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Effects of Early Mobilization on Hemodynamics in Acs Patients At Rsud Dr. Soedirman Kebumen

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ABSTRACT

Background: Coronary heart disease Acute Coronary Syndrome (ACS) accounts for about 7 million deaths every year. Patients with ACS require cardiac rehabilitation which aims to restore optimal physical, medical, psychological, social, emotional, sexual, and vocational conditions. Early mobilization is needed to optimize health status in ACS patients. For patients whose hemodynamic status is not balanced, a solution that can be suggested is to train the patient to tolerate changes in position rather than leaving him in the supine position.

Objective: to determine the effect of early mobilization on hemodynamics in ACS patients at RSUD dr. Sudirman, Kebumen.

Methods: The research method is a quasi-experimental design with one group pre-test-post-test design. The population in this study were all ACS patients totaling 180 patients. The authors involved 64 ACS patients (17%) with consecutive sampling. The instruments were SOP for early mobilization and medical record sheets from the doctor's examination. Data were analyzed descriptively and comparatively using the Wilcoxon Signed Rank Test.

Results: Hemodynamics in ACS patients who were not given early mobilization treatment both before and after treatment were in the normal category of 32 respondents (100%). Hemodynamics in ACS patients who were given early mobilization treatment both before and after treatment were in the normal category of 32 respondents (100%). There is an effect of early mobilization on hemodynamics in ACS patients. systolic blood pressure increased by 6.75, diastolic blood pressure increased by 6.00, pulse increased by 5.31, RR increased by 1.09 and oxygen saturation increased by 0.81.

KEYWORDS: early mobilization, hemodynamics, ACS

ARTICLE DETAILS

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INTRODUCTION

Coronary heart disease Acute Coronary Syndrome (ACS) accounts for about 7 million deaths per year (WHO, 2019). Based on the 2019 data from Sample Registration System (SRS) survey in Indonesia, Coronary Heart Disease (CHD) was the highest cause of death at all ages after stroke, namely 12.9%. Therefore, prevention of CHD through early identification of risk factors, prognostic markers, and early treatment of CHD is important to reduce the mortality rate. Acute Coronary Syndrome (ACS) is part of CHD.

Patients who experience an ACS attack can be in a life-threatening condition (Brady et al., 2013). A study by Muti (2020) concerning hemodynamics in heart failure patients reveals the respiratory rate of most patients with a value of 23 x/minute, oxygen saturation of 70.9%, blood pressure of 131-140 mmHg, and the most dominant pulse at 80-90 x/minute.

ACS patients require cardiac rehabilitation in order to restore optimal physical, medical, psychological, social, emotional, sexual, and vocational conditions (Roveny, 2017). Cardiac rehabilitation is also beneficial for training the mobility and work of the heart and restoring conditions to meet the daily needs (Badriyah, Kadarsih, & Permatasari, 2015). A study by Kurniawan (2018) regarding the physical activity description of phase IV cardiac rehabilitation in patients with congestive heart failure shows that the average respondent weighs 67.91 kg with a minimum weight of 47 kg and a maximum weight of 87 kg. In terms of gender, most of the patients are female. On average, the respondents do not smoke (76%). Most of the respondents are CHF patients with mild and moderate IPAQ interpretation. This study concludes that the level of physical activity in phase IV shows that most of the respondents are patients with activity levels of walking/low physical activity and moderate physical activity, but no one at a high level of physical activity.

Early mobilization of critically ill patients can increase muscle strength, reduce oxidative stress and inflammation, and during activity or exercise will maximize 60%-75% oxygen intake and increase antioxidant production. Early mobilization of critically ill patients on ventilators has the benefit of significantly increasing muscle strength and breathing in three and six weeks, while also improving the patient's functional outcomes (Muhamat & Adhinugraha, 2016).

Early mobilization is required to prevent and minimize anxiety and depression, prevent thromboembolism, reduce morbidity, and improve cardiovascular function as well as reduce recurrence rates in ACS patients (Benson, 2015). Early mobilization therapy is beneficial for AMI patients, but the implementation of early mobilization by nurses should be based on the patient's level of awareness and individual needs. Besides, nurses need to consider that early mobilization programs should be monitored based on blood pressure targets and perceived exertion (Yenni, Nurchayati & Sabrian, 2015).

Early mobilization is required to optimize the health status of ACS patients. A previous study by Asgari, et.al. (2015) reveals that early mobilization can reduce heart rate and does not cause changes in blood pressure. Thus, the use of early mobilization in treating ACS patients is highly recommended. Generally, critically ill patients have poor vascular elasticity, dysfunctional feedback cycles and/or low cardiovascular reserves. For patients whose hemodynamic status is not balanced, the suggested solution is to train the patient to tolerate changes in position rather than leaving the patient in the supine position (Vollman, 2013).

