Technology of preparation of chicken jalebi and its sensory attributes

Preeti Doley, M. Hazarika, D.R. Nath, K. Sarma*, A.K. Sarma, S. Choudhury and D. Bhuyan

Department of Livestock Production Management, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati-781 022, Assam, India.

Received: 06-08-2018 Accepted: 24-01-2019

ABSTRACT
Chicken jalebis- a new snack was prepared by incorporating 23% non meat ingredients(Black gram flour, Bengal gram flour, corn flour, rice flour, semolina flour) at different proportions with 55% chicken (Broiler meat) to find out the best formulation without affecting the physico-chemical, microbial and organoleptic qualities of the product. Non meat ingredients were fermented for 24 hrs with curd at room temperature. Chicken was collected from local market, deboned, minced and processed. Different formulations of chicken jalebi batter were prepared by mixing broiler minced meat with fermented non meat ingredients, spices, oil, salt and ice to form a stable emulsion. The batter is then stuffed in a conical shaped plastic packet and pressed in such a manner to give a jalebi shape and then fried in sunflower refine oil at 180±5°C for 5-10mins.

One part of the chicken jalebis was immersed in tomato sauce, prepared from tomato magi sauce with little modification and other part was kept as such and then sensory attributes were evaluated and it was found that chicken jalebi containing rice flour was highly accepted by the consumers.

Key words: Chicken jalebi, New technology, Sensory attributes.

INTRODUCTION
Meat is an important food of animal origin with high quality protein containing all the essential amino acids in balance proportion as our body needs. Due to rapid industrialization, urbanization, increase in per capita income, changes in traditional life style and food habits besides quest for newer and variety healthy meat products have all created a situation demanding an urgent attention and needed to expand meat production activities by exploring all possible ways and means. Among the food animals and birds of different species, chicken in India has occupied a special place in our food menu due to their low production cost, high palatability, wider acceptability and opportunities to prepare large number of convenience chicken meat products. There are no religious taboos and stigmas attached to eating of chicken products in the country. Poultry is one of the fastest growing sectors of the agricultural activities in India today.

The main source of meat in Assam are broiler, culled birds, indigenous chicken, duck, goat, pig and cattle, of these, broiler accounts for the largest share in meat production scenario of the state. Unlike other parts of the country, almost 90% of Assam’s populations are non vegetarian. With the passing of time people are becoming educated and aware of the superior qualities nutritive value of broiler meat consequent to which the demand for broiler meat and meat products have been increasing sharply.

According to the Food Standards Agency, Ready-To-Eat (RTE) food products are these which can be consumed without further heating or processing. This definition covers both open and pre-wrapped ready-to-eat products and is intended to apply whether the RTE food may be consumed hot or cold. RTE foods are becoming increasingly popular with the consumers predominantly due to their convenience of consumption, ease of preparation and storage besides consumers‘ appeal. (Harper,1981). There exist a greater potential for the global food industry to manipulate the nutritional status of RTE products according to the demand of the consumers. In the next decade, with the application of different extrusion technologies varieties of RTE products could be developed with balanced nutrition and bioactive compounds which will help, both the consumers and the food industry could be developed. (Brennan et.al, 2013)

Jalebi is a popular sweet meat available in sweet shops of India, Pakistan, Bangladesh and few other South East Asian countries. The word ‘Jalebi’ has come from the Arabic word ‘Zulabia’ or Persian word ‘ Zalibiya’ (Davidson, 2014). It is a traditional dish which is an important part of many festivals and celebrations like Diwali, Puja and Ramadan etc.

Meat jalebi, a new concept which suits to this situation and presently not marketed/served to the customers as the recipe and technology for the same are not to the common sweet shoppers. If the product is developed successfully and launched in the market, it will perhaps serve the purpose (Tiffin items) for the regular travellers, office-
goers, besides picnickers and others too. Hotels and restaurants may also serve the product as a popular snack. Considering the above facts and high potentiality of RTE food products in this part of the country, besides having wider possibilities nutritional status of the product (as it is a combination of starch and animal protein) by incorporation of bioactive components, such as dietary fibre and antioxidants it was planned to develop a suitable production technology for meat jalebis an alternative to sweet jalebi.

