

## Effect of Jamun Seed Powder on the Sensory quality of Restructured Chicken Block at Refrigerated Storage

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(Received: 25 April 2023; Revised: 11 May 2023; Accepted: 27 May 2023; Published: 05 July 2023)

(Published by Research Trend)

**ABSTRACT:** Consumers are becoming more intrigued by organic preservatives with enhanced health benefits. Antioxidant and anti-diabetic benefits of jamun seed powder (JSP) are well established. A study was done to develop a reconstructed chicken block with JSP added at levels of 0% (C), 3% (T1), and 5% (T2). The completed product was cut into thin slices (4 mm thick), packaged in LDPE pouches, and chilled (4–1°C). The products were exposed to sensory evaluation on days 1, 7, 12, and 17 of storage. On the first day of storage, the sensory scores were considerably higher for controls (7.10 to 7.30) than for treatments (6.45 to 7.05), but on all subsequent days, they were significantly lower for controls (1.00 to 3.30) than for the treatments (5.77 to 6.94). The assessments for the treatments' appearance, flavour, juiciness, texture, and overall acceptability varied between 6.15 to 6.78, 5.95 to 6.80, 6.00 to 6.90, 5.77 to 7.05, and 6.25 to 7.05, respectively. All sensory characteristics of the control and treatments significantly decreased as storage days increased, however, the product was still acceptable up to the seventh day for the control and 17 days for the treatments when kept in the refrigerator. On the first, seventh, and twelve days after being stored, T1 received higher sensory scores than T2; however, there was no marked differences on the seventeenth day. For the overall acceptability score in treatment 1, there was no discernible change between the first and seventh days of storage and the 12th and 17th days of storage. Therefore, JSP could be incorporated at a level of 3% to restructured meat blocks and maintained at refrigeration temperature for up to 17 days without compromising the sensory qualities.

**Keywords:** Restructured chicken block, Jamun seed powder, Sensory quality, Refrigeration storage.

### INTRODUCTION

High-quality proteins, minerals, trace elements, fat-soluble vitamins, and other micronutrients are often obtained from meat and meat products. There is an increasing preference among consumers for poultry meat worldwide including India. Polyunsaturated fatty acids increase the risk of lipid oxidation in poultry meat (Bourre, 2005). Oxidation causes a product's nutritional and sensory qualities to deteriorate (Estevez *et al.*, 2005). Due to their hazardous (carcinogenic) potential, synthetic antioxidants are only allowed in minimal concentrations (Jayaprakasha *et al.*, 2003). Natural anti-oxidants from plants and fruits have acquired widespread recognition for their efficacy in preventing the auto-oxidation of foods that are rich in fat (Reddy *et al.*, 2005).

In Indian medicine, jamun seed powder is widely used and has been proven to possess anti-diabetic and antioxidant properties. Several constituents, including saponins, tannins, phenolic compounds, amino acids, alkaloids, phytosterols, flavonoids, and the absence of anthraquinone, were present in the seeds of jamun (*Eugenia jambolana* Lam or *Syzygium cumini* Linn)

(Murti *et al.*, 2012; Modi *et al.*, 2010; Kumar *et al.*, 2009). Jamun seeds have several beneficial qualities, including those that are antibacterial, antioxidant, cardioprotective, anti-cancer, anti-diarrheal, and hypoglycemic properties and more (Stephen, 2012). According to claims, the seeds contain the alkaloids jambosine and glycoside jambilin as antimellin, which prevent the diastatic conversion of starch to sugar (Shrikant *et al.*, 2012).

The antioxidative effect of Jamun seed extracts was comparable to that of BHT, a synthetic antioxidant, in both heat-treated and untreated states. Thermal treatment does not diminish its antioxidative property (Faiyaz *et al.*, 2010). Jamun fruit can be employed in culinary preparations as well as the formulation of nutraceutical supplements as a prominent source of natural antioxidants (Zhang and Lin 2009; Shahnawaz *et al.*, 2010).

