

## ORIGINAL ARTICLE

# Transparent Collagen Soap From Shellfish (*Anadara Granosa*) With Additional Oils From Olae Plant (*Etlintera Calophrys*) (*k.schum.*) *a.d.poulsen*

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## ABSTRACT

**Introduction:** Currently the most common chemicals used to make soap are less safe for human skin, so making soap containing natural ingredients that are safe for the skin needs to be developed. Shellfish (*anadara granosa*) have a high enough collagen content and can be used as a natural raw material for making soap with the addition of essential oils of etlingera plants that contain secondary metabolites and function as anti-oxidants. Research on Transparent collagen soap from shellfish (*anadara granosa*) with essential oils from plant (*etlingera calophrys*) (*k.schum.*) has been successfully carried out. The study aims to determine the process and formulation of making collagen soap from shellfish with the addition of essential oils from etlingera plants and to find out the results of collagen rendament of shellfish and rendament of essential oils of etlingera plants. **Methods:** The method used in making collagen soap is a simple mixing method. The parameters observed included analysis of shell collagen yield, etlingera essential oil yield and chemical soap test. **Results:** Shellfish collagen rendament was 9.23 percent and essential oil rendament was 23 percent. The results of testing the chemical properties of collagen soap are produced according to the Indonesian National Standard (SNI). Moisture value is 12.53 percent, saponification value is 258mg KOH/gram of oil, and the acidity value has a pH of 10. **Conclusion:** The results of this study show transparent collagen soap from shells (*anadara granosa*) with essential oil of the plant (*etlingera calophrys*) is safe to use.

**Keywords:** Soap, Collagen, Transparent, Shellfish, Etlingera plant, Rendament

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## INTRODUCTION

Healthy and charming skin is everyone's dream. In our age, skin dries up easily and loses its moisture and elasticity through a process known as elastosis. Elastosis give rise to many signs of aging, including wrinkled and sagging skin (1). Especially with the Covid-19 pandemic currently hitting, it turns out that the skin has the potential to experience damage, it is due to changing habits, such as washing hands more frequently, using hand sanitizers which cause the skin to dry easily and loss of skin elasticity. Collagen can prevent aging, moisturize and tighten skin (photoaging). Photoaging will occur when the skin is exposed to UV rays chronically and repeatedly over a period of

time. Skin damage can occur due to reduced amounts of collagen fibers in the skin (2). One way to prevent premature aging of the skin is to use soap containing collagen which can be made by using clam meat (*Anadara* Shellfish).

However, nowadays many soaps have an instant effect but use chemicals that are less safe for the skin. Usually the materials used are mercury or Sodium Lauryl Sulfate (SLS). Mercury or Sodium Lauryl Sulfate (SLS) causes various problems such as changes in skin color, black spots on the skin, skin irritation and allergies (3).

Based on these conditions, it is necessary to have soap products that use ingredients that are safe for the skin. One of them is by producing collagen soap from shellfish (*Anadara Grandosa*). Shellfish is a source of animal protein which is classified as complete protein, because the essential amino acid levels are high (85%-95%) and are easily digested by the body.

Clams also contain fat soluble vitamins and B complex (4). Blood clam meat contains nutrients and minerals such as vitamin B1, iron, zinc, selenium and as a source of protein. Blood clams are good for the skin because they contain collagen proteins which play a role in skin rejuvenation or preventing premature aging (5). In blood clams, there is protein in the form of fiber (fibrous), one of which is collagen. The chemical composition of shellfish (*Anadara Granosa*) is 9-13% protein, 0-2% fat, 1-7% glycogen, and has a caloric value of 80 calories in 50 grams of fresh meat (6).

In addition to containing collagen, this soap is enriched with the essential oil extract of the etlingera plant, where this plant has many traditional, local and commercial uses which contain secondary metabolites that function as anti-oxidants (7). Antioxidants can ward off free radicals and are actually able to slow down or inhibit the oxidation of substances that are easily oxidized even in low concentrations (8). Natural antioxidant compounds are recommended for use because they have a better level of safety so that their use in the world of health and cosmetics (9). Essential oils are substances that give plants an aroma (10). Essential oils are usually liquid and have a distinctive aroma according to the plant source. The use of essential oils is very wide ranging from cosmetics, perfume, the food and beverage industry, to the pharmaceutical industry (11).

