



THE PROFILE OF VITAL LUNG CAPACITY ON UJUNG KULON NATIONAL PARK PROFESSIONAL DIVERS

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Abstract

This research aims to describe the profile of vital lung capacity of professional divers in Ujung Kulon National Park. This type of research is descriptive with a cross sectional approach. The research subjects in this study is all population of professional divers in Ujung Kulon National Park, totaling 24 people with varying age categories, ranging from 20-29 years, 30-39 years, 40-49 years, to 50-59 years. The data collection techniques in this research were carried out by interviewing, questionnaire, and lung vital capacity tests using spirometer. The data were analyzed by means of descriptive analytic. Based on the results of the spirometry test, it is known that only 12.5% of professional divers have FVC %pred, FEV1%pred and the FEV1 / FVC ratio are in the normal category, two people in the 30-39 year age range, and one person in the age range. 50-59 years. Another 87.5% experienced have restriction and obstruction symptoms. The degree of restriction and obstruction disturbance experienced by divers also varies according to age range category.

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INTRODUCTION

Diving is a sport that has a high risk due to air pressure when the body enters the water, the more the body enters the water, the greater the pressure. Some techniques such as Equalizing are the body's way of balancing it by channeling air from the airways through the Eustachian tubes. Professional divers must be familiar with this technique because besides having to master several diving techniques, they must also have a legally recognized license. A diver has a good vital lung capacity, of course it is very important, because at the time of diving will help a stable endurance. Oxygen (O₂) intake when the body is doing activities will help so that the muscles do not experience fatigue, this condition is of course very important if divers have good vital lung capacity.

Through the Decree of the Minister of Forestry Number: 284 / Kpts-II / 1992 dated February 26, 1992, Ujung Kulon was designated as the Ujung Kulon National Park with a total area of 122,956 Ha consisting of land area 78,619 Ha and waters 44,337 Ha. The professional divers of Ujung Kulon National Park have a very important task in preserving the environment, one of which is to carry out underwater conservation, with an area of 44,337 hectares of water and a member of 18 divers under the Department of Maritime Affairs. If divers have good vital lung capacity, it will greatly assist divers in carrying out their duties.

The vital capacity of the lungs can also be said to be the quality of the lungs, to have a good vital lung capacity is to

maintain lung function. Maintaining lung function, one of which is doing sports or regular physical activity, diving is an example of getting a good vital lung capacity. Zn, Amin, & Thufeilsyah (2014) explain that Vital Capacity (VC) is the maximum amount of air that can be exhaled after maximum inspiration: $VC = TV + IRV + ERV$ (Should be 80% of TLC). In adult males, the vital capacity of the lungs amounts to about 4800 ml.

Spirometry examination is an examination that aims to measure the individual static and dynamic lung volume using a device called a spirometer. Several types of simple electronic spirometer, such as the Spirometer Contect can measure precisely certain parameters related to Vital Capacity (VC), including Forced Vital Capacity (FVC), Forced Expiratory Volume 1 (FEV₁), FEV₁/ FVC Ratio, and Peak Expiratory Flow (PEF). According to Amin (2013) in Bakhtiar, Irviana, & Tantri (2017), the spirometer cannot make a specific diagnosis but can determine the presence of obstructive and restrictive disorders and can estimate the degree of abnormality.

Spirometry is a method for screening lung diseases that can also be used in determining chest strength and function, detecting various respiratory diseases, especially due to environmental pollution and cigarette smoke (Herman, 2016).

According to Zn, Amin, & Thufeilsyah (2014), normal lung function will show the results of FVC% pred > 80%, FEV₁% pred > 80%, and FEV₁ /

FVC > 70%. If the three values are less than these parameters, then lung function can be categorized as having impaired physiological function, either restriction, obstruction, or a combination of restriction-obstruction.

Based on the information obtained by the author, the divers in Ujung Kulon National Park do not yet know what the vital capacity of the lungs is like, with the smoking habit of divers as one of the factors that affect the vital capacity of the lungs to be bad. By using a vital lung capacity measuring instrument, namely Spirometry, the author wants to contribute which is useful for measuring the level of vital lung capacity of professional divers in Ujung Kulon National Park and then a vital lung capacity profile will be created for professional divers that can be used as learning and evaluation of professional divers.

METHODS

This research is a descriptive study using a cross sectional approach. Descriptive research is a research method that seeks to describe the object or subject under study in accordance with what it is, with the aim of systematically describing the facts and characteristics of the object under study accurately. In this case, descriptive research was carried out to systematically describe the facts and what they are according to the characteristics of the vital lung capacity of professional divers in Ujung Kulon National Park.

