STANDARDIZATION OF SIMPLICIA PINEAPPLE SEA CUCUMBER (*Thelenota ananas*) FROM PELAPIS ISLAND, WEST KALIMANTAN

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ABSTRACT

Standardization is an effort to improve product quality and safety. Standardization of pharmaceutical ingredients and drug formulations is a prerequisite for ensuring the reproducibility of drugs and therapeutic quality. With standardization, it is hoped that it can further increase trust in medicines derived from natural ingredients. Standardization of medicinal materials includes starting materials, intermediates, or finished products. Pineapple sea cucumber is one of the natural ingredients that can be used as raw material for herbal medicine. Protein is the main content of pineapple sea cucumber which is often used as an herbal medicine that can help the wound healing process. This study aims to standardize the simplicia of pineapple sea cucumber (*Thelenota ananas*) native to Pelapis Island, West Kalimantan. Standardization is based on physical, chemical, and microbiological parameters such as raw material requirements for standardized herbal medicines (OHT). The test is performed in the laboratory using the method according to SNI. The results of the Simplicia test of pineapple sea cucumbers from Pelapis Island, West Kalimantan, include water content of 9.46%, protein 59.8%, zinc 0.040 mg/kg, cadmium < 0.054 mg/kg, copper < 0.006 mg/kg, lead 0.001 mg/kg, mercury < 0.007 mg/kg, ALT 8.6 x 10^2 colonies/g, E.Coli < 3 APM/gr and Salmonella negative met the requirements.

Keywords: simplicia, pineapple sea cucumber, *Thelenota ananas*, standardization.

INTRODUCTION

Standardization according to American Herbal Product Association is definite information and control done to get the product with a consistent yield composition sustainable and secures the quality and benefits you get [1]. According to WHO Parameters, standardization is required for drugs and herbs, among others, standardization of organoleptic, microscopic standardization, standardization of physics, standardization of chemistry, and standardization of biology. Organoleptic standardization includes color, taste, texture, and smell. then microscopic standardization, physical standardization includes ash content, acid soluble ash rate, soluble juice rate water, ethanol soluble essence content, and humidity. Then standardized chemistry includes determining the fingerprint then standardization of biology includes microbial contaminants and mold numbers yeast and heavy metal limit tests. Everything has a standard value of each for each parameter standardization [2]. One of the medicinal ingredients that are commonly used in natural remedies is simplicia. To achieve a repeatable (reproducible) effect, simplicia needs to be standardized [3].

According to Yusron, the types of sea cucumbers included in the main category is the sand sea cucumber (H. scabra), black belly sea cucumber (H. atra), milk sea cucumber (H. nobilis), red

belly sea cucumber (H. edulis) and sea cucumber pineapple (T. ananas), while those belonging to in the moderate economic value category is sea cucumbers (A. lecanopra) and sea cucumbers Bilalo (A. mauritiana) belonging to the clan Actinopyga, other types are included low economic category. Sea cucumbers are organisms that occupy sandy substrate, is a deposit feeder that can eat anything that is on the bottom of the water such as detritus, sand particles, coral rubble, diatoms, blue algae filaments, red algae, flakes sea urchins, copepods, fish eggs, and some other microorganisms.[4] Sea cucumbers are food ingredients that contain enough nutrition. Sea cucumbers are an excellent source of protein [5]. The protein content in dried sea cucumbers is 82 g per 100 g with a high digestibility value. Of that amount, about 80% is in the form of collagen. Collagen serves as a connective tissue in the growth of bones and skin. In bone growth, calcium supplements alone are not enough because bones are composed of calcium phosphate and collagen. Without collagen, bones will become brittle and break easily. Sea cucumbers as a seafood product also contain omega-3 fatty acids the body needs. The omega-3 fatty acid is EPA (eicosapentanoic acid) and DHA (docohexaenoic acid). Both of these beneficial omega-3 fatty acids inhibit the aging process and lowers bad LDL and VLDL cholesterol in the body thereby reducing the risk of heart disease. EPA and DHA in sea cucumbers can also reduce blood viscosity, prevent blood clots and reduce the risk of occurrence of cardiovascular disorders. EPA and DHA are long-chain and double bonds that restore damaged tissue and improve the performance of the brain and eyes. Besides that, the content of essential fatty acids such as EPA and DHA also plays an important role as a wound healing agent and antithrombotic, namely to reduce blood clotting in blood vessels. This can reduce the risk of stroke and heart disease. Both acids above can also help slow down the process of cell degeneration as well as slow down the aging process. The efficacy of sea cucumbers to overcome heart disease is thought to be due to the acid content of docosahexanate (DHA) in sea cucumbers. Intake of DHA-the main fatty acid in sperm, brain, and retina of the eye-high can lower blood triglycerides and cause heart disease. Results other research shows that the efficacy of sea cucumbers Holothuria atra, H. scabra, and Bohadshia argus, kills the Streptococcus fecal bacteria, which causes swelling of the lining in the heart, and S. viridans, destroyer of heart valves. Relative content of eicosapentaenic acid (EPA) and docosahexaenic acid (DHA). high, at 25.69% and 3.69% respectively. Large EPA values indicate at which sea cucumber repairs damaged tissue and inhibits the formation of prostaglandins that cause inflammation tall. High levels of DHA, are the main fatty acid in sperm and the brain, as well as the retina of the eye. Intake of High DHA can lower blood triglycerides that cause heart disease. DHA deficiency causes a decrease in brain serotonin which triggers Alzheimer's disease and depression. Sea cucumbers can cure various diseases, especially their ability to heal cell regeneration and this is the main reason sea cucumbers are used to treat various diseases disease. Besides being able to regenerate cells, sea cucumbers are also rich in nutritional content.

