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The relationship between body mass index with quality of CPR compression in Nursing Students

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ABSTRAK

Latar Belakang: *Penyakit Jantung Koroner salah satu penyakit yang menyebabkan kematian terbanyak di Indonesia. Salah satu hal yang menyebabkan kematian dari penyakit jantung koroner adalah henti jantung. Salah satu pertolongan yang dapat diberikan adalah tindakan RJP (Resusitasi Jantung dan Paru). RJP dapat dilakukan oleh masyarakat awam atau petugas terlatih. Fenomena yang sering terjadi adalah ketika kompresi dilakukan, seringkali mahasiswa tidak optimal dalam memberikan kompresi dari segi kedalaman kompresi. Dampak RJP yang tidak berkualitas dapat menyebabkan kematian, ekonomi, psikologis, sosial, dan lama perawatan.*

Tujuan: *Untuk mengetahui hubungan Antara Indeks Massa Tubuh (IMT) dengan Kualitas Kompresi Resusitasi Jantung dan Paru pada Mahasiswa Keperawatan.*

Metode: *Penelitian ini menggunakan jenis penelitian deskriptif analitik, dengan metode observasional menggunakan desain cross sectional menggunakan total sampling sebanyak 46 responden.*

Hasil: *Berdasarkan hasil uji Exact Fisher didapatkan nilai p-value < α (0,001 < 0,05) sehingga ada hubungan IMT mahasiswa dengan kualitas kedalam kompresi. Kualitas kompresi dada perawat dalam melakukan kompresi dada kurang, meskipun beberapa perawat sudah pernah melakukan pelatihan resusitasi jantung paru. Seseorang yang memiliki BMI kategori tinggi dan rendah di Rumah Sakit, didapatkan data bahwa saat melakukan kompresi dada kepada pasien mengalami cepat lelah, BMI yang tinggi sulit untuk melakukan kompresi dada saat naik ke tempat tidur.*

Kesimpulan: *Indeks Masa Tubuh dapat meningkatkan kualitas kompresi mahasiswa dalam melakukan resusitasi jantung paru. IMT secara tidak langsung berperan penting dalam performa perawat agar memberikan resusitasi jantung paru yang optimal.*

KATA KUNCI*: indek masa tubuh; kompresi dada; resusitasi jantung dan paru*

ABSTRACT

Background: *Coronary Heart Disease is one of the diseases that causes the most deaths in Indonesia. One of the causes of death from coronary heart disease is cardiac arrest. One of the help that can be given is CPR (Cardiopulmonary Resuscitation). CPR can be performed by ordinary people or trained personnel. The phenomenon that often occurs is that when compression is performed, students are often not optimal in providing compression in terms of compression depth. The impact of poor quality CPR can cause death, economic, psychological, social, and length of treatment.*

Objectives: *This study aims to determine the relationship between Body Mass Index (BMI) and the Quality of Cardiac and Lung Resuscitation Compression in Nursing Students.*

Method: *This study uses a descriptive analytic research, with an observational method using a cross sectional design using a total sampling of 46 respondents. The instrument used in this study is a structured format developed by the researcher. The structured format*

contains a patient characteristics assessment format and an observation format containing height, weight, BMI, and depth at the time of compression.
Result: *Based on the results of Fisher's Exact test, p-value < (0.001 < 0.05) was obtained so that there was a relationship between student BMI and quality into compression. The quality of nurses' chest compressions in performing chest compressions is lacking, even though some nurses have had cardiopulmonary resuscitation training. Someone who has a high and low BMI in the hospital, it was found that when doing chest compressions the patient gets tired quickly, a high BMI is difficult to do chest compressions when getting into bed.*
Conclusion: *Body Mass Index can improve the quality of student compression in cardiopulmonary resuscitation. BMI indirectly plays an important role in the performance of nurses in order to provide optimal cardiopulmonary resuscitation.*

KEYWORD *: body mass index; compressions; cardiopulmonary resuscitation*

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INTRODUCTION

Cardiac arrest as a health problem that is always increasing in the last 15 years in the United States is coronary heart disease (CHD) (1). Data on the incidence of cardiac arrest in hospitals in Indonesia each year is not known with certainty (10). However, cardiac arrest data came from 144 hospitals in the United States with 22,628 cases with age > 16 years. The incidence of cardiac arrest is 53.7% in the intensive care unit (2).

