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The Effect of Sea Cucumber Administration on Blood Pressure in Hypertensive Patients

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Abstract

Hypertension or high blood pressure is an increase in systolic blood pressure of more than 140 mmHg and diastolic blood pressure of more than 90 mmHg in two measurements with an interval of five minutes in a state of sufficient rest/calm. Knowing about the Effect of Sea Cucumber Flour on Blood Pressure in Hypertensive Patients in the Lajalubi Environment, Pasar Wajo Village, Buton Regency. The method used in the data collection method is observation. The population in this study is the entire community suffering from hypertension In the Lajalubi Environment, Pasarwajo Village, Buton Regency who visited in the last month was 102 people. The sampling technique uses purposive sampling with a sample of 15 people. The results of the study showed a p value < α, which was 0.000 < 0.05 which means H0 was rejected and Hα was accepted, so it was concluded that there was an effect of sea cucumber flour administration on blood pressure. The conclusion is that there is an effect of sea cucumber consumption on blood pressure in hypertensive patients in the Lajalubi Environment, Buton Regency in 2021. The suggestion is that the results of this study can be used as a reference for future research on hypertension using other independent variables.

Keywords: Sea Cucumber, Blood Pressure, Hypertension, Patients

Introduction

Hypertension or high blood pressure is an increase in systolic blood pressure of more than 140 mmHg and diastolic blood pressure of more than 90 mmHg in two measurements with an interval of five minutes in a state of sufficient rest/calm. Hypertension is still a serious health threat to people around the world. Hypertension that lasts for a long time (persistent) can cause damage to the kidneys (kidney failure), heart (coronary heart disease) and brain (causing stroke) if not detected early and get adequate treatment.

Nearly 1 billion people worldwide have high blood pressure. Hypertension is one of the leading causes of premature death worldwide. In 2020, around 1.56 billion adults will live with hypertension. Hypertension kills nearly 8 billion people annually in the world and nearly 1.5 million people annually in the Southeast Asian region. About one-third of adults in East and South Asia suffer from hypertension The World Health Organization (WHO) said that the number of people with hypertension will continue to increase along with the population increasing in 2025, it is estimated that around 29% of the world's citizens will be affected by hypertension [1].

WHO said that developing countries have 40% of people with hypertension while developed countries only 35%, the African region holds the top position of hypertension patients, which is 40%. The Americas region is 35% and Southeast Asia is 36%. The Asian region of the disease kills 1.5 million people annually.

The high prevalence of hypertension does not only occur in developed countries but also in developing countries such as Indonesia. Based on the results of Basic Health Research (RISKESDAS) in 2018, the prevalence rate of hypertension measured in the population aged ≥18 reached 34.1%, a sharp increase from 25.8% in 2013, with the highest prevalence rate in South Kalimantan Province at 44.1% and the lowest in Papua province at 22.2%. Gorontalo Province itself in the results of Riskesdas in 2013 reached 29.0% and in Riskesdas in 2018 it became 31.0% and was in 20th place out of 34 provinces [2].

Based on data from the results, the prevalence of hypertension at the age of 31-44 years (31.6%) from the age of 45-54 years amounted to (45.3%), at the age of 55-64 years amounted to 55.2%, at the age of 65-74 years amounted to (63.2%) and at the age of 75 years amounted to (69.5%) [3].

Southeast Sulawesi Health Profile in 2016 recorded a high incidence of hypertension. Based on data and information on blood pressure measurements diagnosed with hypertension/hypertension, the highest occurred in women, namely 21,006 people (34.47%) and the lowest in men as many as 10,811 people (50.32%), a total of 31,817 cases of hypertension for men and women (38.60%). This shows that hypertension cases are still high in Southeast Sulawesi. Meanwhile, the data on the data obtained at the Pasarwajo Health Center, Pasarwajo District, Buton Regency in 2018 showed that hypertension was typical of 121 people, 53 men and 68 women.