Most of the active compound from antioxidants are very good for the repair of human body cells. Results studies show that sea cucumbers contain 86% protein that is easily broken down by the enzyme pepsin. Of that amount, about 80% is in the form of collagen. It's a network binder in bone and skin development. In bone growth, calcium supplements alone do not suffice, because bones consist of calcium phosphate and collagen as fillers. No collagen bones become brittle and break easily like glass. Conversely, without calcium, the bones will spring like rubber. It works by stimulating the body to secrete synovial fluid for lubrication joints. The results of other studies showed that 11 amino acids in sea cucumbers: myristic, palmitate, palmitoleate, stearate, oleate, linoleate, arachidonate, eicosapentaenoic, behenate, erucate, and docosahexaenoic. These fatty acids are thought to accelerate the healing of external and internal wounds. The benefits of collagen increase the regeneration of dead cells due to wounds speeding up healing. The research results show that these bacteria were shown to be inhibited in their growth after being given sea cucumber extract [6]. This study aims to standardize the Simplicia pineapple sea cucumber (*Thelenota ananas*) native to Pelapis Island in West Kalimantan. Standardization is based on

physical, chemical, and microbiological parameters such as raw material requirements for standardized herbal medicinal products (OHT).

METHODOLOGY

Materials

Tools used to make simplicia include scales, containers, knives, kitchen utensils, strainers, smoking tools, cutting boards, bamboo buckets, and jars. Testers for water, ash, and acid-insoluble ash are mixers, mesh no. 20, desiccator, analytical balance, oven, porcelain crucible, oven, and filter paper. Phytochemical screening tools include analytical balance, test tube, stir stick, filter paper, stainless steel spoon, measuring cup, beaker, water bath, and dropper.

Methods

Sample collection

Pineapple sea cucumber (*Thelenota ananas*) was obtained from the marine waters of Pelapis Island, Dusun Raya, RT 07, Pelapis Village, Karimata Islands District, North Kayong Regency, West Kalimantan.

Determination

Pineapple sea cucumber (*Thelenota ananas*) was determined by Department of Biology, Department of Mathematics and Science, Tanjungpura University, Pontianak, West Kalimantan.

Making simplicia

Wet sorting of freshly picked pineapple cucumbers. Pineapple sea cucumbers are cleaned by separating innards and dirt from the pulp and washing them with clean water. The pineapple sea cucumbers are then boiled, then smoked, and sun-dried [7]. The dried pineapple sea cucumbers are finely chopped. Sea cucumber pineapple slices are dried in the sun so they dry out and break easily. The simplicia dry type was then packaged and stored. Simplicia pineapple sea cucumber powder was used to test the physical, chemical, and microbiological parameters of simplicia. The powder was made by blending dried pineapple sea cucumber simplicia. The simplicia then sieved with mesh number 20.

Organoleptic

Organoleptic study of pineapple simplicia sea cucumbers including taste, color, smell, and shape using the five senses [8].

Parameters test

The phytochemical studies were conducted by sending samples to the chemistry lab at Pontianak University of Technology in West Kalimantan. Acid Insoluble Ash Test, Water Content, Ash Content, Protein, Total Fat, Cadmium (Cd), Iron (Fe), Zinc (Zn), Magnesium (Mg), Lead (Pb), Copper (Cu), Mercury (Hg), Escherichia coli (E coli), Total Platelet Count (ALT) and Salmonella

were performed by sending samples to the Laboratory of Industrial Testing and Standardization Institute (BARISTAN) Pontianak City, West Kalimantan.