Another study by Kusyati (2019) on Hemodynamics of Patients with Acute Myocardial Infarction (AMI) in the Critical Care Units shows that the average systolic blood pressure in AMI patients is 113.96 mmHg with the diastolic blood pressure of 73.21 mmHg, the mean MAP of 86.76 mmHg, the average heart rate of 116 bpm, the mean Oxygen Saturation of 92% and ECG lethal of 43 respondents (80.8%).

Early mobilization program in the treatment of ACS patients at ICCU RS RSUD dr. Soedirman Kebumen, has been performed but has not been well documented. It also has not been implemented correctly and continuously. Meanwhile, out of the 10 patients who were observed and interviewed, 50% (5 patients) stated that they were afraid to move because they were afraid to feel chest pain again. A total of 30% (3 patients) felt that they had no chest pain and wanted to move freely and 20% (2 patients) did gradual mobilization as directed by the nurse. Considering the phenomena and explanations above, this study focuses on the implementation of early mobilization that can affect hemodynamics with the title of e "Effects of early mobilization on hemodynamics in ACS patients at RSUD dr. Sudirman Kebumen"

This study aims to determine the effect of early mobilization on hemodynamics in ACS patients at RSUD dr. Sudirman Kebumen

METHODS

This quasi-experimental study uses one group pre-test-post-test design. The population in this study was all ACS patients with a total of 180 patients. A total of 64 ACS patients (17%) were involved in this study. The determination of the sample used a consecutive sampling technique. Instruments were in the form of SOPs for early mobilization and medical record sheets of doctor's examination results. Data were analyzed descriptively and comparatively using the Wilcoxon Signed Rank Test.

RESULTS

1. Hemodynamics in ACS patients

a. Hemodynamics in ACS patients who were not given early mobilization treatment

Hemodynamics	Category	Pre		Post	
		f	%	f	%
Systolic Blood Pressure	Normal	32	100.0	32	100.0
Diastolic Blood Pressure	Normal	32	100.0	32	100.0
Pulse	Normal	32	100.0	32	100.0
RR	Normal	32	100.0	32	100.0
Oxygen saturation	Normal	32	100.0	32	100.0

Based on the table above, the hemodynamics in ACS patients who are not given early mobilization treatment both before and after treatment are in the normal category, namely 32 respondents (100%).

a. Hemodynamics in ACS patients treated with early mobilization

Hemodynamics	Category	Pre		Post	
		f	%	f	%
Systolic Blood Pressure	Normal	32	100.0	32	100.0
Diastolic Blood Pressure	Normal	32	100.0	32	100.0
Pulse	Normal	32	100.0	32	100.0
RR	Normal	32	100.0	32	100.0
Oxygen saturation	Normal	32	100.0	32	100.0

Based on the table above, the hemodynamics in ACS patients who are given early mobilization treatment both before and after treatment are in the normal category, namely 32 respondents (100%).

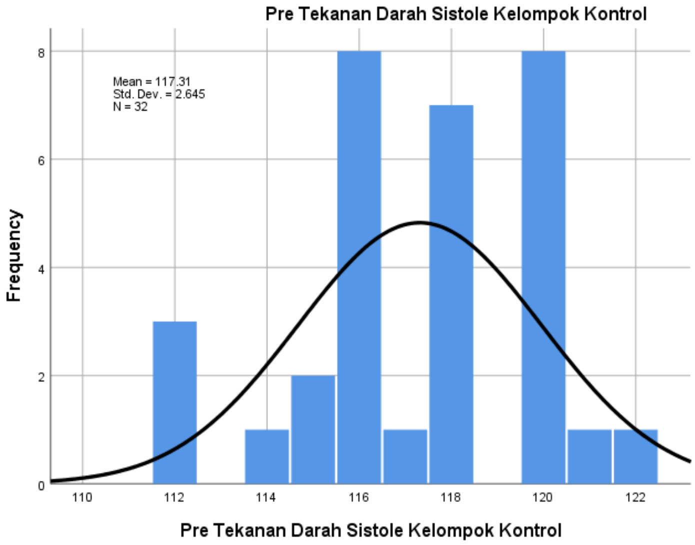
2. Effects of early mobilization on hemodynamics in ACS patients