Many risk factors are the cause of hypertension. The risk factors that cause hypertension are divided into 2, namely risk factors that cannot be changed such as genetic factors, age and gender. And factors that can be changed such as obesity, lack of exercise or physical activity, stress, smoking, alcohol consumption, and salt consumption [4]. According to the Riskesdas results report in almost all provinces in Indonesia, consuming vegetables and fruits is relatively low and nationally consuming salty foods, smoking habits, lack of physical activity and stressor levels are still quite high in prevalence [5].

Treatment of hypertension consists of non-pharmacological and pharmacological therapies. Where for the provision of non-pharmacological therapy by doing a healthy lifestyle such as quitting smoking, losing excess weight, physical exercise, lowering salt intake, and increasing the intake of vegetables and fruits. Meanwhile, pharmacological therapy is carried out by administering antihypertensive drugs and herbal medicines. Where the use of herbal medicine for now is urgently needed and needs to be developed considering the increasing cost of treatment.

One of the uses of herbs is by consuming sea cucumbers. Sea cucumbers, also known as sea cucumbers, are invertebrates belonging to the Holothuridae and Stichopodidae families. Sea cucumbers have a protein content of 86.8%, collagen 80.0%, minerals, mucopolysaccharides, Glucasaminoglycans (GAGs), natural antiseptics, glucosamine and chondroitin, saponins, omega-3, 6, and 9, amino acids, lectins, vitamins and minerals, Gamapeptide (not found in other sea cucumber species), and about 50 other types of active ingredients. The ingredients contained in sea cucumbers are very suitable for health support.

Theoretical Concept

Sea Cucumber (Holothuria) is a type of marine life that is one of the sources of animal protein, and has long been consumed by people at home and abroad. Sea cucumbers are slow-moving animals, living on the bottom of sand, sandy mud, seagrass, algae and in the environment of live/dead coral reefs.

In the world there are 1200 species of sea cucumbers, of which 30 species are included in the Sea Cucumber group which can be taxonomically seen in Marine Species Identification. Of the approximately 650 species of sea cucumbers in the world, 10% are in Indonesia and of these numbers, here are 5 types that are classified as having a high selling value, namely: Black Sea Cucumber (Holothuria edulis), Koro Sea Cucumber (Holothuria nobilis), Pineapple Sea Cucumber (Thelonota ananas), Gamat Sea Cucumber (Stichopus noctivatus) and Sand Sea Cucumber (Holothuria scabra).

The availability of sea cucumbers that are quite abundant in Indonesia is a must that research on sea cucumbers as a functional food in Indonesia still needs to be developed when compared to foreign research. Research on the efficacy of sea cucumbers in Indonesia still tends to make sea cucumbers a vitality enhancer and antibacterial [6]. In general, the content possessed by sea cucumbers is the same but differs in the level of concentration according to the type. Sea cucumbers are one of the food sources that are full of nutrients because they have complete nutritional content, including carbohydrates, fatty acids, types of essential amino acids, vitamin components, sterols. and some mineral substances. Complete nutritional content (proximate) based on qualitative amount. Measurement of the nutritional content of dried sand sea cucumber meat (Holuthria scabra).

Proteins in the body of sea cucumbers can be in the form of food reserves, building substances and regulatory substances (enzymes, antibodies, etc.). Proteins in the form of enzymes found in sea cucumbers include alkaline protease, arginine kinase [7]. The content of sea cucumber active compounds also functions as antibacterial, antifungal, and anticoagulant [8]. Sea cucumbers have the ability to regenerate cells which is the main basis that sea cucumbers can heal wounds. Living in harsh environments often causes sea cucumbers' body walls to break or injuries to their organs. However, sea cucumbers can regenerate themselves within 10–90 days so that they are intact again. This is due to the presence of cell growth factor, which is able to stimulate regeneration for the recovery of damaged cells or body tissues. The high protein content of sea cucumbers can increase the regeneration of dead cells due to wounds so that they are able to heal wounds. In addition, protein can also function to strengthen the immune system and produce hormones and enzymes to promote metabolism [9].

Sea cucumbers contain 86% protein that is easily broken down by the enzyme pepsin. Of that amount, collagen is 80% of it and 37% is amino acid. That protein can be converted into value-added products through enzymatic hydrolysis, which is widely used to improve and enhance the nutritional properties of proteins. Conversion of sea cucumber protein into a product that has economic value, biomedical applications, and antioxidant properties from the hydrolysis of sea cucumber flour.