RESULT AND DISCUSSION

Pineapple sea cucumbers caught in the sea are processed by local fishermen. The next step is to do wet sorting. The purpose of doing wet sorting is to sort out the good and the bad sea cucumbers. The sea cucumbers used are free from bad smells, clean, free from counterfeiting and spoilage characteristics, and free from other natural characteristics that affect the quality and safety of the products produced. From an organoleptic point of view, the good sea cucumbers used are characterized by an intact appearance, a clean and yellow color, a specific sea cucumber smell, and a firm, compact and elastic consistency [8]. The wet sea cucumbers were then weighed. The next stage is cleaning the sea cucumbers from their stomach contents and feces to reduce contamination of pathogenic bacteria and maintain the cleanliness of the sea cucumbers used. The purpose of removing the stomach contents is to prevent the sea cucumbers from rotting, as the stomach contents contain microorganisms that can cause sea cucumbers to rot. Next, the pineapple sea cucumbers are washed. Immediately after cleaning the sea cucumbers, cook until hard. Cooking aims to obtain a consistency that meets specifications (dense, hard, consistent, and compact) as well as to inactivate microorganisms and enzymes**.** The first cooking will make the sea cucumber meat tougher and make it easier to proceed to the next stage. The cooked sea cucumbers are then drained until little water runs out. Before drying, sea cucumbers are first smoked. The time needed for fumigation is 24 hours. Based on SNI 2732.3:2009, the purpose of smoking is to obtain sea cucumbers that have a water content of not more than 20% [7]. Pineapple sea cucumbers smoked is carried out over low heat and using racks with a height of 75-100 cm from the ground surface. Fumigation with low heat aims to prevent sea cucumber skin from hardening if exposed to a fire that is too hot. Hard sea cucumber skin will take a long time for the drying process. The sea cucumbers that have been obtained are not smoked for a long time, so the smell of the smoke didn't stick too much.

After going through the smoking process, the sea cucumbers are then dried for 4 days. Drying is done by spreading sea cucumbers over the clothesline. Based on SNI 2732.3:2009 this process aims to avoid mold growth during storage. The expected drying results are that they have a maximum moisture content of 20% and are free from pathogenic bacteria. Drying sea cucumbers is not done at high temperatures and not exposed to direct sunlight; the aim is to prevent the hardening of the sea cucumber skin. Sea cucumbers are dried at an ideal temperature of 34-35^{o}C. Drying at temperatures that exceed the ideal temperature causes the bodies of sea cucumbers to shrink due to too fast shrinkage. During the drying process, the body of the sea cucumbers must be turned over periodically so that they sea cucumbers can dry evenly. after drying, the sea cucumbers were collected and weighed, the weight of the sea cucumbers was 998 gram**s.** Sea cucumbers processed by Pelapis Island fishermen are then shipped to Pontianak. Shipping sea cucumbers from Pelapis to Pontianak took 2 days. Sea cucumbers, processed by fishermen from Pelapis Island, are then thinly sliced and cleaned off the dirt still clinging to the sea cucumber's inner wall. Sea cucumbers then enter the drying process. Sea cucumbers are dried by drying in the sun light for 3 days. The purpose of drying is to obtain a simplicia that does not deteriorate easily and has a long shelf life. This is because the drying process can reduce the moisture content of the simplicia to prevent enzymatic reactions that can damage the simplicia.

The dried sea cucumbers were then sorted dry to separate sea cucumbers that were dry and easy to break. The next process is weighing the simplicia of sea cucumbers. After that, store the simplicia in a tightly closed glass container and avoid direct sunlight. Simplicia must be stored in a dry place and protected from factors that can reduce the quality of simplicia such as insects, humidity, and rodents [7]. Simplisia powder is obtained by mixing it until it passes through mesh number 20.

Pineapple sea cucumber simplicia powder that passes mesh number 20 were sent to the Pontianak Industrial Research and Standardization Center.

