

Characteristics Of Gelatin Extracted From Red Snapper Skin (*Lutjanus argentimaculatus*) In Difference Time Extraction

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Abstract- Red snapper skin is one of the alternative gelatin resource. Gelatin is a protein obtained from the results of partial hydrolysis of skin, bones, and white connective tissue. The type of gelatin is divided into two types, gelatin type A (acid immersion) and type B (base immersion). The purpose of this study was to determine the best extraction time with 5 hours, 6 hours, and 7 hours treatment. The result showed the best value at 7 hours extraction, containing yield (18,60%), gel strength (8,97 N), and viscosity (6,48 cP). In addition, gelatin in this study containing higher glycine (16,54%) as amino acids profile.

Keyword: *fish skin, gelatin, yield, gel strength, viscosity, amino acids*

I. INTRODUCTION

Fish skin is the untapped waste. Fish skin produces 6-7% waste from the weight of fish. Fish skin contains 69,6% water, 26,9% protein, 2,5% ash, and 0,7% fat.¹ Each animal skin has a different characteristic or structure based on the type of animal used. Fish skin consist of the dermis layer which has a number of collagen fibers (Lagler *et al.*, 2018). Skin waste contains collagen and produces gelatine from the collagen hydrolysis.⁶

Gelatin is a protein obtained from the partial hydrolysis of skin, bone, and white connective tissue. Gelatin absorbs 5-10 times water of the weight.⁹ The breakdown of collagen into gelatin can occur through the breakdown of the triple helical protein into a random coil protein. The breakdown of collagen protein can be done using acids or bases and enzymes.¹⁰ Gelatin contains protein 84-86% and has a mineral content 8-12%. Gelatin contains 9 of 10 types of essential amino acids. One type of amino acid hardly available in gelatin is tryptophan.³ Gelatin composed of 18 amino acids including alanin. Phenylalanin. Isoleucine, methionin, etc.¹¹ The chemical structure of gelatin is a protein derivative of collagen fibers found in skin, bones, and cartilage. Gelatin has the composition of the main amino acids, glycine, proline, and hydroxyproline.⁴

Characteristic of gelatine can seen from yield, viscosity, gel strength, and amino acids contains. Gel strength and viscosity are important parameters of gelatin, because they can affect the application of gelatin in products.² The result of amino acids are used to determine the content of essential and non-essential amino acids.

II. MATERIALS AND METHOD

Materials used in this study are red snapperskin(*Lutjanuss argentimaculus*) that was obtained from PT. Alam Jaya Surabaya, ascorbic acid, NaOH, water, aquadest, aluminum foil and filter paper.

The research method in this study consist of two stage, preliminary research and main ressearch. Preliminary research was conducted to determine the best extraction time in producing gelatin from red snapper skin. The variation of the extraction were 2 hours, 4 hours, and 6 hours. The main research was conducted after the best result were obtained from the preliminary esearch. The variations of time extraction in main research were 5 hours, 6 hours, and 7 hours. The main research conducted to determine the quality of gelatin with the best characteristics. Making gelatin from red snapper skin can started by cleansed the skins from meat and waste residue. The the skins is cut to a size 2-3 cm. Then immerse in 0,1M NaOH solution for 2 hours. Then wash it to neutral pH and soak again with ascorbic acid for 20 hours. After that, washed again to neutral ph and extraction at 5, 6, and 7 hours. Then the gelatine liquid is filtered and then gelatin is dried in the oven for 24 hours. Sheet results were analyzed for the chemical physical characteristics of gelatin in red snapper skin

III. RESULT

The results showed that the longer extraction process was increasing the value of gel strength and viscosity. At 5-hour extraction treatment, the gel strength value was 4.36N and the viscosity was 3.23 cP. At 6-hour extraction resulted in a gel strength value was 6.71N and a viscosity was 4.94 cP. At 7 hour extraction the highest gel strength value was 8.91N and the highest viscosity value was 6.48 cP. The highest amino acid results with the best treatment were glycine at 16.54% and the lowest amino acid value of L-Tyrosine 0.37%.