Restructuring is the process of partially or completely disassembling a meat product and then reassembling it in a novel or distinct shape (Mohammad, 2014). In general, less expensive cuts, tough cuts, meat trimmings, or a combination of these are utilized to make restructured meat products. In this technology,

tiny pieces of meat or meat trimmings are combined together to obtain bigger chunks. Again, the larger pieces can be broken down into smaller ones. As an outcome, we can obtain meat products in the desired sizes and shapes. The importance of this kind of product is developing among consumers. Jamun seed powder (JSP) will therefore be incorporated into the restructured chicken block as a unique strategy to have an antioxidant and health-promoting effect.

## MATERIALS AND METHODS

**Chicken meat.** The Department of Livestock Products Technology (LPT), Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), procured the chickens from the Instructional Livestock Farm Complex, and the birds were slaughtered in a hygienic manner by means of a semi-automatic poultry dressing unit. All the carcasses underwent manual deboning and were cut into bite-sized chunks. Thereafter, it was packaged in LDPE bags and stored in the freezer (-18 to 1°C) for further use.

**Preparation of Jamun Seed Powder.** From trees close to the LPT Department, RIVER, fresh jamun fruits were gathered. The seeds were removed, rinsed in potable water, and allowed to air dry. Then the seeds were ground in a home mixer and kept in a hot air oven at the temperature of 60°C overnight for proper drying. The dried powder was ground once more in a home mixer grinder and sieved through a fine mesh. The Jamun seed powder was packed in food grade plastic container and kept in the refrigerator for further use.

**Preparation of restructured chicken block with Jamun Seed Powder (JSP).** Following the formulation of Mandal *et al.* (2002) ; Sudheer *et al.* (2011) several preliminary trials were carried out to standardize the process of developing the restructured chicken block. The product is made with standardized methods (Table 1). The deboned meat was frozen, and it thawed overnight in a cold refrigerator (4°C). Using an 8 mm plate and a meat mincer, the frozen meat was minced (Mado Shop Mincer Junior, Germany). Manual mixing of the minced meat, water, and curing materials was proceeded by homogeneous mixing to extract the proteins. No JSP was added to the control.

In treatments 1 and 2, JSP was added at the level of 3% and 5% and mixed thoroughly. Thus, obtained meat mix was filled in clean stainless-steel mould lined with food-grade aluminium foil. Finally, the moulds were covered with a lid and kept overnight in the refrigerator (4±1°C). The next day the moulds were cooked in water at 90°C for 45 minutes followed by cooling under potable tap water and chilled overnight in a freezer for setting. Then the products were removed from the moulds and subjected to slicing. Thin slices (4 mm thickness) of the finished product were packed in LDPE pouches and stored at refrigeration temperature

(4±1°C). The products were subjected to sensory evaluation on the 1<sup>st</sup>, 7<sup>th</sup>, 12<sup>th</sup> and 17<sup>th</sup> day of storage.

**Table 1: Restructured chicken block recipe.**

Ingredients	Percentage
Meat	100%
Salt	2%
Sugar	1%
Alkaline Phosphate	0.4%
Water	15%
Sodium Nitrite	150ppm
Jamun seed powder	0% (Control); 3% (T1); 5% (T2)

**Sensory evaluation.** A semi-trained panel consisting of ten faculty and post-graduate students of RIVER were selected for sensory evaluation of the products. The panel lists were explained regarding the nature of the experiment without disclosing the identity of the samples. They were requested to record their preference on 8 points hedonic scale (8=extremely desirable, 1=extremely undesirable) (Keeton, 1983) for appearance, flavour, juiciness, texture and overall acceptability.

**Statistical analysis.** Each experiment was replicated thrice. The data were analyzed using SPSS version 16.0 MSI (SPSS, Chicago, U.S.). Two-way analysis of variance (ANOVA) was used for sensory attributes of restructured chicken block. The level of significant effects was tested using the least significant difference (LSD) test (Snedecore and Cochran 1967).

## RESULTS AND DISCUSSION

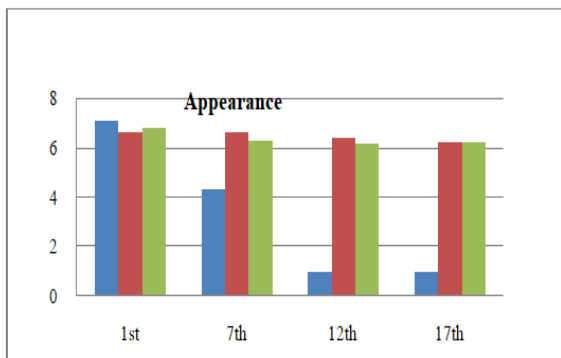
The results and discussion are presented in the form of tables and figures.

