

Composition of Nutritional Content of Sea Cucumbers (*Holothuroidea*) in Mania Waters, Sabu Raijua Regency, East Nusa Tenggara

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Abstract

Sea cucumber having commercial value more than chimoderms group because nutrition composition of sea cucumber is high then demand from world market will sea cucumber increase every year. The purpose of this research i.e., know nutrition composition as an effort to request to need to animal protein community at Mania Sabu Raijua. Methods used is quantitative with quadrant transect and proximate analyzed. The results show that the average ingredients value nutrition of fresh sea cucumber as: the protein (21% to 44.07%), fat (1.01% to 1.19%), carbohydrate (0.5% to 2.34%), ash (2.01% to 3.07%) and water (76.03% to 79.43%).

Keywords: Protein; Fat; Carbohydrate; Ash; Water; Sea cucumber

Introduction

Aquatic marine, brackish and fresh water have huge potential in providing a source of food for humans. Waters are the habitat of various animals and plants that have their own defined roles and functions in these waters.

Indonesia is an archipelago with diverse and varied aquatic biological resources, so it is known as a mega biodiversity country. One of the marine products considered to have an important economic value and widely used as food and non-food resources is sea cucumbers. Several species of sea cucumbers have been known to be edible and highly nutritious [1] stated that sea cucumbers are a source of potential bio far and a raw material for various food industries.

Several species of sea cucumbers have been known to be edible because they contain high nutrition [2,3] reported that the nutritional contents of sea cucumbers include protein content (4.7% to 11.52%), fat (0.03% to 03%), water (76.94% to 90.81%), and ash (0.95% to 3.4%). Salarzadeh [4] reported the proximate compositions of fresh sea cucumbers (*H. parva* and *H. Arenicola*) are protein content (2.5% to 13.8%), fat (0.1% to 0.9%), carbohydrates (from 0% to 2.2%), water (82% to 92.6%), and ash (1.5% to 4:35%). Meanwhile Azam and Singh [5] described the nutrient contents of dried sea cucumbers (*H. scabra*) which include protein (61% to 70%), fat (2% to 3%), carbohydrates (2% to 3%), and water (16% to 24%) and ash (2% to 6%). Based on the observations and interviews with residents, it was found that there has been the cultivation of sea cucumbers as a delicious meal [6].

In regard to the large cultivation of sea cucumbers, it is necessary to carefully examine the composition of nitrate, phosphate, as well as the nutrient content to meet the needs of animal protein of society and the needs of export; therefore, the analysis of the nutrient content of sea cucumbers is greatly needed. Thus, this study aims to examine the chemical parameters and the nutrient content of sea cucumbers in the Sabu Raijua waters.

Research Methods

Time and research location

This research was conducted from July to August 2014. The research location was in Mania waters, Sabu waters, Sabu Raijua Regency. The study was conducted at the laboratory of the faculty of marine and fisheries, Undana and Laboratory of Biochemistry and Chemistry, Politeknik Negeri Kupang.

Materials and equipment

Materials used were 8 species of sea cucumbers collected from the waters of Mania, Sabu Raijua Regency, from July to August 2014, with a body weight of sea cucumbers of 200 to 450 grams/tail. Preparation of the samples: the internal organs and water samples of sea cucumbers were removed and the meat of sea cucumbers was taken of 50 g to 100 g with a length of 10 cm to 15 cm to be analyzed for its nutritional content. The meat of sea cucumbers to be analyzed was washed using running water, then was cut small along 0.5 cm to 1.0 cm, was inserted into the freezer at a temperature of 10°C for 12 hours, and was vacuum dried at a temperature of 30°C for 72 hours. Chemicals and tools used to analyze of the nutrients of the total protein were NaOH, CuSO₄, and Potassium Nitrate using Kjeldahl method, as shown in Table 1.

Carbohydrate content by difference, soxhlet method fat content, ash content methods [7], and water content [7], spectrophotometric (At ug/l).

Analysis of the nutritional content of sea cucumbers (*Holothuroidea*)

Analysis of the nutritional content of 8 kinds of fresh sea cucumbers is shown in Figure 1.

Results and Discussion

Sea cucumbers (*Holothuroidea*) are a highly nutritious food, but little is known about their nutrient content. Based on the results of the proximate analysis of 8 fresh sea cucumber species found in Mania waters, Sabu Raijua Regency, the content of nutrients consisted of protein (39.08%), fat (1.12%), carbohydrate (1.34%), ash (2.42%) and water (78.10%). The species of the sea cucumbers are shown in Table 2.

