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The Effect of Individual Characteristics on the Potential Event of Decompression in Traditional Divers in the Bajo Village, Boalemo Regency

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Abstract

One of the diseases experienced by traditional divers is decompression. This study aims to determine the effect of individual characteristics consisting of age, body mass index, and length of work of divers to the potential incidence of decompression in traditional divers in Bajo Village, Boalemo Regency. This research is a quantitative study with a cross-sectional design, with a total population of 69 people and all of them are made as the object of research (exhaustive sampling). Data is collected by conducting interviews, measuring the height and weight of divers. The instruments used were questionnaires, history sheets, height, and weight measurements. Data analysis using the Mann-Whitney test. The results of this study indicate that of 69 respondents, 41 people (59.4%) experienced symptoms of decompression disease both severe and mild. The results of data analysis showed that there was a significant influence between age and years of service on the potential incidence of decompression with a mann-whitney U value = 260 p = 0,000 (<0.05). and the value of mann-whitney U = 173 p = 0,000 (<0.05) while body mass index does not significantly influence the potential incidence of decompression in traditional divers in Bajo Village, Boalemo Regency with the value of mann-whitney U = 445.5 p = 0.116 (> 0.05). It is expected that traditional divers who have reached the age of early age and have a working period that is above the average of> 13 years in order to reduce their diving activities or can replace fishing with other methods of jam by diving.

Keywords: *Decompression; Individual Characteristics; Traditional Divers; Bajo Village*

Introduction

Diseases due to high air pressure and decompression are the most common health problems experienced by divers. High air pressure is experienced by divers because of being in a depth of the sea, while decompression occurs when the diver rises from a depth of the sea to the surface. When diving, the air pressure experienced by the diver rises as a result of the addition of water pressure as high as from the dive site to the surface of the water (Suma'mur., 2014).

There are about 7 million divers worldwide, various kinds of people do diving, some are done for recreational purposes and also for work. this dive work can cause a number of risks for divers such as decompression, barotrauma, toxic effects of hyperbaric gas, hypothermia, drowning, and being bitten by dangerous marine animals (Lee et al., 2013).

Health problems caused by decompression are often referred to as decompression sickness or Caisson disease or decompression disease. Decompression disease is a health disorder due to changes in ambient pressure in the body due to nitrogen accumulation when diving takes place. nerves (Saleh., 2014).

Air bubbles that form will block blood flow and the nervous system so that it will cause symptoms such as headaches, pain in the joints, itching, paralysis, numbness, which can even cause death. The incidence rate of decompression disease based on the Divers Alert Network (DAN) report on commercial dives was reported as many as 35.3 cases per 10,000 dives (Pollock et al., 2017). In addition, the incidence of Caisson Disease in the United States, for type II (severe) of 2.28 cases per 10,000 divers. and in Timilnadu India, there were 21 deaths due to diving within 2 years, namely in 2012 and 2013 (Raj et al., 2015).

In some areas in Indonesia there are also some people who work as traditional divers and they have the potential to experience decompression because dives are carried out without safe procedures. The results of research conducted in Karimun Jawa Jepara showed that from 2007 to 2013 there were 104 cases and there were 5 deaths, and the factors that influenced the incidence of decompression here were depth, duration of diving, and anemia. (Duke et al., 2017).

On the island of Barrang Lompo, South Sulawesi, research conducted on 47 people with decompression disease found that the risk factors that statistically influential with the incidence of decompression in traditional divers were how to rise to the surface and the working period of the divers, while the rest period did not affect statistically with the incidence of decompression in traditional divers. Multivariate analysis shows that tenure is the variable most at risk of decompression in traditional divers on Barrang Lompo Island (Wijaya et al., 2018).

Based on the research data above we can see that in Indonesia there are many cases of work-related diseases experienced by traditional divers. There may be more similar cases but they were not reported or have not been found. One example is in Boalemo District, Gorontalo Province, there is a village that we encounter a lot of traditional divers who use compressors, namely in Bajo Village.

In Bajo Village, we often find people who are disabled and paralyzed who might be the result of diving work. these divers if they experience health problems, some do not seek treatment at a health service facility, so there are no data recorded. It is not yet known what factors influence the incidence of decompression in divers in this village. Therefore, it is necessary to examine the influence of individual characteristics consisting of age, body mass index and length of work of divers to the potential incidence of decompression in traditional divers in Bajo Village, Boalemo Regency

Methodology

This type of research is an analytic survey using a cross-sectional study design. This research was conducted in Bajo Village, Boalemo Regency, Gorontalo Province. The population is all traditional divers who at that time were domiciled in Bajo Village, Boalemo Regency, and the whole population was used as the object of this study (exhaustive sampling) of 69 people.

