

## **Effect of Chitosan and Chitosan-Nanoparticles as Active Coating on Microbiological Characteristics of Fish Fingers**

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### **Abstract**

*The effect of different concentrations of chitosan and chitosan nanoparticles as active coating on microbiological characteristics of fish fingers during frozen storage at -18°C were studied. Results indicated that, uncoated fish fingers (T1) and that coated with commercial edible coating (T2) had higher total bacterial count (TBC), psychrophilic bacteria, and coliform bacteria, proteolytic bacteria when compared with fish fingers coated with either chitosan or chitosan nanoparticles. Moreover, the lowest counts of abovementioned microorganisms were recorded for chitosan nanoparticles treatments during frozen storage at -18 C up to 6 months. The flow behavior of the edible coating solutions prepared from chitosan and chitosan nanoparticles was studied; it was observed that all samples of edible coating solutions exhibited non-Newtonian pseudoplastic behavior for all concentrations studied.*

**Key Words:** Extraction, Chitosan, Nanoparticles, Antimicrobial, Fish Fingers, rheological properties.

### **1. Introduction**

Ideal biobased and biodegradable polymers are defined as materials that are produced from renewable resources and completely degraded to carbon dioxide and water by the action of micro-organisms. Chitosan is a linear copolymer composed of  $\beta$  (1 $\rightarrow$ 4)-linked 2-acetamido-2-deoxy- $\beta$ -d-glucopyranose and 2-amino-2-deoxy- $\beta$ -d-glucopyranose units. It occurs as a component of the cell wall of some fungi but it is generally produced by carrying out the deacetylation of chitin, an abundant polysaccharide found in the shells of crustaceans, particularly crabs and shrimps. It is a biocompatible, biodegradable and antimicrobial polymer.

Nanotechnology may be able to create many new materials with a vast range of applications. The interesting and sometimes unexpected properties of nanoparticles are largely due to the huge surface area of the material accompanied usually by an increase in stability and improved functionality which dominates the contributions made by the small bulk of the material. Chitosan nanoparticles have many applications in medical and pharmaceutical uses they have been used successfully in drug delivery systems to control the releasing process of the drug (Du et al, 2009; Krishna et al, 2010; Sangeetha et al., 2010; Rafeeq et al, 2010; Kim et al, 2010; Allemann et al, 1993)

Fish fingers produced from minced fish flesh as a battered and breaded product, are commonly stored and marketed in the frozen state. Nevertheless, frozen storage does not completely inhibit microbial and chemical reactions that lead to quality deterioration of fish (Reddy & Srikar, 1996). Moreover, fish and its products such as fish burgers, fish fingers, fish balls, frankfurters and sausages can undergo undesirable changes during frozen storage that lead to deterioration which may limit their storage time.