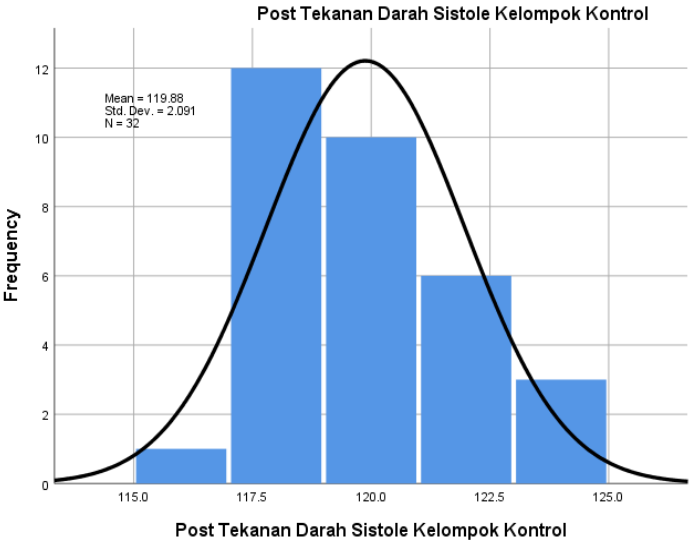
a. Effects of usual treatment (not given early mobilization) on hemodynamics in ACS patients

No	Hemodynamics	n	Mean (Min-Max)	Mean difference	p
1	Pre Systolic Blood Pressure of Control Group	32	117.31 (112-122)	2.56	0.000
	Post Systolic Blood Pressure of Control Group	32	119.87 (116-124)		
2	Pre Diastolic Blood Pressure of Control Group	32	76.13 (70-82)	2.46	0.000
	Post Diastolic Blood Pressure of Control Group	32	78.59 (74-89)		
3	Pre Pulse of Control Group	32	76.41 (72-85)	1.65	0.000
	Post Pulse of Control Group	32	78.06 (72-88)		
4	Pre RR of Control Group	32	17.81 (16-19)	0. 32	0.004
	Post RR of Control Group	32	18.13 (16-19)		
5	Pre Oxygen Saturation of Control Group	32	97.78 (96-99)	0. 60	0.000
	Post Oxygen Saturation of Control Group	32	98.38 (97-99)		

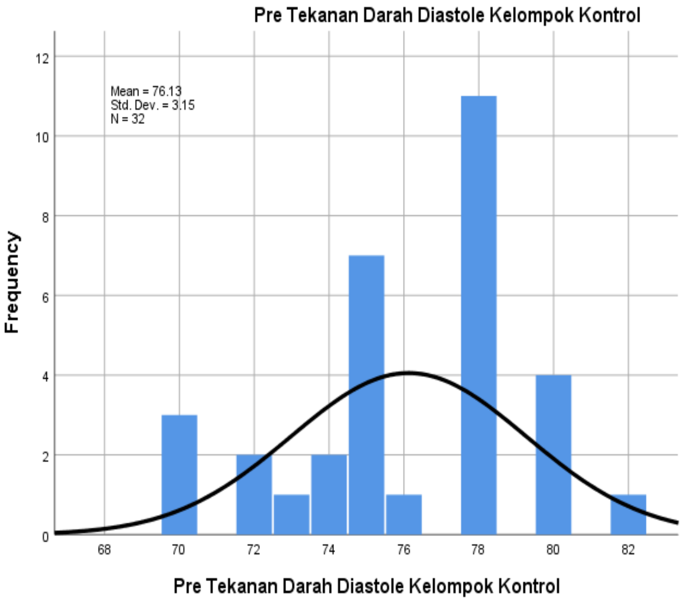
The table above shows a significant increase ($p<0.05$) in hemodynamics in ACS patients who were not given early mobilization treatment with an increase in systolic blood pressure of 2.56, diastolic blood pressure of 2.46, a pulse of 1.65, RR of 0.32, and oxygen saturation of 0. 60. To clarify the hemodynamic improvement in ACS patients in the control group, the data are also presented in the form of histograms.