**MATERIALS AND METHODS**

**Sample preparation:** Chicken was collected from nearby market and brought to the Department slaughter house, College of Veterinary Science, Assam Agricultural University, Khanapara and slaughtered in semi mechanized poultry dressing unit in a strict hygienic condition. The meat was cleaned and excess fat and skin was removed. Subsequently, it was packed tightly in food grade polythene bags and stored at 4±1°C.

Non meat ingredients which include good quality decorticated black gram flour (urad dal), semolina (suji), rice flour, corn flour; Bengal gram flour (besan) and Purabi plain curd were purchased from the local market. On the day before preparing of jalebis at first the non meat ingredients are weighed accordingly for different treatments, i.e. $T_1$, blackgram:besan:cornflour (2:1:2), $T_2$, blackgram:besan:riceflour:cornflour (1:1:1:2), $T_3$, blackgram:besan:suji:cornflour (1:1:1:2). Now water and plain curd @ 2% is added and the mixture is blended properly and kept for fermentation for 24 hours.

On the following day, collected chicken was removed from the refrigerator, deboning was done and deboned meat was cut into small cubes of 2 cm size and thereafter ground in a mincer through 4mm (pore size) plate. The minced meat and the fermented non meat ingredients are mixed properly along with other seasonings like spices and condiments.

On preparation of emulsions, these were stuffed into plastic cones separately for the jalebi shape and deep fried in sunflower refined oil for 5-10 minutes at 180±5°C. The chicken jalebis were then served to sensory evaluation panel judges either by placing the jalebis in sauce or without placing in sauce for evaluation of different eating quality traits viz: Appearance, flavour, texture, juiciness and tenderness.

**Sensory attributes:** Samples for sensory evaluation were served by placing the fried chicken jalebi in sauce and the other without sauce, to a 7-member semi trained panel of comprising of judge of different ages and sexes. They were provided with a comfortable sit in a well lighted and well ventilated room for evaluation of the product samples by score card method for different eating quality traits. A clean glass of water at room temperature was offered to each member for rinsing the mouth both before and after tasting each product. The identity of the coded product samples was kept secret and they were neither distributed nor allowed to discuss during the entire evaluation process. Each product sample was evaluated for appearance, flavor, texture, juiciness, tenderness and overall acceptability by using a 9-point hedonic scale (Bratzler, 1971) where the score value-9 stands for extremely desirable while the score value-1 as extremely undesirable.

**Statistical analysis:** A minimum of five batches of the products were prepared for the proposed study. The data obtained from the above study were analysed statistically by standard statistical method as described by Snedecor and Cochran (1994).

**RESULTS AND DISCUSSION**

The results pertaining to sensory attributes of chicken jalebi are presented in Table 1.

**Appearance:** The mean appearance scores recorded were 6.71±0.10, 7.44±0.10 and 7.02±0.11 for $T_1$, $T_2$, and $T_3$ without sauce and 6.78±0.10, 7.49±0.10 and 7.33±0.12 in $T_1$, $T_2$ and $T_3$ with sauce.