Based on data from one of the hospitals in East Java, the biggest cause of cardiac arrest is Acute Coronary Syndrome (ACS). ACS cases in 2016 amounted to 160 cases, 8% of them were new cases, 24 cases of ACS experienced cardiac arrest and 10% ROSC. In 2017 the prevalence of ACS was 176 cases, 10% of new cases. ACS patients who experienced cardiac arrest in 26 cases and 10% ROSC. Cardiac arrest events have an impact on heart and brain damage within minutes, the success rate of cardiac arrest treatment depends on basic life support and advanced life support (3).

Cardiac arrest events require integrated Cardiopulmonary resuscitation (CPR), one of the crucial points in this chain is cardiopulmonary resuscitation (4). These competencies must not only be possessed by nurses but also nursing students as prospective professional nurses. Every nursing student is required to have the skills to handle cardiac arrest. The number of nursing students is quite large, most of their time is spent mingling in the community, giving them the opportunity to act as first responders in the case of Out of Hospital Cardiac Arrest (OHCA) in the community. Moreover, the student will practice in a hospital, so it is very important to be given an understanding of CPR when encountering an In Hospital Cardiac Arrest (IHCA) case.

The phenomenon in the field shows that students often give less than maximum emphasis. One student is different from other students. In performing compressions, of course, rely on muscle strength and the fulcrum of the body. The results of observations, more than 50% of students weighing less than 45 Kg showed less than optimal results. In contrast to male students who weigh more than 68 Kg, more often their chest compressions are too deep during compression which is at risk of thoracic

fracture. This is supported by Ardiansyah's research which states that there is a significant relationship between BMI and the quality of CPR compression (p=0.018; <0.05).

The weight of the nurse or student is one of the factors that determine the quality of CPR (5). The purpose of this study was to determine the relationship between Body Mass Index (BMI) and the Quality of Compression Cardiopulmonary Resuscitation in Nursing Students.

MATERIALS AND METHODS

This research was conducted in Banyumas in 2020. This study used a descriptive analytic research type, with an observational method using a cross sectional design. The sampling technique in this study used a total sampling of about 46 respondents. The researcher determined that this research for a certain period, from November to December 2020. Students who have attended Basic Trauma & Cardiac Life Support training until October are considered as sampled for this research. The analysis in this study used Fisher's Exact test.

The instrument used in this study is a structured format developed by the researcher. The structured format contains a patient characteristics assessment format and an observation format containing BMI and depth of compression. The depth of compression is obtained from the color indicator on the CPR mannequin. Before conducting the research, the researcher conducted an ethical test first through the Health Research Ethics Commission of the University of Muhammadiyah Purwokerto with the decision that this research was allowed to be carried out with the registration number KEPK/UMP/21/V/2021.

RESULTS AND DISSCUSSION

Based on the results of research conducted by researchers in Banyumas on January 2020, 46 responden, the results of the univariate analysis were as follows:

Based on **Table 1**, Characteristics of respondents based on gender showed that students were dominated by female students as many as 37 people (80.4%).

Table 1. Frequency distribution of respondents' characteristics by gender

Gender	F	Percentage
Male	37	80,4%
Female	9	19,6%
Total	46	100%

Based on **Table 2**, respondent are dominated in the category 18.5 – 22.9 as many as 23 students (50%), category <18.5 as many as 11 students (23.9%), category 23-24.9 as many as 10 students (21.7 %), category 25-29.9 as many as 1 student (2.2%), while students who have a BMI category >4 as many as 1 student (2.2%).

