www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(9): 1863-1865

www.thepharmajournal.com
Received: 11-06-2023
Accepted: 18-07-2023

**Anagha R**
Department of Livestock Products Technology, College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala, India

**Kavitha Rajagopal**
Department of Livestock Products Technology, College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala, India

**Arathy Anil**
Department of Livestock Products Technology, College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala, India

**Renuka Nayar**
Department of Livestock Products Technology, College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala, India

**Vasudevan VN**
Department of Livestock Products Technology, College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University, Wayanad, Kerala, India

**Magna Thomas**
Department of Dairy Science, College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala, India

**Akhil K**
Department of Veterinary Public Health, College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala, India

**Corresponding Author:**
**Anagha R**
Department of Livestock Products Technology, College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala, India

# Study on the storage stability of *kozhi ada*: A traditional meat product of Kerala

**Anagha R, Kavitha Rajagopal, Arathy Anil, Renuka Nayar, Vasudevan V N, Magna Thomas and Akhil K**

**Abstract**
Malabar region of Kerala is well known for its traditional meat snacks which were prepared based on indigenous culinary practices. Mostly available traditional snacks are perishable due to the lack of scientific approaches and interventions during their production. The aim of present study was to assess the storage stability of the traditional snack, *kozhi ada* under aerobic packaging for a period of 60 days and stored at ambient temperature (25-30 °C). Changes in physico-chemical and microbiological parameters were assessed on storage. The pH of the product decreased significantly whereas the tyrosine value and thiobarbituric acid reacting substance number increased significantly during the storage period. The microbiological characteristics including both aerobic plate count and yeast and mould count depicted a significant difference on day 60 of storage. Aerobically packaged *kozhi ada* was shelf stable for a period of 60 days at ambient temperature conditions.

**Keywords:** *Kozhi ada*, shelf stable snack, aerobic packaging, ambient temperature storage

## 1. Introduction
Kerala is famous for its savoury snacks, especially meat, egg or fish-based snacks. Prior to the arrival of modern innovations, Kerala's culinary practices were based on traditional knowledge. The cuisine of Kerala is linked in all its richness to the history, geography, demography, and culture of the land. Traditional meat cuisines are with high nutritional value and sensory quality, produced on a small scale, using traditional ingredients and procedures. However, except for a few, the popularity of some of these products remains confined to the specific community/location. Most common traditional snacks of the Malabar region of Kerala are *erachipathiri*, *chattipathiri*, *samosa*, *erachibonda*, *kozhi ada*, chicken roll, cutlet etc. Some of them have the potential of becoming value added convenience food products of good sensory appeal. The major constraints in promoting traditional food products are the lack of standardised technology and scientific approach in production. The traditional knowledge base on process optimisation, packaging systems and storage conditions has to be enhanced by introducing scientific practices to improve the quality of these products. Further, documentation of these traditional meat products will help in popularising the product.

## 2. Materials and Methods
### 2.1 Preparation of *kozhi ada*
The locally procured broiler carcasses were pressure cooked for 15 minutes along with salt and chilli powder and allowed to drain. The cooked chicken carcasses were deboned and meat was shredded mechanically using a blender. The filling was prepared by sautéing shredded chicken, onion, green chilli, and ginger in oil until it was apparently dry. The dough used for enrobing was prepared using rice flour and refined wheat flour in the ratio 1:3 and kneaded manually with water. Thin discs of 6 cm diameter were made from the dough. The filling, cooled to room temperature was placed on these small discs, folded, and sealed along the sides to make pockets. These pockets were deep-fat fried in hot oil until it turned a golden brown colour. The snacks after cooling to ambient temperature was packed using low-density polyethylene pouches (LDPE), sealed using an impulse sealer (Thejus, India)and stored at ambient temperature (25-30 °C). The physico-chemical parameters and microbiological characteristics were assessed on days 0, 15, 30, 45 and 60.

### 2.2 Physico-chemical parameters
pH of the product was estimated by using a digital pH meter according to the methods of AOAC (2016) [1]. Thiobarbituric Acid Reactive Substances (TBARS) Number of the sample was determined as per Witte *et al*. (1970) [15] with modifications. The tyrosine value of the product was estimated as per the method described by Pearson (1968) [10].

