SHORT COMMUNICATION

Effect of Avocado Pulp on the Quality of Chicken Cutlet

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Abstract

Avocado is a food rich in mono unsaturated fatty acids, tocopherols, phytosterols, phenolic compounds, and procyanidins. In Southern India, avocado (*Persea Americana*) are frequently used for milkshakes and occasionally added to ice cream and other desserts. The study aimed to evaluate the effect of incorporation of avocado pulp on the physico-chemical, sensory and microbial quality of chicken cutlets. Chicken cutlets were prepared with different levels of avocado pulp, *viz.,* 0% (T1), 5% (T2) and 10 % (T3) and the physico-chemical, sensory and microbial quality of prepared chicken cutlets were assessed. The incorporation of avocado pulp into chicken cutlets reduced the extent of lipid oxidation and microbial count significantly ($p < 0.05$). In addition, a significant improvement ($p < 0.05$) in cooking yield and textural properties were also recorded. However, the incorporation of avocado pulp @ 10% in the chicken cutlets showed no significant influence on the overall sensory acceptability of the chicken cutlets.

Key words: Avocado pulp, Chicken cutlets, Microbial quality, Physico-chemical parameters.

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Introduction

Due to rapid urbanization, an increase in the number of working women folks, lack of time for cooking and less preference for traditional meat products at home lead to demand for ready-to-eat and/or ready-to-cook chicken meat products. Cutlets are simple and cost effective means of converting meat into value added convenience products. Meat cutlets are flat croquettes of minced meat and other ingredients like flours, pulses, shredded potato, condiments and spices and are often coated with bread crumbs (Bhat *et al.,* 2015). Avocado (*Persea americana*) is a tropical and subtropical fruit, It contains high amount of fats, proteins, and soluble fibres as well as vitamins and minerals. Consumable foods grown from the ground mash holds up to 33% oil rich with monounsaturated fatty acids (Ortiz *et al.,* 2004). *P. americana* has been used in curing tumours in ethno-medicine, which offers a new therapeutic target on human patients (Paul *et al.,* 2011). Natural sources of rich phenolic extracts with high antioxidant and antimicrobial potential and also anti-inflammatory and anti-cancer effects are growing interest (Alkhalaf *et al.,* 2019). Therefore, consuming avocados as a part of the diet can be beneficial to human health.

By considering the advantage of the biological properties of avocados they could be used as ingredients in meat products. The incorporation of avocado paste or pulp into meat derived products is an alternative to enrich the nutritional value of those products. Rueda-Lugo *et al.* (2006) evaluated the replacement of animal fat with avocado pulp paste, which is rich in vegetable oil, aiming at improving the nutritional value of hotdog sausages. Valenzuela-Melendres *et al.* (2014) reported that avocado as an ingredient in pork frankfurters could be a good alternative for consumers looking for healthy food choices. Therefore, the objective of the present study was to evaluate the effect of the incorporation of avocado pulp on the physico-chemical, sensory and microbial qualities of chicken cutlets.

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Materials and Methods

The experiments were conducted at the Department of Livestock Products Technology (Meat Science), Veterinary College and Research Institute, Namakkal, Tamil Nadu Veterinary and Animal Sciences University, India, from February to July 2021. The frozen deboned chicken meat was cut into small pieces and minced in a meat mincer(Junior MEW 510, MADO, Germany) using an 8 mm plate and used to prepare the cutlet. The formulation for chicken cutlet included minced chicken meat (1Kg), potato (500 g), salt (18 g), ginger paste (15 g), garlic paste(15 g) pepper powder (20g), spice mix (50 g), breadcrumbs (250 g), egg (3 no) and

Oil (400ml). The ingredients of the chicken cutlets were the same for all groups except in T2 and T3, here the minced chicken meat was replaced with 50 g and 100 g avocado pulp. To the minced meat, boiled mashed potato, salt, ginger garlic paste, pepper powder and spice mix were added and blended in a food homogenizer for two minutes for proper mixing. Then the mix made in to desired shape (approximately 25 grams each) and was coated with egg liquid and bread crumbs. Then battered and breaded chicken cutlet was deep fat fried in vegetable oil at 160°C for 5-7 minutes to reach internal core temperature of 75°C. Each sample was analyzed for physicochemical characteristics (pH, shear force value and thiobarbituric acid reactive substance), microbial quality (Total viable count, *Salmonella* spp, *E. coli* and *Staphylococcus aureus*) and sensory attributes were determined by standard procedure. Then, data were subjected to suitable transformation for the temperature and analyzed using the Duncan significance test at a 5% probability level.

Results and Discussion

The results of the physico-chemical, microbial quality and sensory attributes of avocado pulp incorporated chicken cutlet are presented in Table 1 & 2.

Physicochemical Characteristics of Chicken Cutlets

The product yield of chicken meat cutlets increased with increasing levels of avocado pulp incorporation. The product yield of 10 % avocado pulp incorporated chicken meat cutlets was significantly (P<0.05) higher as compared to 5% avocado pulp incorporated cutlets and control. This may be due to the high-fat content of the avocado pulp incorporated into chicken cutlets. Choi *et al.* (2009) reported that fat plays a major role in the processing of emulsion meat products, stabilizing the meat emulsion, reducing cooking loss, and improving viscosity and textural properties. However, no significant difference was observed in the pH values of avocado pulp incorporated chicken meat cutlets and control cutlets. This result agreed with Valenzuela-Melendres *et al.* (2014) that there was no significant difference in pH values of 10 % avocado paste as an ingredient in Pork Frankfurter, but 20 % avocado paste increased pH values significantly. SFV of chicken meat cutlet decreased with increasing levels of avocado pulp incorporation. The SFV of 10 % avocado pulp incorporated chicken meat cutlets was significantly (P<0.05) lower than 5% avocado pulp incorporated cutlets and control.