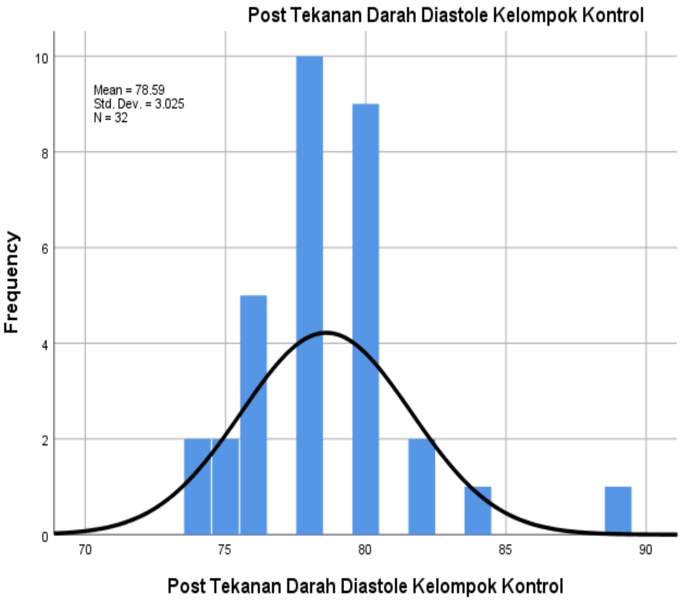
1) **Systolic Blood Pressure**



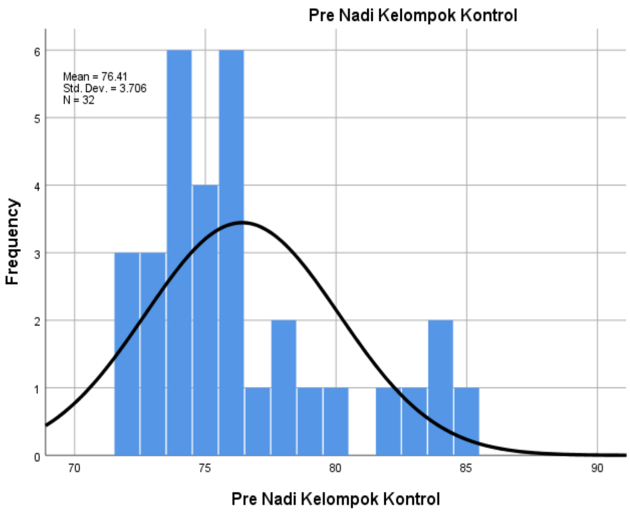


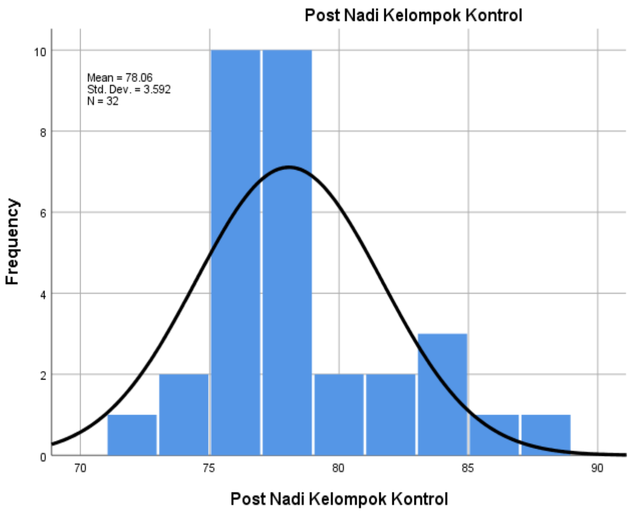
2) **Diastolic Blood Pressure**



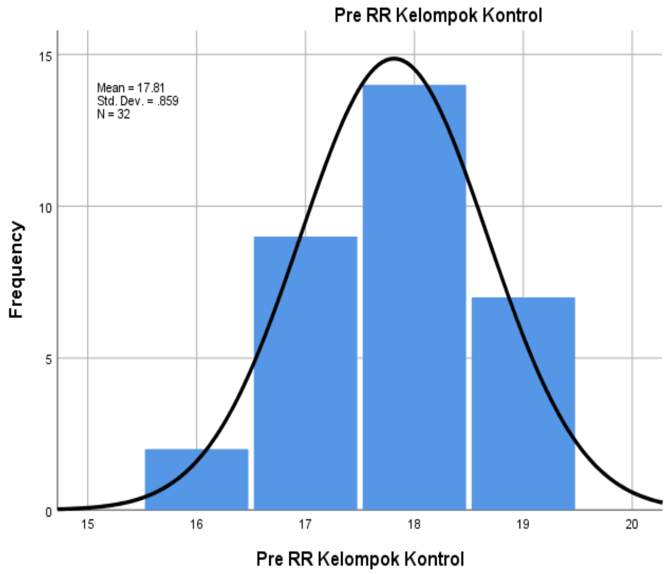


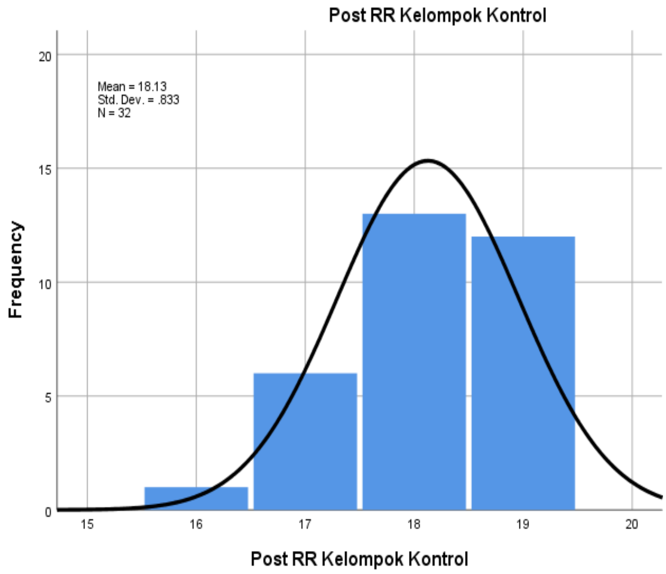
3) **Pulse**



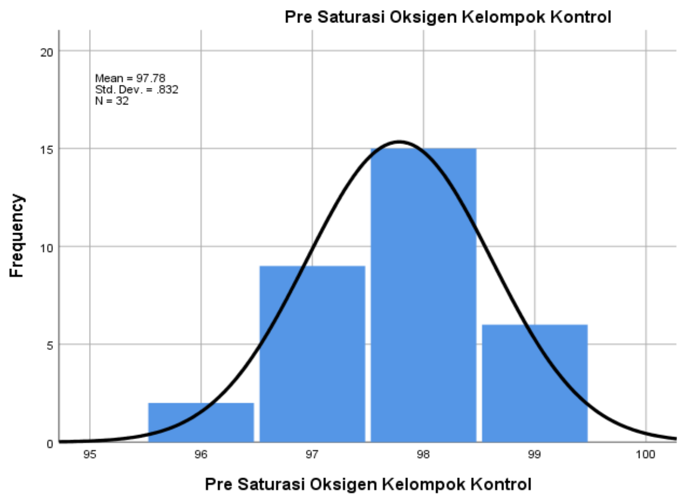


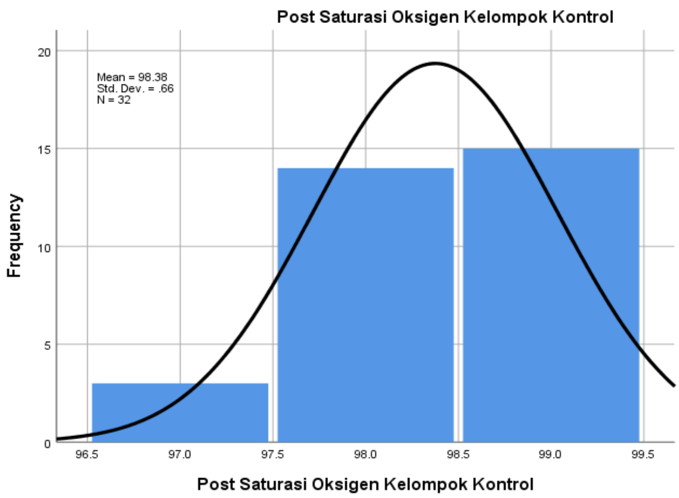
4) RR





5) Oxygen Saturation



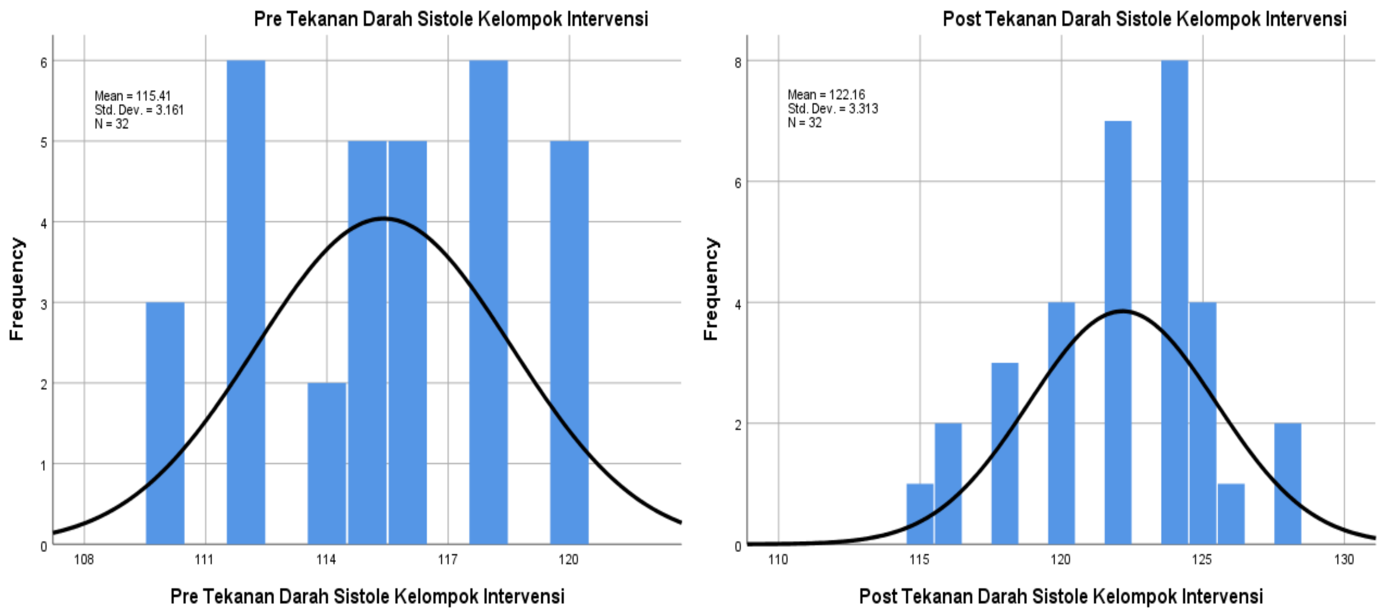


b. Effects of early mobilization on hemodynamics in ACSP patients

No.	Hemodynamics	n	Mean (Min-Max)	Mean difference	p