Based on this background, this study aims to determine the process and formulation of collagen soap from shell collagen with the addition of etlingera plant essential oil.

## MATERIALS AND METHODS

### Materials

The tools used are analytical scales, beaker, spatula, stirring rod, stove, oven, mold, water bath, pH paper, thermometer, filter paper, aluminum foil, measuring cup, test tube, measuring flask, oven, and centrifuge.

The ingredients used are shellfish (*Anadara granosa*), local olae (Etlingera Chalophrys), collagen extract, ice cubes, etlingera essential oil extract, stearic acid, oil coconut, glycerin, acetic acid, 30% NaOH, citric acid, NaCl, coco-DEA, distilled water, ethanol 96%, glucose, fragrance oil vanilla, extract rose water.

### Research Methods

The preparation of raw materials for anadara shells and etlingera plants is obtained from marine products and etlingera plants obtained from the forests of Southeast Sulawesi. then anadara shellfish (*Anadara granosa*) is extracted to get the collagen, collagen isolation from anadara shellfish using the method of Stephanie, et al. (2016). The shellfish meat is separated from the shell and weighed as much as 500 grams. Then the anadara

clam meat was soaked in 0.01 M NaOH at 15oC for 3x24 hours, the solution was changed every day, washed with distilled water, filtered. Then the immersion results were extracted using 0.5 M acetic acid, incubated for 3x24 hours, filtered and then extracted. The shellfish extract was precipitated by adding 0.9 M NaCl to get a precipitate, then it was left to stand for 24 hours. The precipitate was centrifuged at 8000 rpm for 30 minutes. The precipitate is then lyophilized or in a freeze dryer for 30 minutes until dry collagen is obtained, then crushed into powder. On the other hand, extraction of etlingera essential oils, extraction of essential oils from etlingera plant stems which are dried then mashed (13), then extracted using the extraction method (Sulaima, 2014) by macerating etlingera powder with 96% ethanol soaked for 2x24 hours, filtered and extracted. The etlingera extract was evaporated to obtain the etlingera essential oil extract. After that, anadara shellfish collagen rendamen analysis and essential oil rendamen analysis were performed. Then, the making of transparent collagen soap was carried out using a simple saponification method, and the quality analysis was carried out on the transparent collagen soap (14).

## RESULTS

The results of collagen extraction from shellfish (*Anadara Granosa*) produced 9.23% rendament. When compared to the dry collagen rendament of black tilapia which is only 5.97% (16), the collagen rendament of blood clams is very high (Figure 1).

### Rendamen of Essential Oil

The essential oil is obtained from the calculation of the rendament formula:

$$\frac{\text{weight of oil produced}}{\text{weight of material before processing}} \times 100\% \quad (17).$$

The essential oil rendament from the local plant olae etlingera has 23% rendament (Figure 2).



Figure 1 : *Anadara* shellfish dried collagen powder after centrifugation at 8000 rpm for 30 minutes then lyophilized or in a freeze dryer. Collagen rendament was obtained from the ratio of the dry weight of collagen produced with the wet weight of anadara shellfish.



**Figure 2 :** The etlingera plant essential oil extract after the extraction process by drying the etlingera plant which is crushed and then macerated with 96% ethanol for 2x24 hours then filtered and the extract is evaporated. The essential oil rendament is obtained from the calculation of the weight of the oil produced with heavy materials before processing.

### Composition and Quality Analysis of Transparent Collagen Soap

The composition of the transparent collagen soap raw material used is shown in Table 1.

The soap results obtained with this composition, produce soap that is quite soft and transparent is shown in Figure 3.



**Figure 3 :** Transparent collagen soap, the result of a mixture of the compositions in table 1. The resulting soap is soft and transparent.

The amount of fatty acids contained in collagen soap is 2.07% and has met the SNI soap requirements, namely 2.5%.