The appearance scores for control and treatments during 17 days of refrigerated storage ranged between 1.00 to 7.10 and 6.15 to 6.78, respectively (Table 2 & Fig. 1). The appearance scores were significantly higher for control than treatments on 1<sup>st</sup> day and lower on all other days of storage. The higher appearance score for control on 1<sup>st</sup> day of storage may be due to the attractive pink colour of the product and the treatments had a lower score when compared to control may be due to the brown colour imparted by JSP to the product. When the storage days increased the attractive pink colour of the control changed to pale colour. Among the treatments T1 had higher scores than T2 on the 1<sup>st</sup>, 7<sup>th</sup>, and 12<sup>th</sup> day of storage, but no significant difference on the 17<sup>th</sup> day of storage. Similar to the present study the appearance scores (5.90 to 6.40) of the Functional Chicken Chips incorporated with different levels of JSP were moderately desirable compared to the score (7.23) for the control sample. The appearance scores for the product with 1% JSP were significantly higher when compared with 2%, and 3% JSP incorporated products among the treatments (Kasthuri *et al.*, 2017).

**Table 2: Effect of incorporation of Jamun Seed Powder (JSP) on the sensory quality of Restructured Chicken Block during refrigeration storage (4±1°C).**

Appearance				
	1st	7th	12th	17th
Control	7.10±0.17 <sup>cC</sup>	4.30±0.42 <sup>aB</sup>	1.00±0.00 <sup>aA</sup>	1.00±0.00 <sup>aA</sup>
T1	6.78±0.15 <sup>bC</sup>	6.61±0.14 <sup>cC</sup>	6.40±0.13 <sup>cB</sup>	6.23±0.20 <sup>bA</sup>
T2	6.60±0.17 <sup>aB</sup>	6.30±0.19 <sup>bA</sup>	6.15±0.18 <sup>bA</sup>	6.23±0.17 <sup>bA</sup>
Flavour				
	1st	7th	12th	17th
Control	7.10±0.17 <sup>bC</sup>	3.30±0.42 <sup>aB</sup>	1.00±0.00 <sup>aA</sup>	1.00±0.00 <sup>aA</sup>
T1	6.80±0.15 <sup>aC</sup>	6.50±0.16 <sup>bB</sup>	6.55±0.13 <sup>cB</sup>	5.95±0.21 <sup>bA</sup>
T2	6.80±0.21 <sup>aD</sup>	6.56±0.16 <sup>bC</sup>	6.20±0.18 <sup>bA</sup>	6.05±0.18 <sup>bA</sup>
Juiciness				
	1st	7th	12th	17th
Control	7.10±0.19 <sup>cC</sup>	5.10±0.37 <sup>aB</sup>	1.00±0.00 <sup>aA</sup>	1.00±0.00 <sup>aA</sup>
T1	6.90±0.16 <sup>bD</sup>	6.56±0.16 <sup>cC</sup>	6.30±0.12 <sup>cB</sup>	6.09±0.16 <sup>bA</sup>
T2	6.45±0.19 <sup>bB</sup>	6.39±0.18 <sup>bB</sup>	6.05±0.21 <sup>bA</sup>	6.00±0.20 <sup>bA</sup>
Texture				
	1st	7th	12th	17th
Control	7.30±0.16 <sup>cC</sup>	4.70±0.51 <sup>aB</sup>	1.00±0.00 <sup>aA</sup>	1.00±0.00 <sup>aA</sup>
T1	7.05±0.18 <sup>bD</sup>	6.61±0.18 <sup>bC</sup>	6.35±0.0.16 <sup>bB</sup>	6.14±0.21 <sup>cA</sup>
T2	6.90±0.21 <sup>aD</sup>	6.50±0.20 <sup>bC</sup>	6.35±0.18 <sup>bB</sup>	5.77±0.20 <sup>bA</sup>
Overall acceptability				
	1st	7th	12th	17th
Control	7.25±0.16 <sup>cC</sup>	3.80±0.57 <sup>aB</sup>	1.00±0.00 <sup>aA</sup>	1.00±0.00 <sup>aA</sup>
T1	7.05±0.13 <sup>bB</sup>	6.94±0.09 <sup>cB</sup>	6.30±0.12 <sup>bA</sup>	6.27±0.21 <sup>bA</sup>
T2	6.80±0.17 <sup>aC</sup>	6.61±0.24 <sup>bB</sup>	6.25±0.14 <sup>bA</sup>	6.27±0.22 <sup>bA</sup>

