Proximate composition of *ndara granosa* and *Paphia undulata*

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ABSTRACT

The sea region of Indonesia is particularly abundant in natural resources. One of the economically viable aquatic commodities is shellfish. The public has a high demand for the shellfish *Anadara granosa* and *Paphia undulata*. The goal of this study was to ascertain the protein, carbohydrate, fat, water, and ash content of *Anadara granosa* and *Paphia undulata*. The study's sample was intentionally drawn from the sea waters off the coast of Belawan, North Sumatera. Following the SNI technique, the proximal level measurement method was used. According to the examination of proximate levels, there is a 10–12% protein content, 0.14–0.15% carbohydrate content, 1% lipid content, 70%–80% water content, and 2% ash content. It can be concluded that, as functional foods, Anadara granosa and Paphia undulata include nutrients that are good for your health.
Keyword: *Anadara granosa, Paphia undulata*, moisture content, ash content, proximate

ABSTRAK

Indonesia merupakan wilayah kelautan yang sangat kaya akan hasil alam. Kerang merupakan salah satu komoditi perairan yang berpotensial dan ekonomis. *Anadara granosa* dan *Paphia undulata* merupakan kerang yang sangat diminati oleh masyarakat. Tujuan dari penelitian ini adalah untuk mengetahui kandungan proksimat dari *Anadara granosa* dan *Paphia undulata*, yaitu kadar protein, karbohidrat, lemak, air dan abu. Sampel pada penelitian ini diambil secara purposive yang berasal dari perairan laut Belawan, Sumatera Utara. Metode pengukuran kadar proksimat dilakukan mengikuti prosedur SNI. Hasil yang diperoleh dari analisis kadar proksimat adalah kandungan protein 10-12%, karbohidrat 0.14-0.15%, lipid ±1%, air 70-80% dan abu 2-3%. Dari hasil yang diperoleh dapat disimpulkan bahwa Anadara granosa dan Paphia undulata emiliki kandungan nutrisi yang bermanfaat bagi kesehatan, dan dapat memungkinkan digunakan sebagai makanan fungsional.
Kata Kunci: *Anadara granosa, Paphia undulata,* kadar air, kadar abu, proksimat.

1. Introduction

Indonesia is a maritime nation with an abundance of natural resources. One of the prospective and profitable aquatic products in this nation is shellfish. Omega-3 and antioxidant compounds, full and balanced necessary amino acids, various types of minerals, and various vitamins are also abundant in sea shells, which are high in nutritional components including protein, vitamins, and minerals. The shell powder can be used as a calcium source for cattle in addition to human use[1]–[4]. Blood clams and batik clams have only been used for eating up until this point. Conversely, shellfish is a well-known source of high-quality protein[5].

The Latin term for blood clams is *Anadara granosa*. These molluscs belong to the *Peleycypoda* class and are distinguished by having a bivalve shell made up of two sections that are typically symmetrical and include hinges and ligaments on the dorsal side as well as one or two pairs of adductor muscles[6], [7]. The ideal habitat for blood clams is in the form of fine mud substrates measuring less than 0.124 mm, as much as 90 percent on tidal flats, which are protected from the waves, outside the river mouth with 18-30‰ salinity. Blood clams are typically found on coastal land located

between the tidal flat and soft muddy lowlands bordering mangrove forests[2], [6], [8]. With a bright yellow and somewhat darker base colour, batik clams (*Paphia undulata*), often known as baby clams, have shell colour qualities that mimic batik. Batik clams dwell in muddy, sandy waters, like the majority of other shellfish[4], [5], [9].

It is important to conduct a proximate analysis on these two shells since, in addition to their great flavour, they have many health advantages for the body, particularly as a source of protein-rich nutrients. The two shellfish samples that were chosen, *Anadara granosa* and *Paphia undulata*, have distinct qualities, including a distinctly different shell shape that serves as a marker of the species. In addition, these two types of shellfish also have quite different intensities of popularity in the community, which encourages curiosity about how to distinguish the two types of shellfish. Dependent on the amount of ash, water, protein, fat, and carbs in the food.