### 2.3 Microbiological characteristics
All the microbiological parameters were determined by following standard methods of American Public Health Association. Readymade media (Hi-Media and Sisco Research Laboratories, India) were used for all the microbiological examination. Aerobic plate count (APC) was assessed according to Morton (2001) [6]. Yeast and mould count was estimated as per the method described by Beuchat and Cousin (2001) [2].

### 2.4 Statistical analysis
The data was statistically analysed using repeated measures ANOVA followed by the least significant difference (LSD) test.

## 3. Results and Discussion
The pH value of the sample registered a significant decrease ($p$<0.01) during storage and on day 60, the values were significantly lower than that of day 0.The decrease in pH might be attributed to a variety of chemical changes. The change in pH might have been induced by the hydrolytic cleavage of triglycerides in the presence of moisture. Additionally, microbial metabolites like organic acids might also have caused a decrease in pH. Sarvadnya *et al*. (2018) [14] reported a significant decrease in the pH of spent hen meat puffed product stored at ambient temperature. Similarly, a decreasing pH was reported by Jaiswal *et al*. (2014) [5] in chicken meat biscuits stored for 30 days at ambient temperature conditions.

The sample showed a significant ($p$<0.01) increase in TBARS value over the storage period with a significantly ($p$<0.01) higher value on day 60 and a lower value on day 0 which might be due to the oxidation of oil content in deep-fried meat products during storage. This was in accordance with Das *et al*. (2013) [3] who observed that the conventional deep-fat frying of meat products led to increased TBARS number. Similar findings were reported by Muthulakshmi *et al*. (2020) [8] and Hangsing *et al*. (2018) [4] in aerobic packaged buffalo meat sausages stored at -18±1 °C and puffed pork rind stored at ambient temperaturefor 60 days respectively.

The tyrosine value of the sample depicted a significant ($p$<0.01) increase with the highest values on day 60 which could be due to protein degradation. Saini *et al*. (2019) [13] reported that the tyrosine value increased over the 60 days of storage in fried chicken snacks incorporated with chicken powder. Similar results were found by Nemade *et al*. (2021) [9] in spent hen meat cookies when stored for 60 days.

On storage, the microbiological parameters such as both aerobic plate count and yeast and mould count registered a significant ($p$<0.01) difference on day 60 compared to day 0 where there was no growth and the difference noticed on other days was non-significant. This could be due to the decrease in moisture content throughout the storage period. Rajagopal (2023) [12] reported absence of yeast and mould growth in shelf stable extruded snack incorporated with chicken meat till day 60 of storage and thereafter the counts remained stable. Similar result was observed by Raja *et al*. (2014) [11] in aerobically packaged fish curls stored at ambient temperature. But on contrary, in fish curls the aerobic plate count significantly increased over the storage period of 28 days. Post-processing contamination could be directly correlated to the yeast and mould growth. Muthulakshmi and Muthukumar (2020) [7] revealed that the aerobic plate count of spent hen meat *papad* increased on storage at ambient temperature.

**Table 1:** Physico-chemical characteristics of *kozhi ada* on different days of storage

| Particulars | Days of storage | | | | |
|---|---|---|---|---|---|
| | 0 | 15 | 30 | 45 | 60 |
| pH | 5.52±0.14$^{a}$ | 5.27±0.11$^{b}$ | 5.11±0.10$^{c}$ | 5.05±0.05$^{c}$ | 4.99±0.05$^{c}$ |
| TBARS value | 0.011±0.001$^{c}$ | 0.020±0.002$^{b}$ | 0.024±0.002$^{b}$ | 0.044±0.006$^{a}$ | 0.066±0.002$^{a}$ |
| Tyrosine value (mg/100 g) | 3.63±0.16$^{e}$ | 4.18±0.21$^{d}$ | 4.58±0.15$^{c}$ | 5.10±0.09$^{b}$ | 5.66±0.17$^{a}$ |

