

## Chitosan coating improves the quality of dried Bombay duck

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**B**ombay duck (*Harpodon nehereus*) is an abundant marine fish along the North West coast of India. Traditionally the demand of fresh fish is limited and major portion of landings are converted to dried product. The physical and organoleptic qualities of the traditional sun dried products available in the local markets does not meet the standards for human consumption due to various reasons which includes poor handling, sanitation and improper processing that often lead to contamination and spoilage. Coating with antioxidants and antimicrobial agents could ensure maximum protection during processing and subsequent storage of dried fish products. Chitosan is a  $\beta$  (1, 4) linked copolymer of D-glucosamine and N-acetyl-D-glucosamine and it has been studied in food applications including antimicrobials, antioxidants, edible film and texture modification. The combined effect of chitosan coating and drying on the quality of Bombay duck was evaluated in this study.

Bombay duck was gutted, split opened and cleaned in potable water. Then it was kept in 5% salt solution for 5 min. to get the desired salt content in the dried product (Generally, for preparation of fish finger from fish fillet 3-5 min. dip treatment at 5% salt solution is used to get desirable salt content in the product. Hence, similar treatment was followed in the present study to get the desired salt content in the final product). After draining of salt water, it was divided in to three lots. The first lot was dip treated with 0.5% chitosan solution (CH), the second one was dip treated with 1% acetic acid (AA) and the third one was kept as control (without dip treatment). All the samples were dried at 50 °C for 12 hrs. Dried samples (Fig.1) were packed in polythene pouches and stored at room temperature and its qualities were evaluated up to three months. Biochemical parameters such as proximate composition, pH, total volatile base



Fig. 1a. Whole Bombay duck



Fig. 1b. Dried Bombay duck

nitrogen (TVB-N), trimethyl amine (TMA-N), peroxide value (PV) and thiobarbituric acid (TBA) were evaluated. Microbiological quality parameters such as Total Plate Count (TPC), *Staphylococcus aureus*, *Escherichia coli*, *Salmonella* and *Vibrio cholerae* were also examined. Dried Bombay duck had moisture and protein contents of 11.25-11.58%, 69.35-71.02%, respectively. Salt content of the dried fish for control, CH and AA was 6.5%, 7.33%, 10.25%, respectively. Accordingly, both CH and AA sample had a salt content within the permissible limit of 7.5% (IS 14950). The difference in the salt content between samples may be due to the sample preparation process followed in the study. Moisture content of the dried samples showed an increased

trend and the values were within the permissible limit of 15% (IS 14950) during storage (Fig. 2).

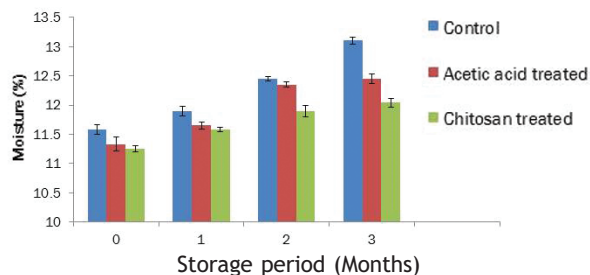


Fig. 2. Changes in moisture content of dried Bombay duck during storage

Biochemical analysis showed an increased trend in pH, TVB-N, TMA-N, PV and TBA during storage and it followed in the order of control > AA> CH samples. Further, it was also found that chitosan treated sample showed less TBA value of 0.42 mg malonaldehyde/kg of oil than untreated sample (1.08 malonaldehyde/kg) of oil at the end of third month. TBA value of 1-2 mg malonaldehyde/kg of fish meat is regarded as the limit beyond which fish will develop an unpleasant odour and taste (Adenike, 2014). In all the samples, TBA values were within the limit throughout the storage period. According to Indian standard specification, the permissible limits of total plate count for dried fish is  $5 \log_{10}$  (IS 14950). In the present study, it was observed that samples crossed the permissible limits of total plate count at the end of first month, second month and third month for control ( $5.5 \log_{10}$ ), acetic acid treated ( $5.4 \log_{10}$ ) and chitosan treated ( $5.83 \log_{10}$ ), respectively (Fig.3). Sensory evaluation revealed that chitosan treated samples had higher score for overall acceptability. It can

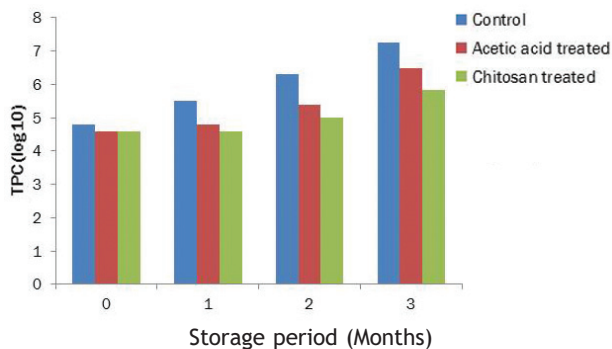


Fig. 3. Changes in total plate count (TPC) of dried Bombay duck during storage

be concluded that the local practice of drying Bombay duck poses problems such as high moisture content, inadequate salting, and contamination with sand and dust which results in poor quality of the final product. Results from the study revealed that 5% salt dip followed by chitosan coating and drying maintained the required salt and moisture content in the dried product. Further, it reduced the oxidation as indicated by lower PV, TBA values and also reduced the total bacterial count in dried Bombay duck during storage which resulted in improved quality of the final products.

## References

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