CHAPTER 1

INTRODUCTION

Chitosan, a deacetylated form of chitin, is a polymer of glucosamine residues linked by β-(1,4) glucosidic bonds. Chitin is widely distributed in nature as a structural component of exoskeletons of crustaceans, insects and other arthropods, as well as a component of the cell walls of most fungi and some algae. It is one of the most abundant natural polymer, second only to cellulose and is linear homopolymer of β-(1,4)-linked-N-acetyl-D-glucosamine (Knorr, 1991 and Lower, 1984). These two biopolymer, chitin and chitosan, are currently available in large quantities as a waste product from the seafood processing industry and can be produced by chemical and biochemical methods (Ornum, 1992). While, chitin is extremely insoluble, chitosan is readily soluble in acidic solutions and increasing use for industrial applications (Srinivasan, 1998). When chitosan is dissolved in saline, distilled water or laboratory media, it exhibits an antimicrobial activity against some strains of filamentous fungi, yeasts and bacteria (Rhoades and Roller, 2000). It is commercially interesting due to the presence of amine group compared to a synthetically substitute cellulose. In this respect, chitosan is recommended as a suitable resource material, because this natural polymer has excellent properties such as high molecular weight, biocompatibility, biodegradability, non-toxic and adsorption properties. With these special properties, chitosan has many attractive applications in biotechnology, medical, environment and in many other industries (Kumar, 2000).

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The reported toxicities and health risks associated with consumption of foods treated with certain chemicals have resulted in an increasing consumer preference for naturally processed products. In this context, the unusual antimicrobial activity of chitin, chitosan and their derivatives against different groups of microorganisms such

as bacteria, yeast and fungi have received considerable attention in recent years (Shahidi *et al.*,1999 and Roller and Covill, 1999). Their most popular application is to be used as an edible film for a controlled release of antimicrobial substances or controll moisture transfer between food and surrounding environment. In the nutritional quality, they have been used as dietary fibre for reduction of lipid absorption. These features of chitosan are potential for treating food to extend the shelf-life and prime quality of the food itself (Roller and Covill, 2000 and Simpson *et al.*, 1997).

The objectives of this study were to investigate the antimicrobial effects of chitosan against food spoilage bacteria, to test its effectiveness in a food model and to access the potential of using chitosan as a natural food preservative.

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