1	Pre Systolic Blood Pressure of Intervention Group	32	115.41 (110-120)	6.75	0.000
	Post Systolic Blood Pressure of Intervention Group	32	122.16 (115-128)		
2	Pre Diastolic Blood Pressure of Intervention Group	32	76.50 (70-82)	6.00	0.000
	Post Diastolic Blood Pressure of Intervention Group	32	82.50 (78-86)		
3	Pre Pulse of Intervention Group	32	77.41 (70-84)	5.31	0.000
	Post Pulse of Intervention Group	32	82.72 (74-89)		
4	Pre RR of Intervention Group	32	17.97 (17-19)	1.09	0.000
	Post RR of Intervention Group	32	19.06 (17-20)		
5	Pre Oxygen Saturation of Intervention Group	32	97.69 (96-99)	0.81	0.000
	Post Oxygen Saturation of Intervention Group	32	98.50 (97-99)		

Table above shows a significant increase ($p<0.05$) of hemodynamics in ACS patients who were given early mobilization treatment with an increased systolic blood pressure of 6.75, diastolic blood pressure of 6.00, pulse of 5.31, RR of 1.09 and oxygen saturation of 0.81. To clarify the hemodynamic improvement in ACS patients in the intervention group, the data are also displayed in the form of histogram.

1) Systolic Blood Pressure



2) Diastolic Blood Pressure

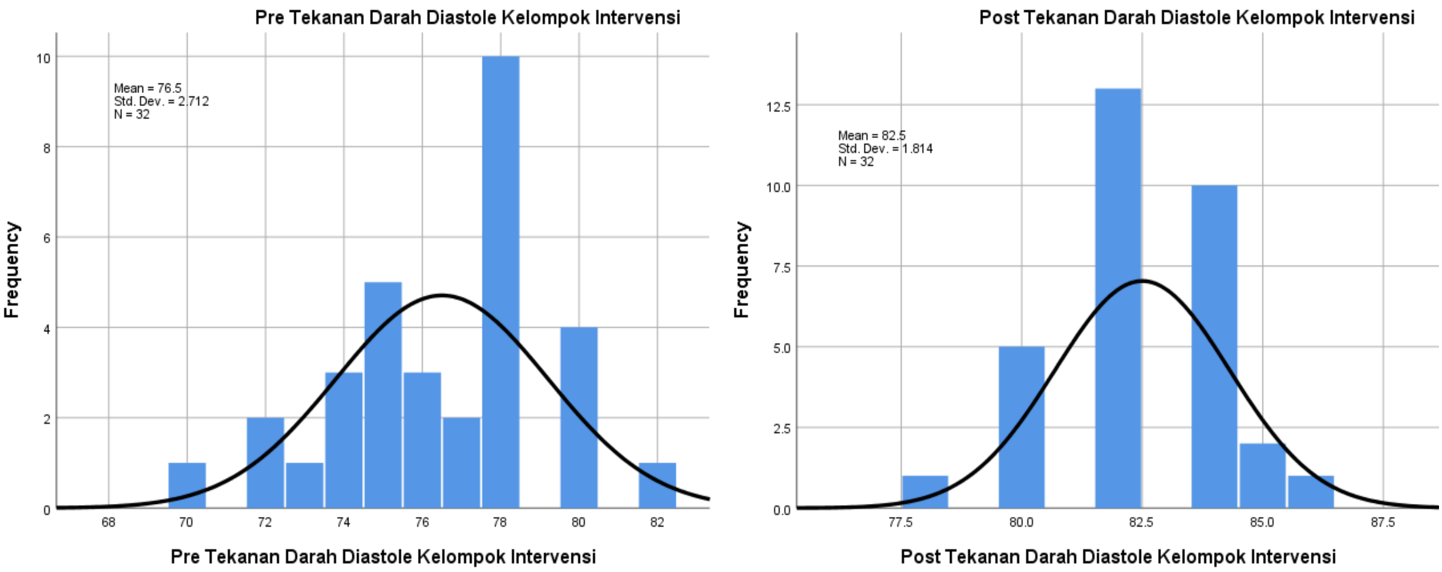


Figure 4.7 Increased Diastolic Blood Pressure in ACS Patients in the Intervention Group

