The absorbance (A) at 532 nm was recorded as TBA number.

The free fatty acid (FFA) content of the product was determined using method of AOAC. The FFA content of the product during storage period was determined using method of AOAC. 20 ml benzene and neutralized alcohol mixture (1:1) was added to a flask containing fat and warmed for 30 seconds. Then 1-2 drops of phenolphthalein was added and titrated against 0.1 N NaOH solution to pale pink colour and percent FFA was calculated in terms of percent oleic acid.

A sensory panel comprising of six semi-trained members from academic staff and students of the department were involved to evaluate the quality of chevron ball for various sensory attributes viz., appearance, flavour, juiciness, texture and overall acceptability using 8 point descriptive scale [10] where '8' denotes 'extremely desirable' and '1' denotes 'extremely poor'. The data analysis was carried out by using Analysis of variance method, as per the procedure described by [15].

Results and Discussion

The results of different quality characteristics viz., physico-chemical properties, oxidative stability and proximate analysis etc. of cooked chevron balls which were subsequently enrobed with different levels (0.25%, 0.50% and 0.75%) of GSE

have been presented in [Table-1]. It was observed that the incorporation of GSE as an antioxidant in batter mix showed significant ($P \leq 0.05$) increase in pH of enrobed chevron balls. [6] found that ginger (9%) and papain (0.5%) treatments caused significant ($P < 0.01$) increase in the moisture and pH of the cooked products compared to the control and cucumis (7.5%) treated samples of enrobed pork chunks. Addition of GSE at different levels (0.25%, 0.50% and 0.75%) showed significant ($P < 0.05$) reduction in TBA values with increasing concentration of GSE. These observations of the present study were in agreement to the results of [12], who evidenced significantly lower ($P < 0.05$) TBA values in all treated samples when compared with control in case of chicken nuggets. The present study had also evidenced significant reduction ($P < 0.05$) in FFA value of products irrespective of concentration of GSE and control. Similarly, [4] found that the curry leaf powder treated sample had significantly lower FFA content (0.31%-0.71%) as compared to control sample (0.37%-0.93%) in ground and cooked goat meat, respectively. It was evident that the addition of different levels of GSE in enrobed chevron balls showed significant ($P > 0.05$) increase in moisture%. This might be due to enrobing, which function as efficient barriers to moisture and/or gases in several foods [14]. Similarly [6] observed that ginger and papain treatments caused significant ($P < 0.01$) increase in the moisture content of enrobed pork chunks. [12] also observed significantly higher moisture content than other treatments in case of rice flour-based battered chicken drumsticks under frozen storage at -40°C for 90 days.

Table-1 Effect of different levels of Grape seed extract (GSE) in batter mix on certain quality characteristics of enrobed chevron balls

Sr. No.	Parameter		Control	0.25%	0.50%	0.75%	CD
1.	Physico-chemical properties	pH	6.32±0.021 ^a	6.38±0.006 ^{ac}	6.35±0.074 ^b	6.37±0.005 ^c	0.044
2.	Oxidative Stability	TBARS	0.615±0.061 ^a	0.435±0.010 ^b	0.361±0.007 ^c	0.418±0.003 ^c	0.039
		FFA	0.11±0.004 ^a	0.054±0.002 ^b	0.041±0.004 ^c	0.036±0.004 ^c	0.01
3.	Proximate Composition	Moisture	63.06±0.28 ^a	63.23±0.165 ^a	62.83±0.176 ^a	64.3±0.115 ^b	0.817
		Fat	24.43±0.871 ^{ab}	26.1±1.05 ^a	24.87±0.240 ^{ab}	23.1±0.288 ^b	2.2

a,b,c,d Means within each column not bearing a common superscript differ significantly at $p < 0.05$

Addition of different levels of GSE significantly ($P < 0.05$) decreased fat% as compared to control. This condition might be due to the coating ingredients, which act as sealants and also prevent high oil uptake during frying of the product [3]. Similarly [12] also observed significantly lower fat content than other treatments in case of rice flour-based battered chicken drumsticks under frozen storage at -40°C for 90 days. The similar results were documented by [2] upon that addition of caseinate, whey and milk powders significantly ($P \leq 0.05$) lowered the fat content in emulsified chicken meat batters as compared to the control.

Effect of different levels of GSE in batter mix on sensory attributes of enrobed

chevron balls is presented in [Table-2]. It showed that addition of different levels of GSE had no significant ($P < 0.05$) effect on appearance, juiciness and texture but flavour and overall palatability were significantly ($P < 0.05$) affected. The enrobing and breading on the fried meat enhances flavour and overall palatability of the product. Similarly [9] observed no significant differences in sensory properties between the packaging methods and none of the sensorial parameter was significantly ($P > 0.05$) affected by gamma irradiation in pork patty. [13] also recorded that addition of GSE (300, 600, 900 mg/kg) had significant ($P > 0.05$) increase flavour and overall palatability of chicken nuggets.

Table-2 Effect of different levels of Grape seed extract (GSE) in batter mix on sensory attributes of enrobed chevron balls Levels of GSE.

Levels of GSE	Appearance	Flavor	Juiciness	Texture	Overall palatability
Control	6.46±0.095	6.26±0.144 ^{ab}	6.33±0.127	6.43±0.096	6.18±0.105 ^a
0.25%	6.42±0.114	6.22±0.121 ^a	6.296±0.025	6.20±0.187	6.37±0.106 ^{ab}
0.50%	6.76±0.114	6.601±0.145 ^{ab}	6.722±0.248	6.60±0.122	6.80±0.167 ^b
0.75%	6.72±0.11	6.712±0.125 ^b	6.75±0.187	6.61±0.175	6.79±0.151 ^b
CD	NS	0.511	NS	NS	0.51

a,b Means within each column not bearing a common superscript differ significantly at $p < 0.05$

Conclusions

The values of sensory scores and physico-chemical characteristics evaluations were considerably highest in enrobed chevron balls prepared incorporation of GSE @ 0.75% in batter mix. Enrichment of enrobing material with different level of natural antioxidant GSE improved various physicochemical characteristics, oxidative stability namely TBA value, FFA and moisture, fat of enrobed chevron balls. The panelists found the enrobing material contain natural antioxidant significantly more palatable than the control. The enrobing with natural antioxidant advantages of enhancing the product quality and palatability.

Conflict of Interest: None declared

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