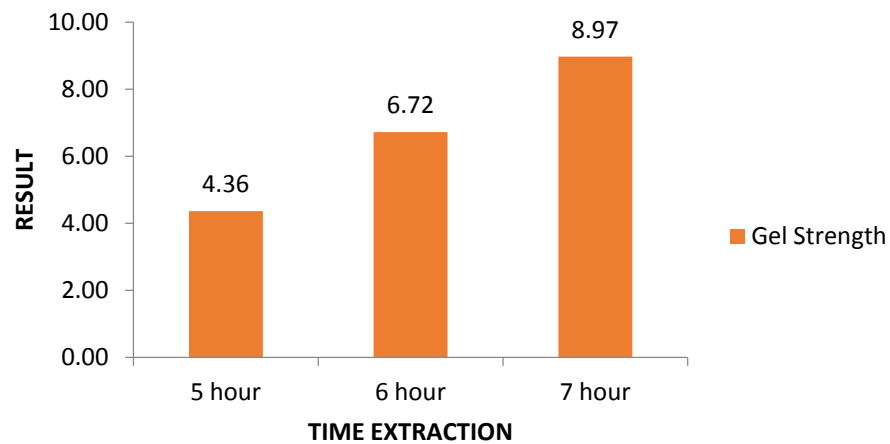


Figure 1. The Result of Gel Strength

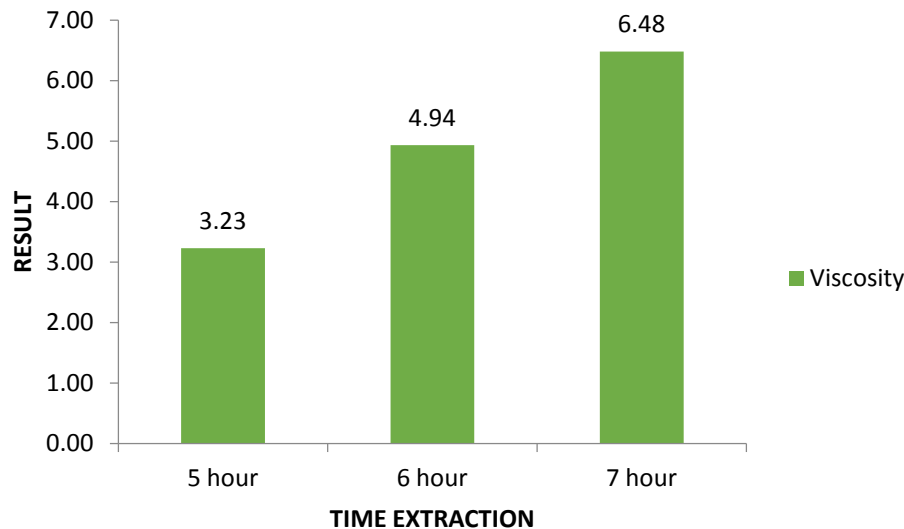


Figure 2. The Result of Viscosity

Table 1. Amino Acids Profile

No	Parameter	Unit	Result
1	L-Serine	%	21,81
2	L-Glutamic Acid	%	6,68
3	L-Phenylalanine	%	1,36
4	L-Isoleucine	%	0,53
5	L-Valine	%	1,20
6	L-Alanin	%	7,04
7	L-Arginine	%	3,47
8	Glysin	%	16,54
9	L-Lysin	%	2,85
10	L-Aspartic Acid	%	3,54
11	L-Leusin	%	1,46
12	L-Tyrosin	%	0,37
13	L-Proline	%	7,77
14	L-Threonin	%	1,70
15	L-Histidine	%	0,39

IV. DISCUSSION

The results of gel strength gelatin extracted from red snapper skin showed differences in each extraction time. At 5 hours extraction, gel strength was 4.36 N or 198.36 g / bloom, 6 hours extraction was 6.72 N or 294.56 g / boom, and 7 hours extraction was 8.97 N or 386 , 48 g / boom. Gel strength has increased with the treatment of extraction time. The strength of the gel produced is in accordance with the standards set by the *Gelatin Manufactures Institute of America* , which is 50-300 g / bloom. Based on ANOVA, the gel strength of gelatin extracted from red snapper skin was found to be significantly different ($P < 0.05$), so it can be said that the difference in extraction time affected the gel strength of gelatin extracted from red snapper skin. Based on Tukey's advanced test, the gel strength of gelatin with differences in extraction time of 5 hours, 6 hours, and 7 hours showed significantly different results. The strength of gel gelatin depends on the length of the amino acid chain. The collagen hydrolysis process depends on the right phase in the polypeptide chain where hydrogen bonds are broken, cross covalent bonds and also as peptide bonds, the gelatin structure is produced with higher peptide chains for higher gel production.⁸

The results of gelatin viscosity of red snapper skin showed differences in each treatment extraction time. At 5 hours extraction, a viscosity was 2.32 cP, at 6 hours extraction was 4.94 cP, and 7 hours extraction was 6.48 cP. Low viscosity values can be caused by the extraction process, where extraction has not been able to hydrolyze and break down the peptide bond structure in the skin of the protein.⁵ Based on ANOVA results, the gelatin viscosity of red snapper skin was found to be significantly different ($P < 0.05$) so that it can be concluded that extraction time affected the viscosity of gelatin in red snapper skin. Based on Tukey's advanced test, the gelatin viscosity of snapper skin with extraction duration was 5 hours, 6 hours, and 7 hours indicating that it was significantly

different. Viscosity values have a relationship with molecular weight, molecular distribution, and average gelatin. Molecular weight is related to the amino acid chain produced. The longer the amino acid chain, the higher the viscosity value. In the 7-hour extraction treatment the highest gel strength value was obtained. This shows that collagen protein is completely hydrolyzed.

Amino acid values with a 7 hour extraction treatment showed that amino acid content has different values where L-Serine was 1.81%, L-Glutamic Acid was 6.68%, L-Phenylalanine was 1.36%, L-Isoleucine was 0.53%, L-Valine was 1.20%, L-Alanine was 7.04%, L-Arginine was 3.47%, Glycine was 16.54%, L-Lisine was 2.85%, L-Acid Aspartate was 3.54%, L-Leucine was 1.46%, L-Tyrosine was 0.37%, L-Proline was 7.77%, L-Threonine was 1.70%, L-Histidine was 0.39%. The highest value is glycine at 16.54%, this is because glycine is the most found amino acid in gelatin. This type of amino acid accounts for 23% of the total amino acids. It is known that thermal stability is influenced by the number of amino acids. Gelatin is made from the partial hydrolysis of collagen.⁷

V. CONCLUSION

The best treatment for making gelatin in red snapper skin is extraction time of 7 hours with a gel strength value of 8.91N. Viscosity of 6.48 cP, and the highest amino acid was 16.54% by glycine and the lowest was 0.37% in L-Tyrosine

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