Development of a Simple Non-toxic Scale-up Method for Extracting Crude Collagen from Yellowfin Tuna (*Thunnus albacares*) Skin

J.M.S.S. Jayasundara[1*], W. Wimalarathne[2], H.M.J.C. Pitawala[3], R.M.T.C.B. Ekanayake[3] and E.D.N.S. Abeyrathne[1]

[1]Department of Animal Science, Uva Wellassa University, Badulla, Sri Lanka*
[2]Ceylon Fresh Seafood, Ja Ela, Sri Lanka
[3]Department of Science & Technology, Uva Wellassa University, Badulla, Sri Lanka

During processing, a greater quantity of fish is dumped as waste which causes a major environmental impact. Therefore, it is crucial to investigate possible ways to minimize the waste and use of these wastes at the industrial level. Thus, the current study was aimed to develop a simple, non-toxic, and scale-up method to extract crude collagen from yellowfin tuna (*Thunnus albacares*) skin. Collagen extraction was carried out through a pre-treatment process where the skin was agitated with 0.1 N NaOH for 48 hours. Two different acid types, lactic acid (0.4 M, 0.5 M, 0.6 M) and acetic acid (0.5 M, as in the previous study) were compared. Sodium chloride (10% w/v) was used to precipitate crude collagen. Extracted collagens were lyophilized and yield was calculated. For the agitation purpose, specially prepared agitator (30 L capacity and 50 rpm) was used. Then, 10% SDS-PAGE (sodium dodecyl sulfate and polyacrylamide gel electrophoresis) analysis and FTIR (Fourier-transform infrared spectroscopy) analysis were carried out for the identification of the extracted crude collagen. The highest yield of collagen was obtained from 0.6 M lactic acid-treated fish skin compared to the rest and it was 14.46 ± 0.56 % based on the wet weight of the skin ($p < 0.05$). All the crude collagen extracts of different concentrations exhibited Amide A, Amide B, Amide i, Amide ii, and Amide iii which are the characteristic spectra of collagen in the FTIR spectrum. Based on the SDS-PAGE analysis it was revealed that the crude collagen extracts have two α-bands and one β-band which is a characteristic of type I collagen. Thus, this study revealed the tuna skin is a good source to extract type I collagen for the commercial and industrial uses.

Keywords: Fish collagen, *Thunnus albacares*, Lactic acid, Acetic acid, Extraction

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