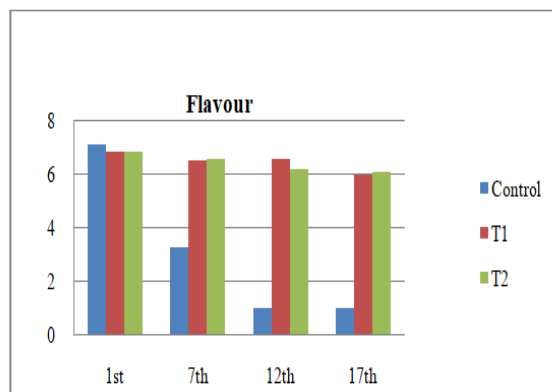
Means with different superscripts in the same row and column differ significantly (P<0.05).



**Fig. 1.** Effect of incorporation of Jamun Seed Powder (JSP) on the appearance score of Restructured Chicken Block during refrigeration storage (4±1°C).

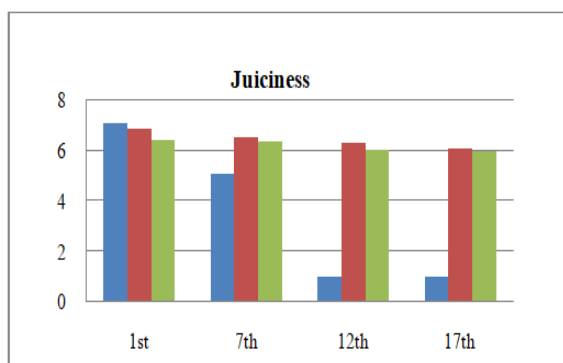
The flavour scores for control and treatments during 17 days of refrigerated storage ranged between 1.00 to 7.10 and 5.95 to 6.80, respectively (Table 2 & Fig. 2). The flavour scores were significantly higher for control than treatments on 1<sup>st</sup> day and lower on all other days of storage. On 1<sup>st</sup>-day flavour scores were lower for the treatments than the control may be due to the effect of the flavour of jamun seed powder which masked the meat flavour of the product. But on subsequent storage days, the flavour score for treatments was higher than the control because of the evidence of oxidized flavour in the control. Among the treatments, T1 had higher scores than T2. Mandal *et al.* (2002) observed that the flavour score (6.38 to 7.16) of restructured cured chicken was significantly decreased during the 15 days of refrigeration storage. The flavour scores were higher on 1<sup>st</sup> day and the product became totally unacceptable on the 15<sup>th</sup> day of storage. Similar to the present study

the flavour scores (5.70 to 6.37) of the Functional Chicken Chips incorporated with 1, 2, and 3% JSP were moderately desirable compared to the score (6.97) for the control (Kasthuri *et al.*, 2017).



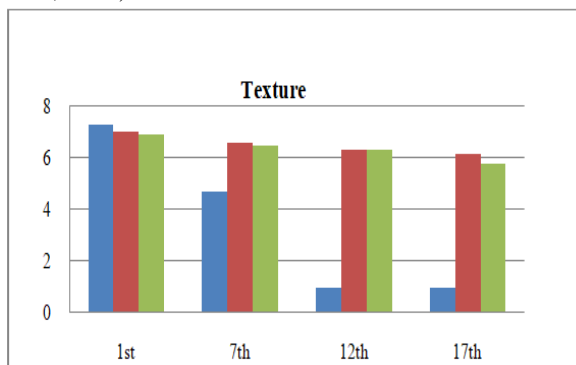
**Fig. 2.** Effect of incorporation of Jamun Seed Powder (JSP) on the flavour score of Restructured Chicken Block during refrigeration storage (4±1°C).