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Parameter	Materials	Tools
Sample	Sea Cucumbers (200-450 gr)	
Protein	Potassium Sulfate	Kjeldahl pumpkin
	Hg ₂ O	Destillor
	Sulfuric acid	Fume hood
	Zn Plate	Erlenmeyer
	Sodium Hidrokarnon Solution	Test tube
	Ethanol 95%	Measuring cup Buret Refrigerator
Fat	Hexane fat (fat solvent)	Filter paper
		Condenser
		Pumpkin fat
		Soxhlet
Carbohydrate	Ethanol 80%	Filter paper Erlenmeyer
	Ether	
	Alcohol 10% distilled water	
	HCl 25%	
	45% NaOH	

Table 1: Materials and tools used to analyze the nutrient content of sea cucumbers in Menia waters, Sabu Raijua Regency.

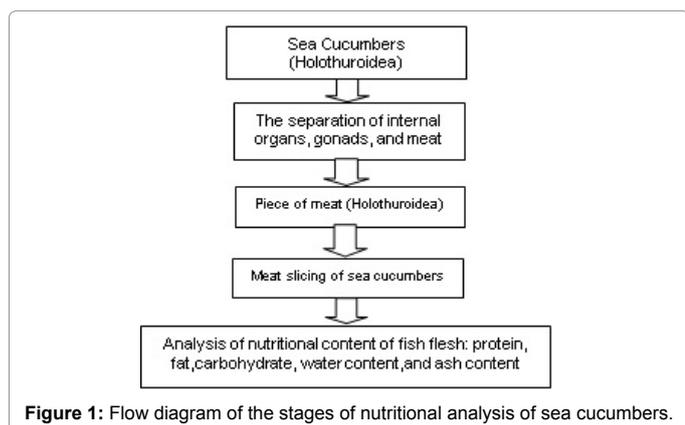


Figure 1: Flow diagram of the stages of nutritional analysis of sea cucumbers.

Species	Nutritional content				
	Protein	Fat	Carbohydrate	Ash	Water
<i>Holothuria nobilis</i>	42.54	1.09	0.56	2.39	76.05
<i>Holothuria scabra</i>	44.07	1.02	0.45	2.01	76.03
<i>Holothuria atra</i>	42.32	1.12	0.87	2.38	78.34
<i>Holothuria edulis</i>	41.61	1.08	1.14	2.47	78.16
<i>Holothuria impatiens</i>	39.94	1.12	1.37	2.16	78.41
<i>Holothuria leucospilota</i>	39.87	1.14	2.12	2.43	79.11
<i>Actinopyga lecanora</i>	31.11	1.14	2.31	2.35	79.24
<i>Bahaschia argus</i>	31.18	1.19	1.89	3.07	79.43
Average	39.08	1.12	1.34	2.42	78.10

Table 2: The content of nutrients of sea cucumbers found in Sabu Raijua waters (% bb).

Table 1 shows the average value of the content of nutrients of fresh sea cucumbers found in Sabu Raijua waters, which were, protein (21% to 44.07%); fat (1.01% to 1.19%); carbohydrates (0.45% to 2.34%), ash (2.01% to 3.07%) and water (76.03% to 79.43%). The range of the average value of the content of nutrients of 8 species of fresh sea cucumbers (*Holothuroidea*) in Sabu Raijua waters was relatively high. The results

of nutritional analysis in this study were in line with [4] results that the nutritional content of fresh sea cucumbers varied (the protein 2.5% to 13.8%, 0.1% to 0.9% fat, carbohydrates 0.2% to 2%, ash 1.5% to 4.35% and water 82% to 92.6%). Omran reported that the nutrient content of sea cucumbers included proteins from 43.24 to 48.27%, fat 4.60% to 5.66%, carbohydrates 44.62% to 48.65%, ash 2.12% to 6.03%, water from 81.41% to 85.76%, and ash 0.4% to 0.60%. Ozer et al. stated that the nutritional content of fresh sea cucumbers composed of 5.78% to 9.53% protein, 0.17% to 0.37% fat, 3.59% 11.06 ash, and 84,45% to 87,21% water. Wen et al. [8] explained that the chemical composition and nutrition of sea cucumbers are in the range of 40.7-63.3%. Meanwhile, Azam [5] reported that the nutritional contents of dried sea cucumbers were protein from 11.27% to 12.29%, and fat 2.07% to 3.46%. From research and other journals on nutrient content of sea cucumbers, it was found that the nutritional content of sea cucumbers varies from one location to another location. This is likely caused by environmental factors, season, location, type and size. As described by Chukwu [9], the nutritional composition of fresh cucumbers depends on the species, seasonal variations, handling and feeds. Therefore, it is important to analyze and study the nutritional composition (biochemistry) from sea cucumber species in every location, by also considering the handling procedures of sea cucumbers.