In addition, collagen components (connective tissue) that can potentially be converted into gelatin by boiling can also act as functional bioactive substances [10]. The protein content in sea cucumbers, especially collagen, can function to bind tissues in bone and joint growth, and the collagen in sea cucumber extract accelerates the healing of internal and external wounds after surgery such as due to cesarean section [11]. In bone growth, calcium, phosphate, and collagen supplements are needed as filling tissues, so without collagen bones will be brittle and easily broken. The calcium and phosphorus components make bones hard and stiff like cement. Meanwhile, collagen fibers make bones similar to steel wire on walls. Collagen along with chondroitin sulfate forms a new cartilage period, so it can reduce pain due to arthritis [12].

The active compound of sea cucumber which is a derivative of protein can also help heal wounds and cause anti-inflammatory effects is glycoside saponins. Saponins are a major holothurin substrate, which can stimulate cortical steroid secretion from the adrenal glands [13]. Holothurian is a toxin from sea cucumbers that functions as a defense mechanism for the sea cucumber's body from predators. Holothurin is secreted by a special gland called the kuvier. One of the main types of holothurine from sea cucumbers that is efficacious in wound healing, postpartum care and as an antifungal is saponins.

Saponins are produced as a form of chemical self-defense mechanism for sea cucumbers in nature. The compound is not only suspected to be used as self-defense from predators. Saponins are widely used because they have, biological effects, including as antifungal, cytotoxic against tumor cells, hemolysis, immune activity, antibacterial and anti-cancer [14]. Sea cucumbers are also known to have antinociceptive (pain reliever) and anti-inflammatory (reduce swelling) effects [15].

The fatty acid content found in sea cucumbers in general is myristic acid, palmitate, almitoleic acid, stearate, oleic acid, linoleic acid, arachsic, eicosapentaenate, behenate, erusate, and docosahexaenate. These fatty acids play an important role in the recovery of surgical wounds. The content of eicosapentaenic acid (EPA) and docosahexaenic acid (DHA) is relatively high, 25.69% and 3.69%, respectively.

High levels of EPA indicate the speed at which sea cucumbers repair damaged tissue. As reported, the content of important fatty acids such as EPA and DHA in sea cucumbers also plays an important role as an antithrombotic agent, namely to reduce blood clotting in the blood vessels. This can reduce the risk of stroke and heart disease. The two acids above can also help slow down the process of cell degeneration in addition to slowing down the aging process [16].

The bioactive ingredients in sea cucumbers also contain antioxidants that help lower the damage to cells and tissues of the body. Antioxidants are defined as compounds that are able to delay, slow or inhibit oxidation reactions. Antioxidants are a very potential group, having the ability to prevent the occurrence and reduce the level of skin damage [17].

Some of the following studies on the benefits of sea cucumbers show promising results in the world of health:

1. Maintaining heart health, Several studies have produced promising evidence regarding the benefits of sea cucumber for improving metabolic disorders that cause cardiovascular disease. A study of rats fed dried sea cucumbers, concluded that sea cucumber feeding led to a significant decrease in total cholesterol, triglycerides, and LDL cholesterol levels.
2. Some early studies found that compounds in sea cucumbers could potentially have anticancer effects. The evidence obtained is indeed new based on laboratory tests, but the initial results are considered quite promising. A study found that the compound Frondanol-A5P in sea cucumbers is beneficial to help treat pancreatic cancer. Tests on human pancreatic cancer cells show that sea cucumber extract can trigger apoptosis or cancer cell death.
3. Prevent infections in the gums and mouth, A study published in Marine Drugs said that sea cucumbers may be beneficial for preventing infections in the mouth caused by the fungus Candida albicans. This fungal infection in the mouth often attacks groups of people with low immunity. For example, the elderly (elderly), people with HIV/AIDS, or people who are undergoing chemotherapy treatment. Through the study, eight adults were given jelly containing sea cucumber extract. While the other nine adults were given a placebo jelly. After consuming the jelly for seven days, both groups of study participants underwent swabs in their mouths. As a result, the group that was given jelly with sea cucumber extract had a lower amount of Candida albicans in their mouths when compared to the group that took a placebo.
4. As an antimicrobial, A series of laboratory tests show that sea cucumber extract is able to inhibit the growth of E. coli, Aureus, and S. typhi bacteria. Trials in mice have even shown the potential of sea cucumber extract to help fight sepsis or bacterial infections that spread throughout the body's organs through the bloodstream.
5. Maintaining liver health, several animal studies have shown that sea cucumbers can improve liver health. One study found in the National Library of Medicine (NCBI) has proven that mice with high blood pressure fed white sea cucumber extract showed a significant decrease in blood pressure, compared to mice not fed extract. Mice with hepatorenal disease given a single dose of black sea cucumber extract also showed a decrease in oxidative stress and liver damage, as well as improved liver and kidney function.