Chicken cutlets incorporated with avocado pulp had significantly lower levels of TBARS values than the control. TBARS value of chicken meat cutlet decreased with increasing levels of avocado pulp incorporation. Similar to our results, it has been reported that replacing 50% of animal fat in pork patties with avocado, sunflower, and olive oils resulted in lower TBARS values than control groups (Rodríguez-Carpena *et al.,* 2011). In contrast to the present results, Valenzuela-Melendres *et al.* (2014) reported that 10 % paste did not have antioxidant properties and 20 % had potential antioxidant properties in pork Frankfurter. This variation may be due to the variety and season of avocado cultivation.

Microbial Quality of Chicken Cutlets

Chicken cutlets incorporated with avocado pulp had significantly (P < 0.05) lower total plate count than the control (Table 1). The present study results agreed with Rodriguez-Carpena *et al.* (2011). They investigated the antibacterial activity of the extracts derived from different avocado parts (peel, seed, and pulp) of a number of varieties against *Bacillus cereus, S. aureus, L.monocytogenes, E. coli*, *Pseudomonas* spp., and *Yarrowia lipolytica*. The highest inhibitory activity against the Gram-positive bacteria *B. cereus* and *L. monocytogenes* was observed, while *E. coli* was the most sensitive among the tested Gram-negative bacterial species. The authors mentioned that all avocado parts had antimicrobial properties, with pulp (mesocarp) showing the highest activity compared to seed and peel. Currently, there is a growing interest in finding new natural antimicrobial agents that are commonly used in the food industry. From the present results, the avocado pulp may be used as a natural antimicrobial agent.

Table 1: Effect of avocado on physico-chemical and microbial quality of chicken cutlet

	Level of avocado pulp (%)		
Parameter	**T1 (0%)**	**T2 (5%)**	**T3 (10 %)**
Physicochemical Characteristics			
Cooking yield (%)	85.13± 0.12^{a}	85.23±0.07^{a}	85.62±0.5^{b}
Cooked pH	6.23±0.04	6.26±0.02	6.27±0.03
SFV	2.47±0.04^{a}	2.34±0.04^{b}	2.26±0.03^{c}
TBARS value	0.19±0.01^{a}	0.14±0.01^{b}	0.12±0.02^{b}
Microbial Quality			
Total viable count (log_{10} cfu/g)	1.86±0.06^{a}	1.62±0.11^{b}	1.54±0.0^{b}
E. coli count (log_{10} cfu/g)	ND	ND	ND
Salmonella (log_{10} cfu/g)	ND	ND	ND

Means bearing different superscripts within a row differ significantly (p < 0.05), ND- not detected.

Sensory Quality of Chicken Cutlets

There was no significant difference in the appearance score of control and avocado pulp treated chicken cutlets. But there were significant (P < 0.05) differences in flavour, juiciness and texture scores. Chicken cutlets incorporated with avocado pulp had higher scores than the control (Table 2). In contrast to the present results, Valenzuela-Melendres *et al.* (2014) observed that flavour of the treatments with avocado paste (10 % and 20 %) was assessed with a lower score than the control

and tomato paste added Frankfurters. Firmness, colour and overall acceptance of treatments with 20% of tomato paste and the combination of 10% avocado and 10% tomato paste had the highest evaluation by the panelists. However, the incorporation of avocado pulp up to 10 % into the chicken cutlets preparation showed no significant influence on the overall sensory acceptability of the chicken cutlets in the present study (Table 2). Avocados is rich in fat, this may be the reason for the higher scores for flavour, juiciness and texture in treated chicken cutlets. Choi *et al.* (2009) reported that fat plays a major role in improving textural properties.

Table 2: Effect of avocado on sensory attributes of chicken cutlet

	Level of avocado pulp (%)		
Parameter	**T1 (0%)**	**T2 (5%)**	**T3 (10 %)**
Sensory Attributes			
Appearance/ Colour	7.39±0.11	7.39±0.06	7.40±0.06
Flavor	7.46±0.06^{a}	7.50±0.07^{ab}	7.54±0.04^{b}
Juiciness	7.22±0.05^{a}	7.33±0.05^{b}	7.36±0.05^{b}
Texture/Tenderness	7.15 ± 0.05^{a}	7.36 ± 0.02^{b}	7.47 ± 0.04^{c}
Overall acceptability	7.19±0.12	7.25±0.09	7.30±0.11

Means bearing different superscripts within a row differ significantly ($p < 0.05$), ND- not detected.

In conclusion, the avocado pulp (10%) incorporated chicken cutlet showed significantly higher texture and antioxidant properties. The present study findings showed a significant reduction in the total plate count with a substantial increase in the textural and juiciness scores of avocado incorporated chicken cutlets. The incorporation of avocado pulp up to 10 % in chicken cutlets preparation was acceptable.

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