Data collection was carried out through questionnaires, history sheets, and weight and height measurements. Data on symptoms of decompression are measured by history and physical examination by the examining physician, data on body mass index is measured by measuring height and weight then calculated using the body mass index formula, and data on age and length of service are asked through a questionnaire. Data collected were analyzed using the SPSS Computer application for windows 25. Univariate analysis was performed by presenting frequency distributions for dependent variables and descriptive statistics tables for independent variables consisting of the sum, range, maximum and minimum values, mean and standard deviation. While the bivariate analysis was analyzed using the mann-whitney test.

Results and Discussion

Frequency distribution

Table 1 Frequency distribution of symptoms of decompression disease of traditional divers in Bajo Village, Boalemo District

Variable	Category	Frequency	Percentage (%)
Symptoms of Decompression Disease	There are symptoms	41	59,4
	There are no symptoms	28	40,6
	Total	**69**	**100**

Source: Primary Data 2020

Table 1 shows that of the 69 divers, those who experienced symptoms of decompression disease both mild and severe symptoms were 41 people (59.4%) and those without symptoms of decompression were 28 people (40.6%).

Descriptive Statistics

Table 2 Descriptive Statistics of age, body mass index and working period of traditional divers in Bajo Village, Boalemo District

Variable	N	Range	Minimum	Maximum	Mean	Deviation Standard
Age	69	45	20	65	35.13	9.99
Body Mass Index	69	21.1	16.6	37.7	23.07	0.47
Working Period	69	34	1	35	13.14	9.10

Source: Primary Data 2020

Table 2. shows that of 69 divers, based on the age of traditional divers in Bajo Village, Boalemo District, the youngest is 20 years old and the oldest is 65 years old, with an average age of 35.13 years. Based on body mass index, the thinnest with a BMI of 16.6 and the fattest with a BMI of 37.7 with an

average BMI of 23.07. based on years of service, the most recent with a term of 1 year and the longest with a tenure of 35 years with an average tenure of 13.14 years.

Bivariate Analysis

Table 3 Effect of age, body mass index and years of service on the potential incidence of decompression in traditional divers in Bajo Village, Boalemo District

Variable	Decompression Symptoms	N	Mean Rank	Sum of Ranks	Statistical test results	
					Mann–whitney U	Asymp. sig
Age	There are symptoms	41	42.66	1749	260	0.000
	No symptoms	28	23.79	666		
	Total	**69**				
Body mass index	There are symptoms	41	38.13	1563.5	445.5	0.116
	No symptoms	28	30.41	851.50		
	Total	**69**				
Working period	There are symptoms	41	44.78	1836	173	0.000
	No symptoms	28	20.68	579		
	Total	**69**				

Source: Primary Data, 2020

Table 3. shows that from a total of 69 traditional divers in Bajo village, Boalemo district, based on the age of divers, those who experienced symptoms of decompression obtained a ranking of 1749 and those without symptoms of decompression obtained a number of 666 with the results of mann-whitney test getting 260 results with p-value = 0.000 (<0.05) this indicates that there is a significant age difference between divers who experience symptoms of decompression with those who do not experience symptoms of decompression. Thus, it can be concluded that there is an influence of age of divers with the potential incidence of decompression in traditional divers in Bajo Village, Boalemo Regency.

Based on body mass index, from a total of 69 traditional divers in Bajo Village, Boalemo district, divers who experienced symptoms of decompression obtained a ranking of 1563.5 and those who did not experience decompression symptoms obtained a ranking of 851.50 with the results of the mann-whitney test getting 445.5 results with a value of p = 0.116 (> 0.05) this indicates that there is no significant difference between divers who experience symptoms of decompression with those who do not experience symptoms of decompression. Thus, it can be concluded that there is no influence between body mass index on the potential incidence of decompression in traditional divers in Bajo Village, Boalemo District.

Based on years of service, from a total of 69 traditional divers in Bajo Village, Boalemo District, divers who experienced symptoms of decompression obtained a ranking of 1836 and those without symptoms of decompression obtained 579 ranking with the results of the mann-whitney test obtained 173 results with a value of p = 0,000 (<0.05) this indicates that there is a significant difference between divers who experience symptoms of decompression disease and those who do not experience symptoms of decompression. Thus, it can be concluded that there is an influence between the working period of the diver on the potential incidence of decompression in traditional divers in Bajo Village, Boalemo Regency.