**Means having different letters as superscript differ significantly at 0.01 level ($p$<0.01) within a row

**Table 2:** Microbiological characteristics of *kozhi ada* on different days of storage

| Particulars | Days of storage | | | | |
|---|---|---|---|---|---|
| | 0 | 15 | 30 | 45 | 60 |
| Aerobic plate count ($log_{10}$cfu/g) | 0±0$^{b}$ | 0.85±0.49$^{ab}$ | 1.33±0.44$^{ab}$ | 1.84±0.02$^{a}$ | 1.91±0.02$^{a}$ |
| Yeast and mould count ($log_{10}$cfu/g) | 0±0$^{b}$ | 0.87±0.5$^{ab}$ | 1.33±0.45$^{ab}$ | 1.79±0.05$^{a}$ | 1.85±0.03$^{a}$ |

**Means having different letters as superscript differ significantly at 0.01 level ($p$<0.01) within a row

## 4. Conclusion
*Kozhi ada* under aerobic packaging was found to be shelf stable for a period of 60 days without any physicochemical or microbiological quality deterioration under ambient temperature (25 - 30 °C) of storage.

## 5. Acknowledgement
The author acknowledges Kerala Veterinary and Animal Sciences University for providing funds to conduct the research.

## 6. References
1. AOAC. Meat and meat products. In: Official Methods of Analysis of Analytical Chemists. (20th Ed.). Association of Official Analytical Chemists Inc., Rockville, Maryland; c2016. p. 1-34.
2. Beuchat LR, Cousin MA. Yeast and Molds. In: Downes, F.P. and Ito, K. (Ed.), Compendium of Methods for the Microbiological Examination of Foods. (4th Ed.). APHA, Washington D.C; c2001. p. 209-213.
3. Das R, Pawar DP, Modi VK. Quality characteristics of battered and fried chicken: comparison of pressure frying

and conventional frying. Journal of Food Science and Technology. 2013;50(2):284-292.
4. Hangsing L, Khate K, Hazarika P, Malik AH, Boro PR. Development of shelf stable puffed pork rind. North-East Veterinarian. 2018;18(3):7-9.
5. Jaiswal RK, Pathak V, Goswami M, Mandal T. Physicochemical properties of chicken meat biscuits at ambient temperature in aerobic packaging. Veterinary Practitioner. 2014;15(2):335-336.
6. Morton RD. Aerobic plate count. In: Downes, F.P., and Ito, K. (ed.), Compendium of Methods for the Microbiological Examination of Foods. (4th Ed.). APHA, Washington, D.C; c2001. p. 63-67.
7. Muthulakshmi M, Muthukumar M. Shelf life of spent hen meat *papad* stored at ambient temperature. International Journal of Current Microbiology and Applied Sciences. 2020;9(10):798-806.
8. Muthulakshmi M, Dushyanthan K, Babu RN, Vasanthi C. Studies on the frozen stored buffalo meat sausages incorporating offal meat under different packaging conditions. Journal of Food Animal and Sciences. 2020;1(2):104-111.
9. Nemade A, Londhe S, Waghamare R. Shelf Stability of Cookies Incorporated with Spent Hen Meat Powder in Aerobic Packaging at Ambient Temperature (37±1 °C). International Journal of Livestock Research. 2021;11(3):65-71.
10. Pearson D. Application of chemical method for assessment of beef quality. In Methods related to protein breakdown. Journal of the Science of Food and Agriculture. 1968;19:366-369.
11. Raja WH, Kumar S, Bhat ZF, Kumar P. Effect of ambient storage on the quality characteristics of aerobically packaged fish curls incorporated with different flours. Springer Plus. 2014;3(1):1-10.
12. Rajagopal K. Influence of different mixtures of ingredients on the nutritional properties of a high protein extruded snack. The Pharma Innovation. 2023;12(2):2462-2467.
13. Saini A, Pandey A, Sharma S, Ambedkar YR, Suradkar US, Meena P, *et al*. Effect of rosemary (*Rosmarinus officinalis* L.) leaves extract on quality attributes of chicken powder incorporated fried chicken snacks. Journal of Animal Research. 2019;9(4):565-571.
14. Sarvadnya RG, Kokane RD, Kharate A, Dange A, Gadekar YP, Girish PS, *et al*. A study on the shelf life of the spent hen meat puffed product (SHPP) stored at ambient temperature. International Journal of Life Science and Agriculture Research. 2018;4(3):241-247.
15. Witte VC, Krause GF, Bailey ME. A new extraction method for determining 2-thiobarbituric acid values of pork and beef during storage. Journal of Food Science. 1970;35(5):582-585.