After the saponification of soap is formed, ingredients such as ethanol can be added. The addition of ethanol aims to make the soap transparent. It is made by dissolving the finished soap in ethanol with the same weight. Then some of the ethanol is evaporated. When the soap is thick enough and the liquid droplets are found, it quickly becomes a hard mass (18).

### Saponification Numbers

The test results obtained that the saponification number

for coconut oil is 258 mg KOH / gram of oil. The results of this analysis are in accordance with the standard that the saponification number for coconut oil is in the range of 251-263 mg KOH / gram of oil.

### Water Content

Testing the water content of solid bath soap needs to be done because the water content will affect the quality of the soap. The amount of water added to the soap product will affect the solubility of the soap (20). The result of water content test on transparent collagen soap was 12.53%.

### Degree of Acidity (pH)

The average degree of acidity or pH value of the soap produced or SNI standards ranges from 9-11 (21). The pH test results obtained a pH value of 10, which means that the transparent collagen soap meets the SNI requirements.

### DISCUSSION

Rendament is an important parameter that shows the effectiveness of a raw material being converted into a product. Collagen rendament is obtained from the ratio of the dry weight of collagen produced to the wet weight of the skin that has been cleaned (15).

From the research results, it can be seen that the collagen content in Anadara shells is quite high, which means that it can be used as raw material for soap and can later be used, where it is known that collagen can prevent aging and tighten skin (1). The term premature skin aging is often referred to as photoaging. Photoaging will occur when the skin is exposed to UV rays chronically and repeatedly over a period of time. One of the causes of skin damage in photoaging is the reduced amount of collagen fibers in the skin.

Apart from containing collagen, transparent collagen soap is also enriched with the essential oil extract of the etlingera plant which contains secondary metabolites which function as anti-oxidants. It is known that antioxidants can ward off free radicals. The effect of free radicals on the skin is marked by the presence of wrinkles so that the skin quickly experiences the aging process, the presence of black spots, looks duller, drier and can even cause skin cancer. Antioxidants can actually slow down or inhibit the oxidation of easily oxidized substances. Sources of antioxidants can come from synthetic or natural compounds. Natural antioxidant compounds are recommended for use because they have a better level of safety (20). Essential oils are substances that give plants their aroma. Essential oils have volatile components in some plants with certain characteristics.

The process of forming soap is known as the lathering or saponification reaction. The alkalis that are

commonly used are NaOH and KOH. Coconut oil, NaOH, and stearic acid are the main parts in the soap making process. The saponification reaction is an exothermic reaction, so care must be taken when adding oil and lye to avoid overheating. In the lathering process, the addition of the alkaline NaOH solution is carried out gradually while stirring and heating to produce soap. The saturation of fatty acids and alkalis, both acids in the free state or fatty acids that are bound as oil or fat (18).

The quantity of water that is too much contained in a soap will make it easy to shrink and uncomfortable to use (19). Determination of the moisture content of soap was carried out using the gravimetric method. Based on the Indonesian National Standard (SNI), determination of water content in the composition of soap is a maximum of 15%.

The pH quality standard requirements for soap are between 9-11 (21), and the pH value of soap is 10, which means it is safe for skin and meets SNI standards. Soaps that have too high a pH can increase the absorption of the skin, causing the skin to itch or peel and cause dryness (20). Free fatty acids come from fatty acids that are not bound to sodium or triglycerides. The fatty acid level should not be too high as this will trigger rancidity and reduce the shelf life of the soap (20). The results of the examination of free fatty acids in transparent collagen soap met the SNI requirements, namely 2.07%. Requirements for free fatty acids in transparent solid soap 2.5% (SNI, 2004)

## CONCLUSION

From the activities that have been carried out, it can be concluded that the collagen from Anadara shellfish (*Anadara Granosa*) has a high amount of collagen as seen from the collagen rendament value of 9.23%. Transparent collagen soap produced in accordance with SNI standards can be seen from the results of analysis of fatty acids, water content and pH. This collagen soap also has a soft texture. When reacting ingredients in soap making, it must be done with the correct procedure.

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