

Study on some properties of acid-soluble collagens isolated from fish skin and bones of rainbow trout (*Onchorhynchus mykiss*)

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Abstract: To make more effective use of fish-byproduct resources, acid-soluble collagen (ASC) was isolated from the skin and bones of rainbow trout (*Onchorhynchus mykiss*) with yields of 9.448% and 1.122% on a wet weight basis, respectively. Based on their electrophoretic pattern, both collagens were classified as type I with slightly different amino acid compositions and low imino acid content. From the result, both collagens were rich in inter- and intra-molecular cross-linked components, β and γ components with bone collagen having more band intensity. Similar changes in viscosity of collagens from the skin and bone of rainbow trout were observed. Collagens from the skin and bones had minimum solubility at pH 9 and 7, respectively. No changes in solubility were observed in the presence of NaCl up to 3% (w/v). However, a sharp decrease in solubility was found above 3% NaCl.

Keywords: Collagen, acid-soluble collagen rainbow trout, *Onchorhynchus mykiss*, fish skins, fish bones

Introduction

Collagens are generally extracellular structural proteins involved in formation of connective tissue structure and are known to occur in genetically distinct forms identified as type I through XIX. They vary considerably in their complexity and the diversity of their structure. Also, the different types show variations in amino acid composition and physical properties that also seems to be correlated with the temperature of the source animal's environment. The main sources of industrial collagen are limited to those from pig and bovine skin and bones.

Due to collagen's unique chemical features, they have been used in various ways, such as leathers and films, beauty aids and cosmetics, biomedical and pharmaceutical applications, and food (Morimura *et al.*, 2002; Kittiphattanabawon *et al.*, 2005). However, the occurrence of bovine spongiform encephalopathy (BSE), and foot/mouth disease (FMD) along with religious constraints has resulted in an anxiety among users of collagen and collagen-derived products from land-based animals in recent years and thus increasing attention has been paid to alternative collagen sources, especially fish skin and bones which comprise about 30% of the total fish weight available after fish fillet

preparation (Shahidi, 1994).

So far, skin and bone collagen from several fish species have been isolated and characterized (Kimura *et al.*, 1991; Ciarlo *et al.*, 1997; Nagai and Suzuki, 2000a, 2000b; Yata *et al.*, 2001; Nagai *et al.*, 2002; Sadowska *et al.*, 2003). Rainbow trout (*Onchorhynchus mykiss*) is a worldwide favorite fish species produced in large amounts in northern Iran. As there is an increased consumer demand for its fillet, optimal utilization of their wastes after filleting, especially evaluation of its potential use as an important source of collagen could be profitable. Hence, the objective of the present study was to extract collagen from the skin and bone of rainbow trout (*Onchorhynchus mykiss*) and investigate the biochemical properties of prepared collagens.

Material and Methods

Fish skin and bone preparation

Cultured Rainbow trout (*O.mykiss*)- on the same feeding regime, growth temperature of 12-15°C, mean size of 25 cm and age of 3 years- were delivered on ice to process plant, Kian Maahi Khazar Co.,Ltd (Babolsar, Iran) and freezed at -20°C till skinning and deboning. Skins and bones were taken off at -20°C and kept frozen till use. The skins of about 50 Kg of fish

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