Method

The design of this study uses a type of Quasi experimental research with the research design used is a one group pre test - post test design. The characteristics and types of this research are to reveal causal relationships by involving a group of subjects. The subject group was observed before the intervention, then observed again after the intervention. In this study, hypertensive patients were selected who began with observation of blood pressure (pretest), then were given the treatment of consuming sea cucumber capsules for 1 week every day for one time drink. After being given, another observation was made on blood pressure (posttest). The design in this study can be explained in the following scheme [18].

This research was carried out in the Lajalubi Environment, Pasarwajo Village, Buton Regency, Southeast Sulawesi Province. This research was carried out for approximately 4 months,

counting from the ongoing research process. Population is every subject that meets predetermined criteria [19].

The population in this study is all people who suffer from hypertension in the Lajalubi Environment, Pasarwajo Village, Buton Regency, Southeast Sulawesi Province. The number of patients who visited in the last month was 102 people.

The sample is the part of the population to be studied or part of the number of characteristics possessed by the population [20]. To determine the sample size if the subject is less than 100. If the subject is larger, it can be taken between 20-25%. In this study, the sample was some people with hypertension. In this study, the sample was some hypertension patients in One Lajalubi Neighborhood, Pasarwajo Village as many as 15 respondents.

Inclusion criteria are the general characteristics of the research subjects of a target population that are affordable and will be studied. Scientific considerations must be a guideline when determining inclusion criteria. The criteria in this study are: Respondents who suffer from hypertension, Willing to be respondents, Cooperative respondents (respondents who communicate easily), Not taking medication during the study. The exclusion criteria are the elimination or exclusion of subjects who meet the inclusion criteria from the study for various reasons. The exclusion criteria in this study are: Respondents resign to become respondents during the study, Respondents with emergency conditions.

Sampling is carried out by non-probability sampling with a purposive sampling technique, a sampling technique by selecting samples among the population according to the researcher's wishes, based on the researcher's inclusion criteria, so that the sample can represent the characteristics of the population that has been known previously. In the data of the Pasar Wajo Health Center for people with high blood pressure, Lajalubi Neighborhood, Pasar Wajo District, Buton Regency, there were 102 residents suffering from hypertension, the researcher took a sample of 32 respondents by determining based on the arikunto formula.

At this stage, the researcher must be able to determine or select the appropriate technology or instrument to measure these variables. In this regard, the process of selecting or developing measurement tools and methods that are suitable for the problem to be evaluated is called instrumentatio [21]. The tools (instruments) in this study used in this study are Sphygmomanometer and stethoscope for measuring blood pressure, observation sheet and capsules containing 0.5 grams of seaweed flour.

Data collection is a series of research activities that include recording events or information or characteristics of a part or all of the population that will support the research. The data collected included independent variables/independent variables, dependent variables/bound variables, basic data or auxiliary data related to respondents or research locations [22].

Data collection is carried out using a computer program, namely SPSS, through the following stages: Data collection will be carried out using a sphygmomanometer and stethoscope to measure blood pressure. The data used as a complement to the primary data related to the problem to be researched, are the data that will be taken from the Sangia Wambulu Health Center. According to Hidayat, (2014) after the questionnaire of the number of respondents was collected, data processing was carried out in the following ways: Editing, Coding, Scoring, Data Tabularization, Data Cleaning, Data Analysis.