Appearance of the chicken jalebis with different formulations were found to be significantly different (p<0.01). The highest score was recorded in the products with sauce. This might be due to addition of sauce which

---

### Table 1: Effect of non meat ingredients and sauce on organoleptic properties of chicken jalebi (Mean±SE).

| Treatment Overall | Appearance | Flavour | Texture | Juiciness | Tenderness Acceptability |
|-------------------|------------|---------|---------|-----------|--------------------------|
| $T_1$ | Without sauce | 6.71±0.099<sup>A</sup> | 6.84±0.129<sup>A</sup> | 6.89±0.095<sup>A</sup> | 6.13±0.117<sup>A</sup> | 6.69±0.094<sup>A</sup> | 6.67±0.084<sup>A</sup> |
| $T_2$ | With sauce | 6.78±0.095<sup>A</sup> | 6.93±0.119<sup>AB</sup> | 6.84±0.120<sup>A</sup> | 7.16±0.110<sup>AB</sup> | 7.11±0.106<sup>AB</sup> | 6.87±0.075<sup>AB</sup> |
| $T_3$ | Without sauce | 7.44±0.093<sup>BC</sup> | 7.42±0.118<sup>BC</sup> | 7.58±0.098<sup>AB</sup> | 6.47±0.108<sup>BC</sup> | 6.78±0.123<sup>AB</sup> | 7.11±0.085<sup>BC</sup> |
| $T_4$ | With sauce | 7.49±0.099<sup>ABC</sup> | 7.91±0.121<sup>C</sup> | 7.44±0.129<sup>ABC</sup> | 7.67±0.090<sup>C</sup> | 7.49±0.122<sup>ABC</sup> | 7.51±0.093<sup>BC</sup> |
| $T_5$ | Without sauce | 7.02±0.108<sup>C</sup> | 7.58±0.116<sup>C</sup> | 7.49±0.108<sup>C</sup> | 6.71±0.117<sup>C</sup> | 6.89±0.124<sup>BC</sup> | 7.20±0.088<sup>C</sup> |
| $T_6$ | With sauce | 7.33±0.115<sup>C</sup> | 7.73±0.133<sup>C</sup> | 7.20±0.098<sup>B</sup> | 7.56±0.098<sup>D</sup> | 7.80±0.103<sup>C</sup> | 7.49±0.075<sup>C</sup> |

$T_1$ = Treatment 1, $T_2$ = Treatment 2, $T_3$ = Treatment 3  
SE = Standard Error  
Mean bearing a common superscript (capital letter) in columns do not differ significantly, P>0.01, n=5
gave a better colour to the product. The highest appearance score was awarded to T1 sample. Addition of rice flour and sauce apart from other ingredients developed a better appearance and colour profile. Similar findings were also recorded by Osterlie et al. (2005), where addition of tomato paste gives better colour in pork sausage.

**Flavour:** The mean flavour scores recorded were 6.84±0.13, 7.42±0.12 and 7.58±0.12 in T1, T2 and T3 without sauce and 6.93±0.12, 7.91±0.12 and 7.73±0.13 for T1, T2 and T3 with sauce respectively.

Significant differences (p<0.01) were observed among the flavour scores of chicken jalebis with different formulation. The highest score was recorded in the products with sauce; this might be due to addition of sauce which gives a tangy and mild sour taste to the product. The highest flavour score was scored in T3 with sauce. The combination of rice flour, sauce and other non-meat ingredients offered a better flavour than other formulations. Abras et al. (2014) have recorded that with incorporation of brown rice flour in the bread had increased the firmness and flavour score in the final products.

**Texture:** The mean texture scores recorded were 6.89±0.10, 7.58±0.10 and 7.49±0.11 in T1, T2 and T3 without sauce and 6.84±12, 7.44±13 and 7.20±0.10 for T1, T2 and T3 with sauce respectively.

There are significant differences (p<0.01) among the texture score of chicken jalebis with different formulations. The highest textural was score recorded in T3 sample without sauce. Rice flour might be the factor to impart mild crispy texture to the product’s crust which the panellists liked much. Pereira et al. (2016) had also similar observation with rice flour incorporated sausage products.