The juiciness scores for control and treatments during 17 days of refrigerated storage ranged between 1.00 to 7.10 and 6.00 to 6.90, respectively (Table, II & Fig.3.). The juiciness scores were significantly higher for control than treatments on 1<sup>st</sup> day and lower on all other days of storage. Among the treatments, T1 had higher scores than T2 on the 7<sup>th</sup> and 12<sup>th</sup> day of storage. Sudheer *et al.* (2011) reported that the juiciness scores of gizzard-incorporated restructured chicken blocks during refrigerated storage ranged between (6.8 to 7.0) for treatments and (5.7 to 5.9) for control.



**Fig. 3.** Effect of incorporation of Jamun Seed Powder (JSP) on the juiciness score of Restructured Chicken Block during refrigeration storage ( $4\pm 1^{\circ}\text{C}$ ).

The texture scores for control and treatments during 17 days of refrigerated storage ranged between 1.00 to 7.30 and 5.77 to 7.05, respectively (Table, 2 & Fig. 4). The texture scores were significantly higher for control than treatments on 1<sup>st</sup> day and lower on all other days of storage. Among the treatments T1 had higher scores than T2 on the 1<sup>st</sup>, and 17<sup>th</sup> days of storage but no significant difference on the 7<sup>th</sup> and 12<sup>th</sup> days of storage. Similar to the present study the texture scores (5.87 to 6.13) of the Functional Chicken Chips incorporated with different levels of JSP were moderately desirable compared to the score (6.97) for the control sample. The texture scores for the product with 1% JSP were significantly higher when compared with 2%, and 3% JSP incorporated products among the treatments (Kasthuri *et al.*, 2017). The texture scores of gizzard-incorporated restructured chicken blocks during 10 days of refrigerated storage ranged between (6.7 to 7.0) for treatments and (5.8 to 6.2) for control (Sudheer *et al.*, 2011).



**Fig. 4.** Effect of incorporation of Jamun Seed Powder (JSP) on the texture score of Restructured Chicken Block during refrigeration storage ( $4\pm 1^{\circ}\text{C}$ ).

The overall acceptability scores for control and treatments during 17 days of refrigerated storage ranged between 1.00 to 7.25 and 6.25 to 7.05, respectively (Table, II). The overall acceptability scores were significantly higher for control than treatments on 1<sup>st</sup> day and lower on all other days of storage. Among the treatments T1 had higher scores than T2 on the 1<sup>st</sup>, and 7<sup>th</sup> days of storage but no significant difference on the 12<sup>th</sup>, and 17<sup>th</sup> days of storage. Similar to the present study the texture scores (5.6 to 6.27) of the Functional

Chicken Chips incorporated with different levels of JSP were moderately desirable compared to the score (7.33) for the control sample. The texture scores for the product with 1% JSP were significantly higher when compared with 2%, and 3% JSP incorporated products among the treatments (Kasthuri *et al.*, 2017). The overall acceptability scores of the gizzard-incorporated restructured chicken block during 10 days of refrigerated storage ranged between (6.20 to 7.20) for treatments and (5.20 to 6.20) for control (Sudheer *et al.*, 2011).

## CONCLUSIONS

Based on the findings of the present study it can be concluded that Jamun seed powder could be incorporated at the level of 3% to restructured meat block and stored up to 17 days under refrigeration temperature without affecting the sensory attributes.

## FUTURE SCOPE

To explore the usage of Jamun seed powder as a preservative in different meat species like Beef, chevon, mutton, pork etc.

**Acknowledgement.** The authors thank the Dean, of Rajiv Gandhi Institute of Veterinary Education and Research, Puducherry for providing the necessary facilities.

**Conflict of Interest.** None.

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**How to cite this article:** S. Kasthuri, Hariharan R. and P. K. Mandal (2023). Effect of Jamun Seed Powder on the Sensory quality of Restructured Chicken Block at Refrigerated Storage. *Biological Forum – An International Journal*, 15(7): 279-283.