2. Methods

Anadara granosa and *Paphia undulata* were purchased from the fish landing centre in Belawan, North Sumatera, and transported to the laboratory in their preserved state in an ice box. After thoroughly cleaning the clams, the total weight of each was calculated. The clams were separated into five groups for analysis. All the chemical reagents that were used in this research were analytical grade purchased from Merck.

The procedure was prepared based on SNI 01-2891-1992. First, carefully weighed 2 grams of the sample, and put it into a 100 ml *Kjehdahl* flask. Then, add 2 grams of selen mixture and 25 ml of concentrated sulfuric acid. Heated over an electric heater or fire burner until it boils and the solution becomes clear greenish (about 2 hours). Allowed to cool, then diluted and put into a 100 ml volumetric flask, adjusted to the marking line. 5 ml of the solution was pipetted and put into a distiller, added 5 ml of 30% sodium hydroxide and a few drops of phenolphthalein indicator. Distilled for about 10 minutes, as a container using 10 ml of a 25% boric acid solution that has been mixed with indicators. Rinse the tip of the cooler with distilled water. And then titrate this product using 0.1 N chloride acid, and do the determination of the blank. The calculation of the protein contains was conducted using the formula below:

$$\text{Protein contains (\%)} = [(V1-V2) \; x \; N \; x \; 14.007 \; x \; \text{cf} \; x \; \text{df}]/w \qquad (1)$$

Note:
W = weight of sample (mg)
V1 = 0.1 N chloride acid used for titar the sample (ml)
V2 = 0.1 N chloride acid used for titar the blank (ml)
N = Chloride acid normality's
cf = 6.25
14.007 = Ar Nitrogen (mg/mmol)
df = dilution factors

The procedure for carbohydrates analysis was prepared based on SNI 01-2891-1992. First, approximately 3 g of clams are carefully weighed into a 500 ml Erlenmeyer. Added 200 ml of 3% chloride acid solution. Simmer for 3 hours in an upright cooler. Cool and neutralized with saturated sodium hydroxide (with universal indicator). A little 3% acetic acid was added so that the solution was slightly acidic, then the contents were transferred to a 500 ml volumetric flask and pressed to the marking line, then filtered. Pipette 10 ml of the filter into a 500 ml Erlenmeyer. Add 25 ml of Luff's solution (with a pipette) and a few grains of boiling stone and 15 ml of distilled water. The mixture is heated with a constant flame. Try to bring the solution to a boil within 3 minutes (use a stopwatch). Continue the simmer for exactly 10 minutes (counting from when it starts to boil and using a stopwatch) then quickly cool in a bath of ice. After cooling, add 15 ml of 20% potassium iodide solution and 25 ml of 25% sulfuric acid slowly. Titrate immediately with 0.1 N sodium thiocyanate solution (use the instructions for 0.5% starch solution), and do the determination of the blank. The calculation of the carbohydrate content was conducted using the formula below:

$$\text{Glucose contains (\%)} = [(W1 \times \text{df})/W] \times 100\% \qquad (2)$$

Note:
Carbohydrate contains = 0.90 × Glucose contains
W = weight of the sample (mg)
W1 = glucose contained for ml sodium thiocyanate used (mg)
df = diluting factor
Volume of titration based on the table of Luff-Schools' sugar determination

The procedure for lipids analysis was prepared based on SNI 01-2891-1992. Carefully weigh 3 g of the sample into a beaker glass, add 30 ml of 25% chloride acid and 25 ml of water and a few grains of boiling stone, then cover the beaker with a watch glass and boil for 15 minutes. This mixture is additionally filtered while still hot and again heated until it stops reacting with acid. The residue contained in the filter paper was dried at a temperature of 100-105ºC. Then put in a filter paper wrap (Piper Thimble) and extracted with hexane for 3 hours at a temperature of approximately 80ºC. After being distilled from the hexane solution or another fat solvent and dried at a temperature between 100-105ºC, the

fat extract is weighed while it is still cool. This drying process was repeated until a constant weight was reached. The calculation of the lipid content was conducted using the formula below:

$$\text{Lipid contain (\%)} = [(W1-W2)/W] \times 100\ \% \qquad (3)$$

where:
W   = weight of sample (g)
W1   = weight of lipid after extracted (g)
W2   = weight of lipid before extracted (g)