3) Pulse

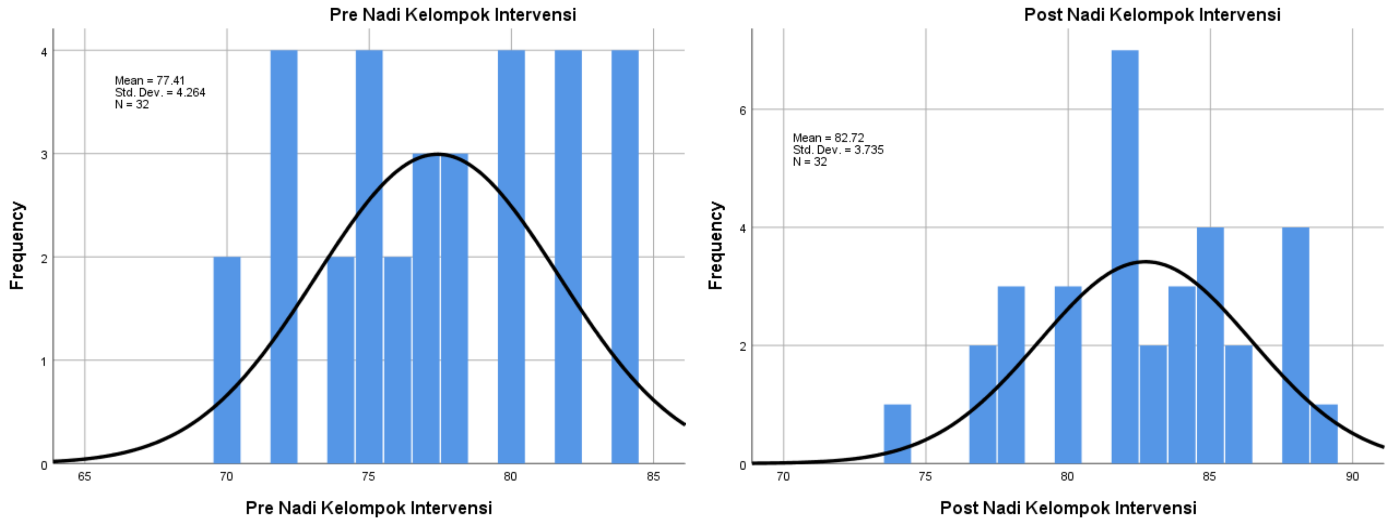
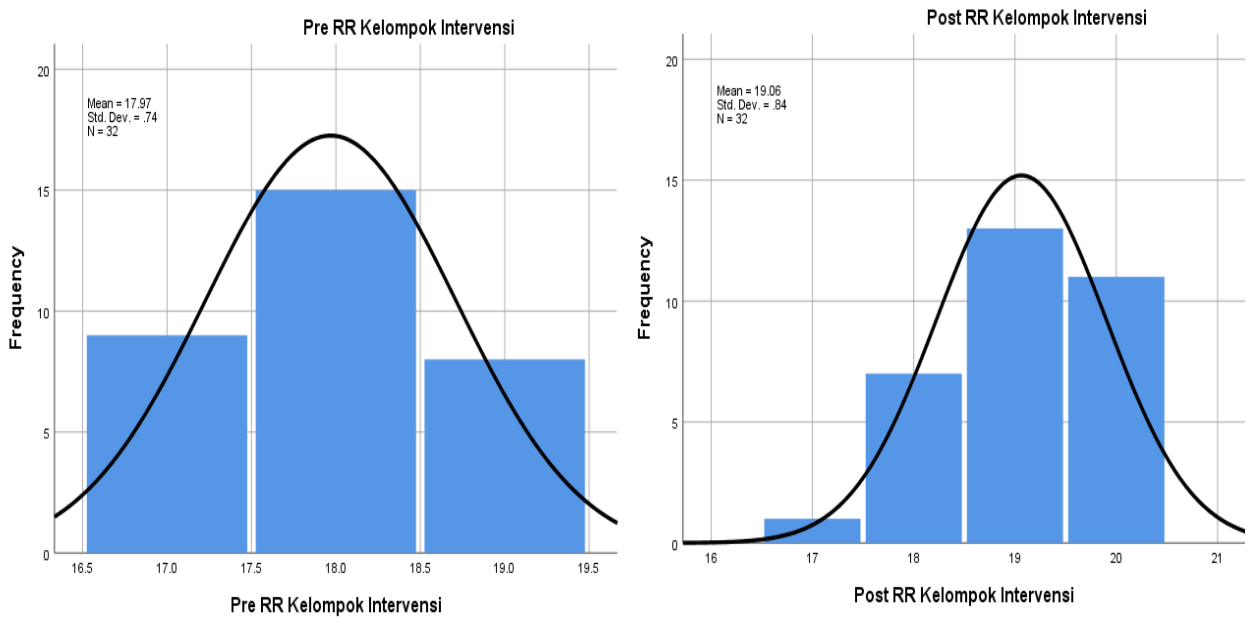
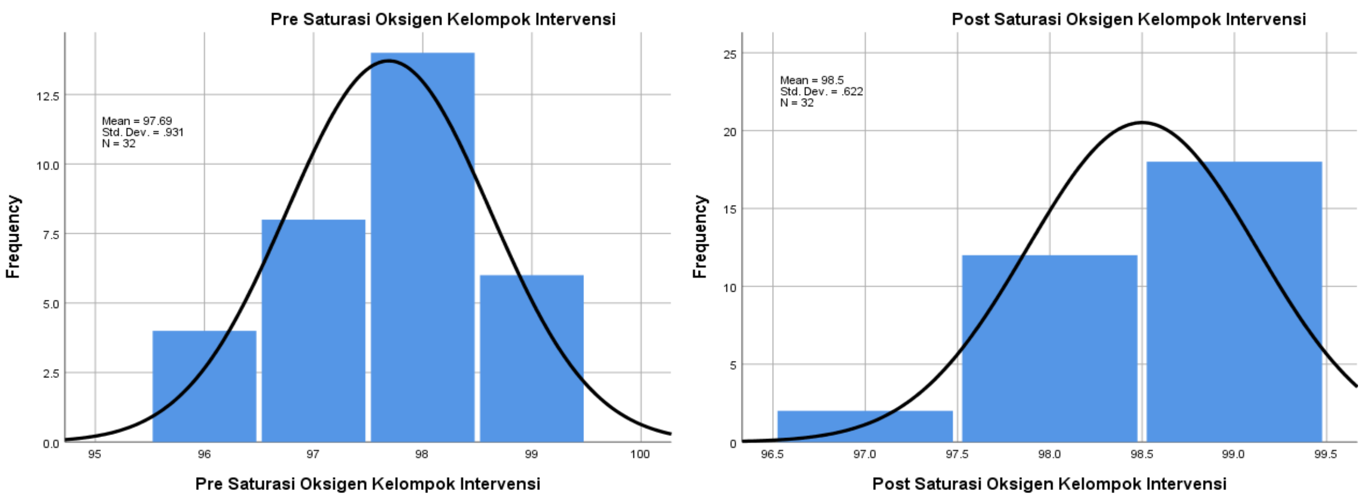


