

Original article

Extraction and characterization of fresh and sea water fish skin as halal gelatin sources

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Introduction

Gelatin, protein polymer from collagen conversion, is multifunctional ingredient used in foods and non-food industries such as pharmacy and cosmetics. Gelatin is prepared by thermal denaturation of collagen. The function of gelatin is widely known in many products such as being used as a stabilizer, thickener, emulsifier and gelling agent [1]. The necessity of gelatin tends to increase year by year in Indonesia. However, it comes from import from other countries.

Generally, commercial gelatin come from bovine and pig causing somewhat health problems (BSE) and religion sentiment. The alternative source is necessary to meet the requirement of "halal" term for Moslem society. In addition, Jewish need it for kosher food. Study to finding good raw material as alternative sources derived from fish skin waste industrial fish-processing is important. Both the freshwater and seawater fish might be favorably new sources of gelatin. Thus, the aims of this study were to extract and characterize fish skin gelatin from fresh water and sea water fish.

Materials and methods

Fish skins from freshwater species, namely, pangasius catfish (*Pangasius* sp.) and red tilapia (*Oreochromis niloticus*) were used, while seawater species used were red snapper (*Lutjanus sanguineus*) and parrotfish (*Scarus ghobban*). Fresh specimens were collected and immediately stored at -20°C until used.

Fish skins were rinsed in 1% lime water, then soaked in 1% citric acid solution for 12 h at room temperature. Washing process was performed 5 times, then the skins were extracted in distilled water at 65°C for 6 h. The evaporator was used to dry up gelatin solution for 1 h after extraction step. Characterization was performed for obtained fish skin gelatin, such as yield, gel strength, viscosity, pH, color, amino acid

composition, and SDS-PAGE pattern. In addition, all the fish skin were prepared to investigate the microscopic structure of collagen where the samples dyed with haematoxylin-eosin and Masson's trichrome.

Results and discussion

Gelatin from fish skin both fresh and sea water was successfully extracted. The result showed gelatin from sea water fish had relative higher physico-chemical characteristic than from fresh water. The yield was in the range of 22.0 to 24.7% where parrotfish skin showed the highest of this yield. Gel strength of obtained gelatin was among 54.2 and 118.4 gf, while viscosity was in the range of 16.1 to 22.0 cP. Gel strength and viscosity are the important properties for gelatin. In addition, pH was 4.50 to 4.59 for the obtained gelatin.

The amino acids, namely glycine and proline were found as the main composition. This result showed the similarity with other researcher [2,3]. The results of SDS-PAGE demonstrated that the obtained gelatin consisted of β , $\alpha 1$ and $\alpha 2$ chains like other gelatin. Observation under light microscopy showed that the skins of seawater fish contained more collagen than those of freshwater fish.

Conclusions

Based on the characteristics as revealed in this study, fish skin gelatin can be used as a source of gelatin for halal purposes. The skin gelatin from parrotfish especially showed the highest rheological properties such as yield, gel strength and viscosity.

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