The procedure for water content analysis was prepared based on SNI 01-2891-1992. Each sample was weighed in a closed weighing bottle whose weight was known. The weighing bottle is equipped with a stirrer and quartz sand/folded filter paper. The samples were then dried in an oven at 105°C for 3 hours. After that, it was cooled in a desiccator for 30 minutes. To determine the water content, the results were weighed until a constant weight was obtained. The calculation of the water content was conducted using the formula below:

$$\text{Water content (\%)} = [(W1-W2)/W] \times 100\ \% \qquad (4)$$

where:
W   = weight of sample (g)
W1   = weight of empty weighing bottle plus sample (g)
W2   = weight of empty weighing bottle plus dried sample (g)

The procedure for ash content analysis was prepared based on SNI 01-2891-1992. A porcelain crucible containing 3 grams of the sample was heated over the burner's flame. Then, it is heated to a maximum of 550°C in an electric furnace till complete ashing (occasionally opening the furnace door slightly to allow oxygen to enter). The ash is cooled in a desiccator first before being weighed again until a steady weight was attained. The calculation of the ash content was conducted using the formula below:

$$\text{Ash content \%} = [(W1-W2)/W] \times 100\ \% \qquad (5)$$

where:
W   = weight of sample (g)
W1   = weight of empty porcelain crucible plus sample (g)
W2   = weight of empty porcelain crucible (g)

3. Result and Discussion

Anadara granosa and *Paphia undulata* had their protein content determined using the *Kjeldahl* protein level determination method. The *Kjeldahl* method's advantage is that it can be used to roughly test protein content, and it is still frequently used. Its disadvantage is that it takes a long time to complete each stage of the test and that it can measure total organic nitrogen, which makes it possible to identify nitrogen that is not derived from protein. *Paphia undulata* has a 10.34 percent protein content on average compared to 12.41 percent for *Anadara granosa*. According to earlier investigations, there was no noticeable difference between the outcomes of this study of blood clams and batik clams. Different protein levels between blood clams and batik clams in earlier research may have resulted from differences in species, sex, age, and habitat where the mussels were collected[2]. The food and eating habits of the bivalves are also suggested to contribute to the variation in protein content values. Bivalves can be divided into sediment feeders and suspension feeders based on what they eat and how they eat it. Since the way suspension-eating bivalves consume their food differs from groups that consume sediment, it is likely to have an impact on the nutritional value that each of the bivalves absorbs[10].

Table 1*Anadara granosa* and *Paphia undulata* amounts of protein, carbohydrate, fat, water, and ash content

No	Sample	Protein	Carbohydrate	Lipid	Water	Ash
1	*Anadara granosa*	12,41±0,15%	0,14±0,0002%	1,09±0,02%	80,22±0,14%	3,21±0,10%
2	*Paphia undulata*	10,34±0,14%	0,15±0,0021%	1,03±0,01%	78,83±0,86%	2,68±0,04%

According to Table 1, *Anadara granosa* had a slightly lower carbohydrate content than *Paphia undulata* (0.15 percent), at 0.14 percent. Fishery products' carbohydrates, which usually take the form of glycogen, lack fiber. One to eight percent of shellfish contain glycogen[11]. This could be as a result of a number of characteristics, including age, digested food, metabolic rate, movement rate, and gonad development level, which vary from one clam to another[12]. The best method for measuring carbohydrate levels is the Luff Schoorl method, which is more widely used and has a 10% measurement error. It is also more convenient and affordable. The pH of the solution must be carefully considered when

evaluating carbohydrates using the Luff-Schoorl method since a pH that is too low (too acidic) can result in a titration result that is greater than it actually is because of the oxidation reaction of iodide ions to iodine. The titration result will be lower than it actually is if the pH is too high (too alkaline), as there is a possibility of inaccuracy due to the hydrolysis of iodine when it reacts with water at high pH levels[13].