The results of this study indicate that there are significant differences in the age of divers between divers who experience symptoms of decompression disease and those who do not experience symptoms of decompression. So it can be concluded that there is an influence of age on the potential incidence of decompression in traditional divers in Bajo Village, Boalemo Regency.

Previous research that is in line with this is a study conducted in Konawe Regency Saponda by (Jusmawati., 2016). the age of a diver is very influential on one's health because age is a picture of one's physical health. a young age is not ready for his organs and emotional maturity to accept a heavy workload so it is risky to do work that is not in accordance with its portion.

Other studies that are in line with this research are those conducted by Linggayani & Ramadhian (2018) which states that risk factors for decompression are age, ambient temperature, duration of diving, speed rises to the surface after diving, as well as a history of previous respiratory disorders. However, there are different studies which state that there is no significant relationship between age and interference caused by diving in traditional divers in Karimun Jawa Jepara (Rahmadayanti et al., 2017)

The results of this study also showed that there was no significant difference in body mass index between divers who experienced symptoms of decompression disease and those who did not experience symptoms of decompression. Thus, it can be concluded that there is no influence of body mass index with the potential incidence of decompression in traditional divers in Bajo Village, Boalemo District. This is in line with previous research conducted in Jepara Java which stated that there was no relationship between body mass index and interference caused by diving (Rahmadayanti et al., 2017)

This contrasts with the theory that nitrogen gas dissolves more easily in fat compared to water in body tissues, so that if the percentage of fat in the tissues or organs of the body is greater than water it will increase the risk of decompression. Nitrogen is 5 times more soluble in fat than in water (Mitchell, 2005) obesity or fat dives affect the ventilation space of the lungs because during the process of contraction and diaphragm opening, especially in the process of abdominal breathing, there is no maximum ventilation space because the diagram opening is blocked by fat deposits in the body so that the vital lung capacity decreases markedly.

People with a body mass index of more than 25 to 27 are included in the overweight category and more than 27 are included in the obesity category. being overweight and obese indicates the amount of fat in the body's tissues is also excessive. The possibility that makes the results of this study contradict the theories is due to the inadequate number of respondents and the majority have a normal body mass index so that the results of the bivariate analysis between the incidence of decompression with body mass index the difference is not significant.

Another thing that might cause the body mass index does not significantly influence the potential incidence of decompression disease is because the measurement of BMI is done now while some of the respondents have been exposed to symptoms of decompression a few years ago so that there may have been a drastic weight loss.

The results of this study also showed that there were significant differences in the working period between divers who experienced symptoms of decompression and those who did not experience symptoms of decompression. so it can be concluded that there is an influence of work period on the potential occurrence of decompression in traditional divers in Bajo Village, Boalemo District. The longer a person works as a diver, the greater the person's potential for decompression, because the exposure received is also greater.

This research is in line with what was done by (Wijaya., 2018) which states that the working period of a diver is the most influential risk factor for the incidence of decompression, which is 3.9 times, where the working period variable is controlled by other variables namely the depth of diving, diving frequency, and duration of diving.

Other studies that are also in line with this research are those conducted by (Alaydrus., 2014). the study states that the longer a person works as a diver, the greater the risk of decompression. Because the longer a person is exposed to differences in pressure that causes a loss of efficiency and productivity of work, then the risk for suffering from decompression is even greater.

A long period of work can affect the length of time a person is exposed to risk factors at his workplace. Because the longer the divers do the diving activities, the greater the exposure or risk factors that are obtained in the environment. The longer a person is exposed to differences in pressure, the greater the risk of suffering from decompression (Embuai et al., 2020)

But it is different from research (Syamila., 2017). the results of his research stated that the length of service does not directly affect the incidence of decompression because in addition to the length of service can determine the length of time a person is exposed to risk factors, but long working periods can also provide more experience to divers. so the longer the diver works, the more experience and knowledge gained so that a diver who has worked for a long time is more careful and more attentive to the procedure of the diver.

Conclusion

Based on the results of this study, it can be concluded that there is an influence of individual characteristics namely age and length of work on the potential incidence of decompression in traditional divers in Bajo Village, Boalemo Regency. however, body mass index does not significantly influence the potential incidence of decompression in traditional divers in Bajo Village, Boalemo Regency. Thus, it is expected that traditional divers who have reached the age of early age (≥ 46 years) and work periods that are above the average ie> 13 years in order to reduce their diving activities or can be replaced with fishing activities by other means other than by how to dive.

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