Simplicia test results

Pineapple sea cucumber simplicia has a light brown color, a pronounced aroma, and a slightly salty taste. Based on the test results obtained from the Pontianak Industrial Research and Standardization Center, sea cucumber simplicia has a moisture content of 9.46%. The maximum water content requirement for simplicia is stipulated by SNI 2732.1-2009, which is 20%. Low water content inhibits enzymatic reactions and slows down the growth of microorganisms so that simplicia lasts longer [7]. The ash content indicates the mineral content of the pineapple sea cucumber simplicia**.** Test results from the Pontianak Industrial Research and Standardization Center showed that sea cucumber simplicia had an ash content of 23.8%. A high ash content indicates a high mineral content in the simplicia [7]. The body wall of sea cucumbers has auditory bones. The ossicles are made of calcium carbonate and are evenly distributed throughout the layers of the epidermis. Acid-insoluble ash values indicate the presence of acid-insoluble metal or mineral impurities in simplicia. Test results from the Pontianak Industrial Research and Standardization Center for acid-insoluble ash were 0.002%. High acid-insoluble ash content indicates the presence of silicates derived from soil, sand, and metals such as mercury and lead. The high protein content in sea cucumbers can play an important role in tissue regeneration in the wound healing process. Based on the test results obtained from the Pontianak Industrial Research and Standardization Center, the protein content of sea cucumber simplicia was 59.8%. Sea cucumbers contain 40.7-63% w/w protein in dry conditions and 2.5-13.8%/w protein in wet conditions. The total fat content of sea cucumber simplicia based on tests obtained from the Pontianak Industrial Research and Standardization Center is 1.7%. The fat content in sea cucumber simplicia is less than the average total fat contained in sea cucumbers.

Table 1. Results of Simplicia test of pineapple sea cucumber (*Thelenota ananas*) conducted at the Research and Industrial Standardization Center of Pontianak

Method	**Parameter**	**Test**
SNI 01 - 2891 - 1992	Water rate	9.46%
	Ash content	23.8%%
	Ash Insoluble in Acid	0.002%
	Protein	59.8%
	Total Fat	0.711%
SNI 01 - 2896 - 1998	Magnesium) (Mg)	0.054 mg/kg
	Iron (Fe	0.070 mg/kg
	Zinc (Zn)	0.040 mg/kg
	Cadmium (Cd)	0.001 mg/kg
	Copper (Cu)	0.006 mg/kg

	Lead (Pb)	0.001 mg/kg
	Mercury (Hg)	< 0.004 mg/kg
SNI-ISO 7218 : 2013, item 10.3 .	Total Colony Plate Number	8.0×10^2 /g
SNI 01 - 2897 - 1992, item 3	Escherichia Coli (E. Coli)	< 3 APM/gr
SNI 01 - 2897 - 1992, item 4	Salmonella	Negative Negative/25 gr

Sea cucumbers contain several types of minerals. Research by the Pontianak Center for Industrial Research and Standardization shows that the three minerals found in sea cucumbers contain three minerals, namely magnesium (Mg), iron (Fe), and zinc (Zn). The Mg content in sea cucumber simplicia is 0.054 mg/kg. Magnesium can speed up the healing process in the face of angiogenesis stimulation by triggering VEGF. Zn contained in sea cucumber simplicia is 0.040 mg/kg. Zn plays a role in the immune response, is an important cofactor for normal cell replication and growth, is involved in enzymatic reactions, and is a product of DNA polymerization in the wound healing process. The Fe contained in the pineapple sea cucumber is 0.070 mg/kg. The metal contamination levels of the pineapple sea cucumber simplicia tested at the Pontianak Industrial Research and Standardization Center were copper (Cu) 0.006 mg/kg, cadmium (Cd) 0.001 mg/kg, mercury (Hg) <0.004 mg/kg, and lead (Pb) 0.001 mg/kg. The limits for metal contamination are based on SNI 2732.1-2009, namely, Cu is a maximum of 20.0 mg/kg, Cd is 1.0 mg/kg, Hg is 5 mg/kg, and Pb is a maximum of 1.0 mg/kg. Based on these values, it can be concluded that the metal content in the tested pineapple sea cucumber simplicia met the specified metal contamination limit requirements. The results of the pineapple sea cucumber simplicia microbial contamination test conducted at the Pontianak Industrial Research and Standardization Center, namely Escherichia coli <; 3 APM/gr, (ALT) of 8.6 x 10 2 colonies/g, and Salmonella was negative. The requirements for dried sea cucumber microbial contamination are based on SNI 2732.1-2009, namely maximum Escherichia coli <; 3 APM/gr, ALT 1.0 x 105, and Salmonella negative (none). Based on the results obtained, it can be concluded that the pineapple sea cucumber simplicia tested met the specified microbial contamination requirements [9].

CONCLUSION

The results of the sample analysis indicate that it is indeed a pineapple sea cucumber (*Thelenota ananas*). The Simplicia test results for Pineapple Sea Cucumber include Water 9.46%, Protein 59.8%, Zinc 0.040 mg/kg, Cadmium <<0.coli < 3 APM/g and Salmonella negative met the requirements.

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CONFLICT OF INTEREST

The authors state no conflict of interest.

AUTHOR CONTRIBUTIONS

Each author contributed equally to designing of the study, collection of data, and drafting of the

manuscript.

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