Effect of squilla protein hydrolysate on lipid oxidation of fish nuggets during refrigerated storage

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Lipid oxidation causes loss of nutritional qualities and gives unpleasant odour in fishery products (Dong *et al*., 2008). In recent years, the use of natural antioxidants in fish-based products has been evaluated to replace or minimize the use of synthetic additives, satisfying the consumers demand for products with natural characteristics (Sancho *et al*., 2011). The present study was conducted with an objective to evaluate the effect of Squilla Protein Hydrolysate (SPH) on lipid oxidation and quality changes of fish nuggets during refrigerated storage. Protein hydrolysates were extracted from Squilla as per the method developed by Chang-Feng *et al*. (2005) using three proteases namely Alcalase from *Bacillus licheniformis*, Flavourzyme from *Aspergillus oryzae* and Pepsin from Porcine gastric mucusa. SPH was found to be rich in antioxidant activity.

Fish nuggets were prepared from marine catfish (*Netuma thalassina*; mean weight 3.5kg) mince. Catfish mince was divided into five batches *viz*., C1: Control without addition of SPH, C2: Standard control with addition of 1% (w/w) ascorbic acid, T1: Mince with 1% (w/w) SPH prepared using pepsin, T2: Mince with 1% (w/w) SPH prepared using Alcalase and T3: Mince with 1% (w/w) SPH prepared using Flavourzyme. Other ingredients were salt (2%) and corn starch (5%). All the ingredients were ground uniformly and spread on aluminum trays (thickness 2-2.5 cm) and steam cooked for 15 mins. After that it was allowed to cool and cut into nuggets shape. Different batches of fish nuggets were packed in thermofoam trays and stored under refrigerated temperature (Fig. 1). Samples were drawn at regular intervals and assessed for quality parameters *viz*. total plate count (TPC), thiobarbituric acid reactive substances (TBARS), peroxide value (PV), moisture and sensory properties.

Moisture content of all the samples decreased during storage period. However reduction of moisture was very less in case of T2 i.e. fish nuggets with addition of 1% SPH prepared using alcalase (Fig. 2a). PV of C1 i.e. control sample reached 19.2 meq of O_2 / kg of fat by the end of storage period whereas treated samples (T1, T2 and T3) showed relatively lower PV values as compared to control sample (C1) at the end of 10 days of storage (Fig. 2b). After 10 days of storage, fish nuggets incorporated with SPH showed slightly lower TBARS value (mg MDA/Kg) of oil as compared to C1 (Fig. 2c). However, there is no change in TBARS value in case of fish nuggets containing 1% ascorbic acid (C2). Sensory scores for appearance, colour, flavor, odour, taste and texture were found to be higher for the treated samples (Fig. 2d).

TPC of C1 reached 1300 cfu/g, whereas TPC of treated samples (C2, T1, T2, T3) was 100 cfu/g at the end of 10 days of storage at refrigerated temperature. The results of the study indicate that

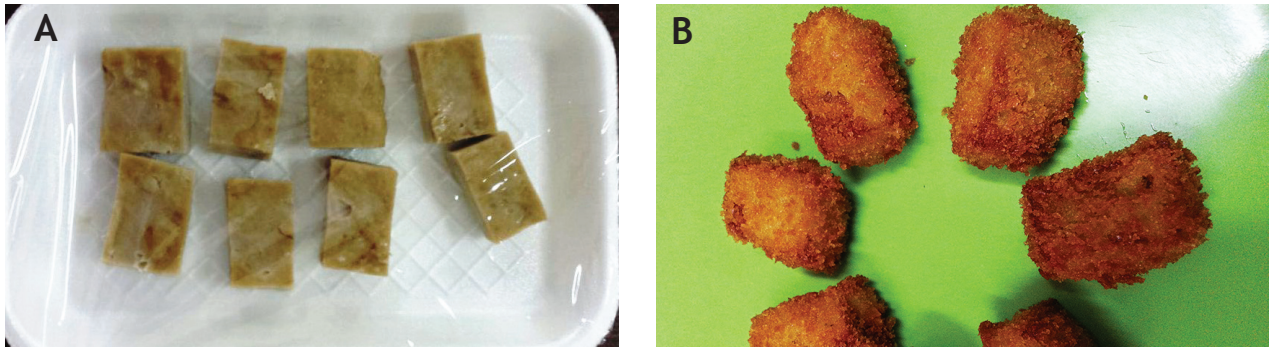

Fig. 1. Fish Nuggets (a) Fish nuggets in thermofoam tray and (b) Fried fish nuggets