Data analysis was carried out in the form of univariate analysis and bivariate analysis. Variable analysis is to find out and show the frequency distribution and percentage of each variable studied. Bivariate analysis is an analysis carried out on two variables that are suspected to be related or correlated. The analysis used was the Wilcoxon test and the Friedman test which were used to determine the difference in values before and after the sample was treated.. The analysis tests used to determine the difference between sea cucumber flour administration and the control and intervention groups were the Independent T-Test if the data was normally distributed and the Mann Whitney test when the data was not normally distributed. The results of the statistical test were obtained by comparing the ρ (p-value) value $\alpha = 0.05$.

However, if the data is not distributed normally, use the Wilcoxon test, which is a nonparametric test. The group is said to be homogeneous if the p-value > 0.05. Where the significance test is 0.05 or a confidence level of 95%. The calculation of the statistical test uses calculations with the computerized system SPSS 26.0.

Result

In this chapter, the results of the research on the Effect of Sea Cucumber Flour on Blood Pressure which was carried out in the Working Area of the Pasarwajo Health Center, Buton Regency on June 28, 2021 with 32 respondents. This presentation is divided into two, namely general data and special data. The general data contains the characteristics of 4 research variables, namely age, gender, marital status and occupation. In this section, it will be made in the form of a table and followed by an explanation or description of the table of research results. The special data presented was based on the results of variable measurements, namely blood pressure before and after giving sea cucumber flour to respondents. In this section, it will be made in the form of tablets and followed by an explanation or description of the tablets from the research.

Table 1: Distribution of Respondent Characteristics by Age

Age	Frequency (n)	Percentage (%)
Age 25-30 years	5	15,6
Age 31-40 years	8	25,1
Age 50 – 70 years old	19	59,3
Total	32	100,0

Based on table 1 above, it shows that of the 32 respondents, most of the respondents aged 25-30 years were 5 respondents with a percentage (15.6%), 19 respondents aged 31-40 years with a percentage (25.1%) and 50-70 years old as many as 8 respondents with a percentage (59.3%).

Table 2: Distribution of Respondent Characteristics by Gender

Gender	Frequency (n)	Percentage (%)
Man	11	34,3
Woman	121	65,7
Total	32	100,0

Based on table 2 above, it shows that of the 32 respondents, the male gender is 11 respondents with a percentage (34.3%) and the female gender is 21 respondents with a percentage (65.7%).

Table 3: Distribution of Respondent Characteristics Based on Marital Status

Gender	Frequency (n)	Percentage (%)
Man	11	34,3
Woman	121	65,7
Total	32	100,0

Based on table 3 above, it shows that of the 32 respondents, who are married or have a family, 22 respondents with a percentage (12.6%), Widow status as many as 4 respondents with a percentage (12.61%) and Widower status as many as 6 respondents with a percentage (15.6%).

Table 4: Distribution of Respondent Characteristics Based on Employment Status

Employment status	Frequency	Percentage %
Fisherman	10	31,2
Housewife	13	40,6
Government worker	9	28,1
Total	32	100,0

Based on table 4 above, it shows that of the 32 respondents, whose employment status is as a fisherman, 10 respondents with a percentage (31.2%), then as an housewife, as many as 13 respondents with a percentage (40.6%) and Government worker as many as 9 respondents with a percentage (28.1%). Bivariate analysis is an analysis of 2 (two) variables that aims to find out whether there is a relationship between independent variables and trirate variables (dependent).

Table 5: Mean Pretest and Posttest Values of Sea Cucumber Flour Administration on Blood Pressure in Hypertension Patients in the Lajalubi Environment, Buton Regency in 2021

	Pre-test	Post test
Mean	147,19	112,81
N	32	32
Deviation standard	8,884	8,126

Analysis: Table 5 shows that the average blood pressure from the first to the third day. The results of the pretest were 147.19 mmHg and the posttest was 112.81 mmHg, so it can be concluded that there has been a decrease in blood pressure.