Participants

In this study, the subjects were all 24 professional divers in Ujung Kulon National Park, which was proven by a license or certification of diving expertise whose legality was recognized according to applicable regulations.

Sampling Procedures

This study uses several data collection techniques, including: 1) Observation, namely by direct observation to the research location to obtain information related to the research problem; 2) Interviews, namely by asking test participants directly with questions that have been prepared in advance in order to obtain actual information regarding the research problem; 3) Questionnaires (adapt by Arikunto, 2010), namely by means of test participants filling in the question posed by researchers who will serve as research respondents and as supporting data; and 4) Spirometry test, which is a test to measure the vital capacity of the lungs for divers. Spirometry test to measure the vital capacity of the lungs with a digital spirometer.

Design or Data Analysis

The data analysis technique is done by describing the research data that was successfully obtained from data collection, the next step is to analyze and describe the data so that the data can be drawn a conclusion. In this study, the statistical analysis used is a descriptive technique with a percentage to identify, describe and describe the profile of the vital lung capacity of professional divers

in Ujung Kulon National Park as it is without making generalized conclusions or generalizations (Sugiyono 2015: 207).

RESULT

Based on the results of the research in table 1, it can be seen that the majority of TNUK professional divers are in the 30-39 year age category, which is 11 people with a percentage of 46%, while the most are in the 20-29 year age category with a percentage of 4%. The youngest diver is 20 years old while the oldest is 59 years old.

The data in table 2 shows the average FEV1, FVC and FEV1 / FVC ratios based on age categories. The highest average value of FEV1 / FVC ratio is in the 30-39 year age category, which is 81.59% and the lowest is in the 50-59 year age category, which is 71.57%. The highest predictive value of FEV1% is in the 30-39 year age category, which is 71.76% and the lowest is in the 50-59 year age category, which is 55.29%. Meanwhile, the highest predictive value of FVC% was in the 40-49 year age category, namely 81.53% and the lowest was in the 50-59 year age category, which was 66.19%.

Based on the data in table 2, it can be seen that in all age categories, only the FEV1/ FVC ratio value is in the normal category, while the FVC% pred and FEV1% pred values are below the normal parameter values. This indicates a disruption of pulmonary function in divers. The 20-29 year age category had the highest FEV1 / FVC ratio value, followed by the 30-39 year old category,

40-49 year old category, and the lowest was the 50-59 year age category.

Based on table 3, it is known that only 12.5% of professional divers have FVC %pred, FEV1%pred and the FEV1 / FVC ratio are in the normal category, two people in the 30-39 year age range, and one people in the age range 50-59 years.

The data in Table 4 contain the mean distribution of the FVC% pred value, which shows the degree of restriction across all age categories. The data in these tables show that 100% of divers in the 20-29 year age category experience moderate restriction. In the 30-39 year age category, 50% of divers experience moderate restriction and 50% have moderate-severe restriction. As many as 50% of divers in the 40-49 year age category have mild restrictions, while the other 50% experience moderate-severe restrictions. In the 50-59 year age category, 60% of divers have moderate restrictions, and 40% experience severe restrictions.

Furthermore, the data in Table 5 contain the distribution of the mean FEV1% pred that indicates the degree of obstruction in various age categories. The data in these tables show that 100% of the divers in the 20-29 year age category have moderate obstruction. In the 30-39 year age category, 44.4% of divers had mild obstruction, 33.4% had moderate obstruction, 11.1% had moderate to severe obstruction, and 11.1% had severe obstruction. In the 40-49 year age category, 50% of divers have mild obstruction, and another 50% have moderate obstruction. Meanwhile, in the

50-59 year age category, 16.6% of divers had mild obstruction, 33.4% had moderate-severe obstruction, and 50% had severe obstruction.

Based on the data from the results of this study, it is known that the higher a person's age, the lower the FEV1 / FVC ratio value, as shown in table 2. According to Mawi (in Situmorang, 2014), the increasing age, the average value of FVC drop. Neil & David (2005) and Syaifuddin (2006) stated that age is one of the factors that influence lung function. The body can experience decreased lung function after the age of 30 years, where each year the surface area of the lungs will be reduced by 4%. Increasing age accompanied by poor environmental conditions and the possibility of suffering from a disease can increase the risk of decreased lung function. This is in line with the data listed in Table 4 regarding the degree of restriction, and Table 5 regarding the degree of obstruction experienced by divers by age category.

In addition, the results of a spirometric examination can also be used in determining chest strength and function, detecting various respiratory diseases, especially due to environmental pollution and cigarette smoke (Herman, 2016). This is evidenced by the results of interviews with the divers which showed that 87.5% or as many as 21 divers were active smokers.