**Juiciness:** The mean juiciness scores recorded were 6.13±0.12, 6.47±0.11 and 6.71±0.12 in T1, T2 and T3 without sauce and 7.16±0.11, 7.67±0.10 and 7.56±0.10 for T1, T2, and T3 with sauce respectively. There are significant differences (p<0.01) among the juiciness score of chicken jalebi with different formulations. The highest juiciness was observed in the treatments with sauce and T3 sample with sauce has shown the highest attribute of juiciness. Tomato sauce which imparts mild tangy and acidic flavour might enhance the juiciness scores in combination of rice flour. Similar findings were also observed by Pereira et al. (2016) with addition of rice flour and tomato sauce has increased the moisture content of the sausages.

**Tenderness:** The mean tenderness scores recorded were 6.69±0.10, 6.78±0.12 and 6.89±0.12 in T1, T2 and T3 without sauce and 7.11±0.11, 7.49±0.12 and 7.80±0.10 for T1, T2, and T3 with sauce respectively. Although tenderness is not a significant attribute in comminuted meat products significant difference (p<0.01) among the tenderness scores of chicken jalebi with different formulations were observed. The highest tenderness was observed in the treatments with sauce. This might be due to addition of sauce which contains higher amount of moisture and consequently made products less firm and softer one. This is an inherent property of all the dry food products that in presence of water, the rheological property and consistency is altered making the food tender one. T3 sample with sauce has shown the highest tenderness scores because of sauce added water.

**Overall acceptability:** The mean overall acceptability scores recorded were 6.67±0.10, 7.11±0.10 and 7.20±0.10 in T1, T2 and T3 without sauce and 6.87±0.10, 7.51±0.10 and 7.49±0.10 for T1, T2, and T3 with sauce respectively. Overall acceptability is the resultant cumulative effect of all other sensory traits. The study has shown significant difference (p<0.01) among the overall acceptability scores of chicken jalebis with different formulations. The highest overall acceptability was observed in the treatments with sauce in all the products. This might be due to addition of sauce which enhances the flavour to the product. Tomato sauce contains many volatile, non volatile and acid producing substances along with sufficient water. Water in tomato sauce while added to dry jalebi can dissolve small food molecule to form solution and dispersing large molecule to form colloidal solution and thus, produce a suitable taste in the test buds of the panel members. T3 sample with sauce has shown the highest overall acceptability. Addition of tomato sauce and addition of rice flour might improve the texture, flavour, firmness and overall acceptability of the chicken jalebis. The findings of Pereira et al. (2016) who incorporated of rice flour in sausages had improved the flavour, texture and firmness of the sausage which may be well compared with the findings.

**CONCLUSION**

Chicken jalebi can successfully be prepared by incorporating with different non meat ingredients. For higher satisfaction of the consumers, the products need to be served with sauce. T3 sample which was prepared by addition of Besan, Black gram flour, Rice flour & Corn flour had shown the best results.

### REFERENCES

Abras, K.S.; Azizi, M.H.; Fallah, N.B.; Khodamoradi, A. (2014). Effect of brown rice flour fortification on the quality of wheat based dough and flat bread. *J.Food Sci Technol.*, 51:2821-2826.

Bratzler, L. J. (1971). Palatability factors and evaluation in science of meat products. (Eds. Price, J. F. And Schoriewert, B. S.) W. H. Freeman and Co. San Francisco.
Brennan, M.A.; Derbyshire, E.; Tiwari, B.K.; Brennan, C.S. (2013). Ready-to-Eat snack products, the role of extrusion technology in developing consumer acceptable and nutritious snacks. *Int. J. Food Sci.*, **48**: 893-902.

Davidson, A. (2014). The Oxford Comparison of Food. Oxford University Press. pp:424-425.

Harper, J.M. (1981). Extrusion of Food, 1. CRC Press, Inc. Florida.

Pereira, J.; Zhou, G.H. and Zhang, W.G. (2016). Effect of rice flour on emulsion stability, organoleptic characteristics and thermal rheology of emulsified sausages. *J. Food and Nutr. Res.*, **4**:216-222.

Snedecor, G.W. and Cochran, W.G. (1994). Statistical Methods, 8th Edn. East West Press Pvt. Ltd., New Delhi.