The presence of fat was determined through experimental analysis utilizing the hydrolysis method on *Anadara granosa* and *Paphia undulata*. Table 1 demonstrates that the average fat content of *Anadara granosa* is higher than that of *Paphia undulata*. *Anadara granosa* and *Paphia undulata* both had average fat contents of 1.03 percent and 1.09 percent, respectively. 0 to 2 percent Meanwhile, Nurjanah et al. (2005) found that the fat level in *Anadara granosa* was 2.50 percent based on their research findings. It is claimed that this fat content is high because of variations in the environment, sex, age, and fishing season. Due to energy-intensive activities like eating and moving around, the fat content is relatively high. However, the variation in fat levels depends on the harvesting age and the organism's metabolic rate. Understanding of the physiological characteristics of animals that will enter the breeding phase, fat will grow with age. Between species and even within a single species, there might be differences in the nutritional makeup of shellfish[12]. A Soxhlet device is used as a fat solvent extractant in the hydrolysis method (Weibull), one of the techniques for determining the amount of fat in meals. Food ingredients that will have their fat content measured are cut into bits after being isolated from non-edible components like skin and others. Following the destruction of the food item with 25% chloride acid and the addition of water for extraction in the Soxhlet device, the food material is mashed or chopped into small pieces. Heating was used to extract various materials over the course of several hours. It is possible to compute the ratio of fat or residue to the weight of the raw ingredients in the processed food or sample, and the fat content of the ingredient is given in grams percent[14]–[16].

Based on table 1, it is clear that *Anadara granosa* and *Paphia undulata* have average water contents of 80.22 percent and 78.83 percent, respectively. On the other hand, *Anadara granosa* and *Paphia undulata* had ash contents of 3.21 and 2.68 percent, respectively. These findings do not significantly differ from those of earlier investigations. According to Nurjanah et al. (2005), wet shellfish that had not been processed had a water content of 74.37 percent and an ash content of 2.24 percent, whereas shellfish that had been processed—such as by boiling—had a lower water content.

A dietary item has a higher chance of being harmed by invasive bacteria or internal biological activity (metabolism) the more water it contains. Since water is one of the ingredients microbes require to grow, the amount of moisture in an item might determine how long it will last[17]. This occurs as a result of the higher respiration rate and greater yield of free water creation brought on by the enhanced activity of microbes in Anadara granosa and Paphia undulata during storage[2], [14], [18].

The amount of minerals in a substance affects how much total ash is present. Foods are made up of water and inorganic components to a 96 percent ratio. Ash content reveals a food ingredient's overall mineral concentration. The target of ash content analysis is to identify the non-volatile (inorganic or mineral salts) substances that are left over after organic chemicals burn and ignite[19]. The quality of food decreases with increasing ash concentration. A material's purity is higher the less ash it contains. A material's high or low ash concentration can result from a variety of factors, including the mineral composition of the raw material's source. The ability of each clam to store minerals from its environment varies, which is one of the reasons why Anadara granosa and Paphia undulata have varying ash content levels. Since mussels often eat as deposit feeders and filter feeders, the ash content of large mussels was generally higher than that of small scallops. This suggests that larger mussels have a stronger ability to store or absorb minerals from their environment[2], [11], [18].

3. Conclusion

In conclusion, the present study shows the potential of *Anadara granosa* and *Paphia undulata* as useful sources of nutritional components. *Anadara granosa* and *Paphia undulata* are potential sources of functional foods in response to the rising global demand for food. It is advised to examine the bioactive molecule from those two clams, such as protein bioactive, for further research because its high protein content.

4. Acknowledgements

5. Conflict of Interest

Competing interests: No relevant disclosures.

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