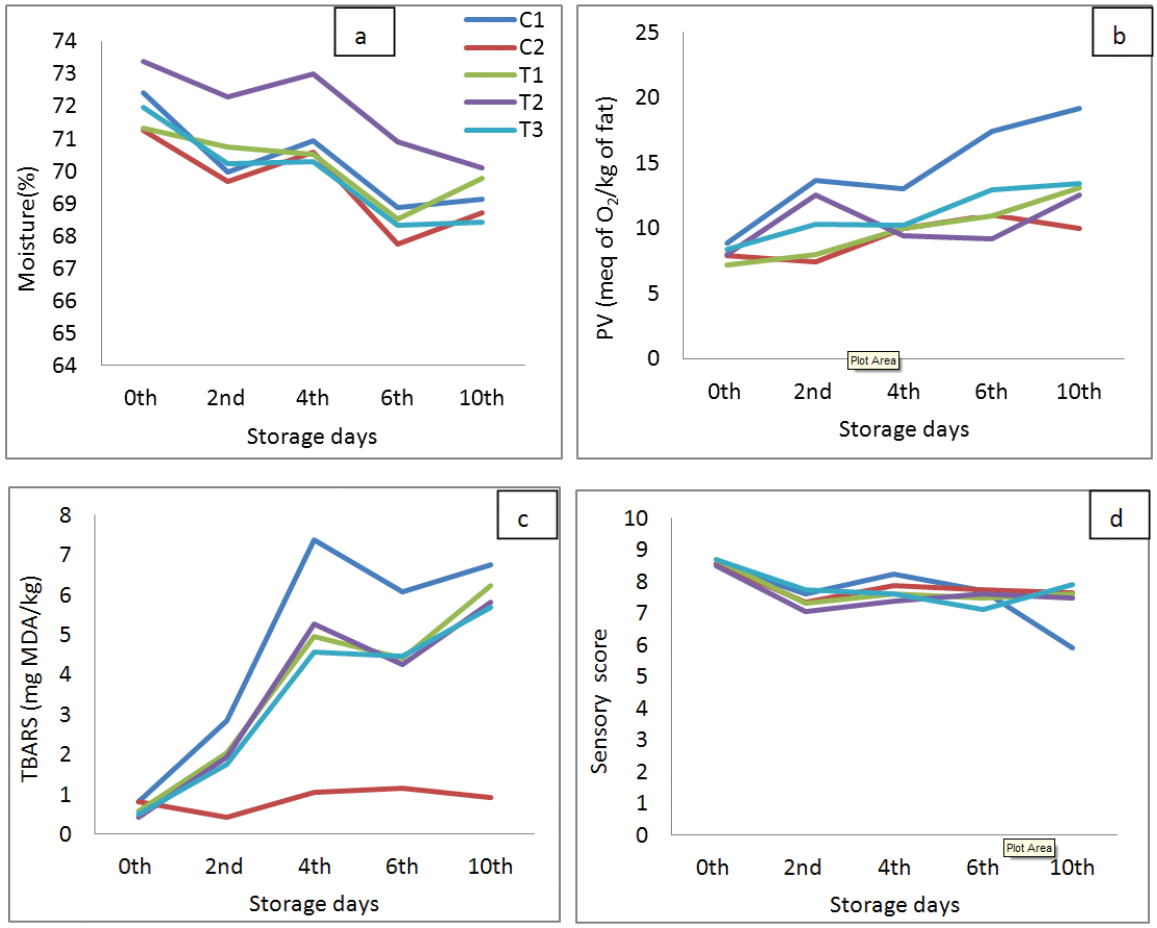

Fig. 2. Changes in untreated and SPH treated samples during refrigerated storage: (a) Reduction of moisture; (b) Changes in PV values; (c) Changes in TBARS values, and (d) Changes in overall acceptability

SPH is a promising alternative to replace harmful synthetic antioxidants in fishery products.

References

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