Table 6: Systolic and Diastolic Pretest Posttest

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	Df	Mr.	Statistic	Df	Mr.
Pre_Test	,228	32	,000	,868	32	.001
Post_Test	,312	32	,000	,755	32	.000

Analysis: In the data normality test, a significant value of systolic and diastolic pretest of 0.001 and a systolic and diastolic posttest of .000 means that all p values < 0.05, so the distribution of data is abnormal so the statistical test uses Wilcoxon signed Rank.

Table 7: Hasil Uji Wilcoxon Signed Rank

Wilcoxon Signed Ranks Test					
	N	Mean Rank Rank	Sum	Z	P Value
Pretest-Posttest	32	16,50	528,00	- 4,985	,000
		,00	,00		

Analysis: Table 7 shows the p value of < α, which is 0.000 < 0.05 which means that H0 is rejected and Hα is accepted, so it is concluded that there is an effect of sea cucumber consumption on blood pressure in hypertensive patients in the Lajalubi Neighborhood, Buton Regency in 2021.

Discussion

The age group of respondents is <30 years old is 5 with (15.6%), then the age <40 years is 8 (25.1%) and the age <50 - 60 years is 19 people (59.3%). The age of 25_30 years has a risk of suffering from hypertension 1.23 times, the age of 30-40 years 2.22 times, and the age of 50-66 years 4.76 times (Prasetyaningrum, 2014). Susanto (2010), said that the increase in blood pressure is related to a decrease in the elasticity of arterial blood vessels. Data was obtained that the gender of the most respondents was female compared to male which was twice that of female (21 people (64.7%) and male (11 people (34.4). Prasetyaningrum (2014) explained that women are more at risk of hypertension than men at the age of less than 45 years, but at the age of 60 years and above women are more at risk of hypertension than men due to hormonal factors.

The characteristics of respondents based on job status were found that of the 32 respondents, whose employment status was as a fisherman, 10 respondents with a percentage (31.2%), then as IRT as many as 13 respondents with a percentage (40.6%) and civil servants as many as 9 respondents with a percentage (28.1%). Epidemiological research proves that there is a link between lack of physical activity and the incidence of hypertension [23]. According to the researchers' assumptions, people who are actively engaged tend to have stable blood pressure than people who are less active.

The above discussion is based on observations at the time of blood pressure research before being given sea cucumber flour, where most respondents experienced an increase in blood pressure because there are several factors such as gender, age, and occupation that can increase high blood pressure. Change in Average Blood Pressure of the 32 respondents and intervention had been carried out for 5 days, all respondents experienced a decrease in blood pressure. The average pressure for 5 days was 147.19 for the pretest and 112.81 for the posttest, so it can be concluded that there has been a decrease in the average blood pressure. The decrease in blood pressure is caused by the content of atioxidans in the form of glycosides in sea cucumbers which play a role in reducing lipid levels in the blood and cholesterol levels [24].

The results of the Wilcoxon test before and after sea cucumber consumption obtained p value results of 0.000 < 0.05 which means that H0 was rejected and Hα was accepted, so it was concluded that there was an effect of sea cucumber flour consumption on blood pressure in hypertensive patients in the Lajalubi Environment, Buton Regency in 2021.

So when viewed statistically in this study, there was a significant influence of the sea cucumber flour administration intervention given to lower blood pressure from respondents ranging from mild hypertension to severe hypertension. From this study, it was found that sea cucumber can be used as one of the non-pharmacological alternatives to reduce blood pressure in hypertensive patients in the community because there was a decrease in blood pressure in respondents in the Lajalubi Environment, Buton Regency who were given sea cucumber flour routinely for one week.

Consuming sea cucumbers has been practiced by the community for a long time because sea cucumbers are said to contain Apigenin which can prevent narrowing of blood vessels and Phthalides which can relax arterial muscles or relax blood vessels. It is this content that regulates blood flow that allows blood vessels to enlarge and reduce blood pressure. Therefore, sea cucumber flour can be used as an alternative option to lower blood pressure non-pharmacological methods.

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