Levels of protein content of sea cucumbers (*Holothuridea*)

The protein content of sea cucumbers in Sabu Rajia waters was relatively higher, that is, 39.08% compared to that described by Karnila et al. [1] who stated that the average level of sea cucumber protein was of 9.94%. Protein content of sea cucumbers in marine waters of Sabu Raijua was higher than that from fish *Oreochomis niloticus* (23.23%), and catfish *Clarias gariepinus* (20%) [10,11]. Meanwhile, Ridzwan et al. [8] reported that the protein content of commercial sea cucumbers was approximately 40.7% to 63.3%. Chen explained that the protein content of dried sea cucumbers reached 83% and could be sold as a supplement in the form of tablets or capsules. Protein is very important in considering the quality of the meat and the texture of aquatic organisms [12,13]. An aquatic organism with is the low level of protein content tends to quickly lose water as well as the texture of meat, especially when cooked [4,14,15]. Based on the results of the analysis of some researchers and journals, the nutritional composition of sea cucumbers varies. This is due to environmental factors, season, place, area, type, and weight. This is in accordance with the statement by [4] that the chemical composition of sea cucumbers may vary according to climatic conditions, geographical location, behavior and handling procedures. Furthermore, Karnila [1] explained that the functions of proteins in the body are as food reserves, builder substances and regulating substances such as enzymes and antibodies [9]. The protein content of aquatic organisms is very important to note because in the texture and muscle of aquatic organisms the protein in small quantities tend to be lost when cooked. It is important to study the chemical composition of organisms of the marine environment such as sea cucumbers of various areas and regions.

Levels of fat content of sea cucumbers (*Holothuridea*)

Based on analysis of the fat content of flesh of sea cucumbers in Sabu Raijua waters, the fat level was 1.01% to 1.19%. This result was still in line with the one reported by Dewi [12] stating that the fat content of sea cucumbers was about 1.7% to 2.31%. Ridzwan et al. reported that sea cucumbers fat content was about 0.99% to 1.55%. The result was higher than that reported by Salarzadeh et al. [4] who found sea cucumbers' fat content was of about 0.1% to 0.9%. Wen et al. reported that sea cucumbers fat content was of 0.3%. These differences can be caused by

many factors such as water conditions, season, geography, behavior, handling procedures, and the food eaten by the sea cucumbers [4].

Chukwu and Adeniyi et al. reported a lower fat content of sea cucumbers when compared to fat in the meat of Nile tilapia (*Oreochromis niloticus*) amounted to 12.85% and catfish (*Clarias gariepinus*) of 13.86% and Salmon of 10%. Fat is one of the main ingredients in the food, which is one source of energy that contains essential fats. Fat components play an important role to determine the physical characteristics of the food such as aroma, texture, taste and appearance. If the fat is removed, one of the physical characteristics is lost [16,17]. Fat is a nutrient that is essential for our body. Fat has many important functions, among others, as a source of energy, lubricating joints, flavor to food and other essential functions. Therefore, the presence of fat levels in a food needs to be considered because apart from its important functions and other functional functions for the body, fat also has negative effects if excessive. Ali et al. stated that the average fat content of sea cucumbers' meat was 1.12%. The fat content of meat of fresh sea cucumbers composed of saturated fatty acids and unsaturated fatty acids. Fredalina et al. stated the dominant constituent of fatty acids of sea cucumbers was EPA s (25.69%), oleic (21.98%), DHA (57.88%), and linolenic acid (12.59%). Sea cucumbers also contained fatty acids linolenic of 0.119% and arachidonic amounted to 0.128%. According to Salarzadeh [4], fats of sea cucumbers were the main components on tissue repair and wound healing. Meanwhile, Ridzwan et al. explained that the total fat content of good sea cucumbers was lower than 2%. Toyamo and Tagaki reported that one of the characteristics of sea cucumbers was a low-fat content, while the fat content change of sea cucumbers depends on season, location, and geography. This condition indicates a superiority in the chemical content of meat of sea cucumbers as a healthy food because it contains omega 3 (linolenic acid, EPA and DHA) and omega 6 (linoleic and arachidonic).

Levels of ash content of sea cucumbers (*Holothuridea*)

The result of the analysis of the ash content of fresh sea cucumbers in Raijua Mania Sabu waters was 2.42%. The results of this analysis were in line with the one reported by Fechter [16] who found that the ash content of fresh sea cucumbers was 1.5% to 4.3%. These results show that the level of ash content was not too high, because the meat had been separated from the body skin of sea cucumbers. The sea cucumber skin is the body wall which consists of cuticles, a protective layer that is covered by the chalk and the thorns which are microscopic grains of chalk scattered in the epidermis. The results of several studies that measured the ash content by not releasing the meat of sea cucumbers from the skin showed a high ash content, which was 31.43% bb and 48.3% bb.

Conclusion

Overall, the results of the analysis of the nutrient contents (proximate) of fresh sea cucumbers' meat in Mania Sabu Raijua waters NTT concluded that sea cucumbers' meat had high nutrition containing the water content of 78.10%; protein of 39.08%; fat of 1.12%; KH of 1.34%; and ash of 2.42%. The nutrient content of food can be used as food, so as to increase the economic value of sea cucumbers.

Gratitude

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