Table 1. Percentage of TNUK Professional Divers by Age Category

Age (Year)	Frequency (n)	Percentage (%)
20-29	1	4
30-39	11	46
40-49	5	21

50-59	7	29
Total	24	100

Source: Primary data, 2020

Table 2. The Average Value of Vital Lung Capacity of TNUK Professional Divers by Age Category

Age	FEV1 (L)	FEV1		FVC (L)	FVC		FEV1 / FVC %
		PRED %	PRE D (L)		PRED (%)	PRED (L)	
20-29	2.51	63.67	3.94	3.08	66.33	4.64	81.38
30-39	2.83	71.76	3.94	3.66	78.94	4.64	81.59
40-49	2.82	71.60	3.94	3.78	81.53	4.64	78.45
50-59	2.18	55.29	3.94	3.07	66.14	4.64	71.57

Source: Primary data, 2020

Table 3. Distribution of Normal Lung Vital Capacity Values (FVC, FEV1, & FEV1 / FVC Ratio) for Professional TNUK Divers by Age Category

Age	Value % Pred FVC	Value % Pred FEV1	Ratio FEV1/ FVC	Frequency (n)	Percentage (%)
20-29	>80%	>80%	>70%	-	-
30-39	>80%	>80%	>70%	2	66.67%
40-49	>80%	>80%	>70%	-	-
50-59	>80%	>80%	>70%	1	33.33%
Total				3	100%

Source: Primary data, 2020

Table 4. Distribution of the % Pred FVC Value that Shows the Degree of Restriction by Age Category

Restriction Degree	Age (year)				Frequency (n)
	20-29	30-39	40-49	50-59	
Low	-	-	1	-	1
Medium	1	3	-	3	7
Medium High		3	1	-	4
High	-	-	-	2	2
Very High	-	-	-	-	-
Total	1	6	2	5	14

Source: Primary data, 2020

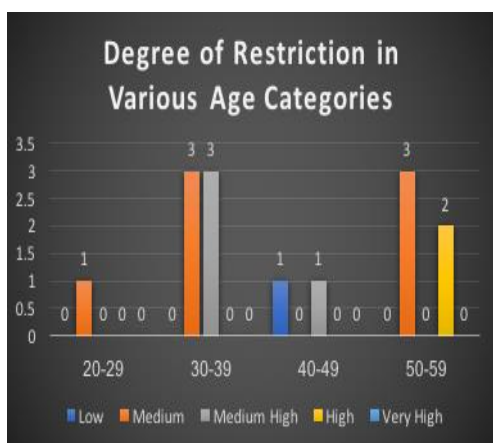


Fig 1. Degree of Restriction in Various Age Categories

Table 5. Distribution of the % Pred FEV1 Value that Shows the Degree of Obstruction by Age Category

Obstruction Degree	Age (year)				Frequency (n)
	20-29	30-39	40-49	50-59	
Low	-	4	2	1	7
Medium	1	3	2	-	6
Medium High	-	1	-	2	3
High	-	1	-	3	4
Very High	-	-	-	-	-
Total	1	9	4	6	20

Source: Primary data, 2020

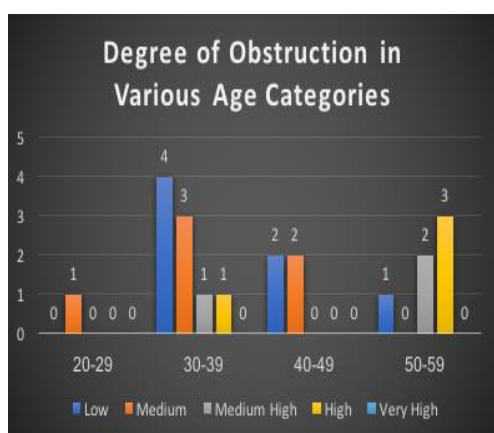


Fig 2. Degree of Obstruction in Various Age Categories

DISCUSSION

This research needs to be trial on a broader scale by considering several other variables such as length of time diving, physical fitness level, and daily activity patterns of divers, so that the results become more accurate.

CONCLUSION

The conclusions of the results of this study indicate that based on the results of the spirometry test, it is known that only 12.5% of professional divers have FVC% pred, FEV1% pred and the FEV1 / FVC ratio are in the normal category, namely two people in the 30-39 year age range, and one person in the 50-59 years age range. Another 87.5% experienced restriction and obstruction symptoms. The results of this study indicate that the higher the age of the diver, the lower the vital capacity of the lungs, both in terms of volume and vital function. In addition, a factor that may affect the decline in lung vitality is the smoking habit of divers. However, to get maximum or more accurate research results, it is necessary to do in-depth research related to this matter.

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