Table 2. Frequency Distribution of Respondents' Characteristics Based on BMI

Category BMI	F	Percentage
<18,50	11	23,9 %
18,5 – 22,9	23	50 %
23-24,9	10	21,7 %
25-29,9	1	2,2 %
>4	1	2,2 %
Total	46	100 %

Based on **Table 3**, The compression quality of students was dominated by 21 (45.7%), low depth of 6 students (13%), and appropriate depth of 19 (41.3%).

Table 3. Respondent's Compression Quality

Compression Quality	F	Percentage
Low	21	45,7 %
Middle	6	13 %
Appropriate Depth	19	41,3 %
Total	46	100 %

Based on **Table 4**, it was found that students who had a BMI <22.9 whose compression depth was less were 28 students (60.8%) more than students who had a BMI <22.9 but according to

the depth when doing compressions, as many as 7 students (15.2%) . Based on Fisher's Exact test, it was obtained with a p value = 0.000 less than = 0.05, which means that there is a relationship between student BMI and the quality of the compression depth of students when performing CPR.

Table 4. Result of Exact Fisher

BMI	Depth of Compression				Total		*p*-value
	Appropriate Depth		Low				
	N	%	N	%	N	%	
<22,9	7	12,9	28	22,1	35	35%	0,00
≥23	10	4,1	1	4,1	11	11%	
Total	17	36,9%	29	63,04	46	100	

DISSCUSSION

According to research by Finke et al., (2018) with a total of 339 respondents with the age of 12-14 years with details of the number of males 197 and females 142 it was found that the mistake made by women was that when performing chest compressions the depth was inadequate, 5-6 cm, 23% better than male students. In children aged 13 years, male students showed better compression accuracy than girls with P<0.0002 (6). According to Kordi et al., (2012) Skills in learning are very different between men and women. Women capture knowledge faster than men. Men's bodies are bigger than women's, so men are stronger at work. Men have greater arm muscle strength and better physical fitness than women. With greater muscle strength and good physique, they will have better activity in performing chest compressions (7).

The results of this study are in line with the research of Tomoki et al., (2014) in their research on the relationship between nurses' weight and the quality of chest compressions. . According to Field et al., (2016) The quality of chest compressions in adults includes a chest compression ratio of 30 compressions and 2 ventilations, a compression rate of 100–120 x/min, a compression depth of 5-6 cm, the placement of the hand at the time of compression must be appropriate (2 the fingers are in the lower half of the sternum), and the chest recoils (8). According to Santosa and Wihastuti (2019), stating that someone who has a high and low BMI category at the hospital, data obtained that when performing chest compressions on patients experiencing fatigue, a high BMI is difficult to perform chest compressions when getting into bed (9).

Manual chest compressions without mechanical CPR require a lot of energy. Rescuers who are underweight will find it difficult to reach the depth of compression when performing CPR (10). Jafaar et al., (2015) the higher the BMI, the deeper the compression, but will quickly experience fatigue and experience incomplete chest recoil. The higher the BMI, the strength of a person will be excessive and can cause thoracic trauma during compression. A lower BMI will decrease the strength of compressions and affect the depth of chest compressions (5). Therefore, BMI needs to be considered to create appropriate and quality chest compressions.

CONCLUSION AND RECOMMENDATION

This study shows that BMI has a relationship with the quality of chest compressions performed, whether someone is female or male. BMI affects how much depth is needed on the respondent, how much force must be expended, and affects the energy expended. Further studies need to be conducted to further investigate the influence of other factors on CPR. In addition, it is highly recommended that CPR training consider BMI factors to maximize the success of CPR in victims. A consideration that might be made based on this study is to prioritize someone who has a higher BMI to do compressions. Researchers suggest that students who will practice in hospitals that do not have the appropriate BMI, when performing CPR should routinely alternate with

other people when performing compressions. On the other hand, students must improve a nutritious and healthy diet, exercise regularly in order to achieve the appropriate BMI so that chest compressions can be performed better.

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