Figure 4.8 Increased Pulse in ACS Patients in the Intervention Group

6) RR



7) Oxygen Saturation



DISCUSSION

1. Hemodynamics in ACS patients who were not given early mobilization treatment

a. Blood Pressure

The blood pressure measurements in ACS patients who were not given early mobilization treatment obtained an average systolic of 117.31 and diastolic of 76.13. Blood pressure is the force of blood pushing against the walls of the artery in which each time the heartbeats, it pumps blood into the arteries. This force maintains the flow of blood in the arteries to keep it smooth. Average normal blood pressure is 120/80 and is measured in millimeters of mercury (mmHg). Blood pressure is measured indirectly with a mercury sphygmomanometer in the sitting or supine position (Burchell, et al, 2011).

Continuous high blood pressure slowly causes damage to the arterial system. The arteries experience hardening due to fatty deposits on the walls, thereby narrowing the lumen contained in the blood vessels resulting in CHD. Increased systemic blood pressure due to hypertension increases resistance to pumping blood from the left ventricle which increases the workload of the heart (Marliani 2013).

The risk factors for CHD can be divided into two, namely modifiable risk factors such as hypertension, dyslipidemia, smoking, obesity, diabetes mellitus, physical activity, and stress and non-modifiable risk factors such as age, gender and genetics. Hypertension is one of the main modifiable risk factors. Patients with hypertension are five times more at risk of suffering from CHD compared to those without hypertension (Farahdika, 2015; Abdul, 2014).

Nelwan (2017) studying Modified Risk Factors for Coronary Heart Disease (CHD) in the Minahasa Ethnic Group of Manado City revealed that the respondents who suffer from hypertension are 5.70 times more at risk of suffering from CHD.

b. Pulse

The measurement of blood pressure in ACS patients who were not given early mobilization treatment obtained an average pulse of 76.41. Pulse rate is the wave that is transmitted through the arteries in response to the ejection of blood from the heart into the aorta. The pulse is formed as blood is pushed through the arteries. To aid circulation, the arteries expand and contract periodically as blood is pumped into the arteries and veins. Thus, the pulse rate can also represent the heartbeats per minute or also known as heart rate. Pulse is counted per minute with a count of repetitions (times/minute) (Musliha, 2011).

Pulse rate is the rhythmic frequency of heartbeats that can be palpated on the surface of the skin at a certain part of the body. In a normal human heart, each beat originates from the SA node. Pulse is one indicator of circulation status (Waugh & Grant, 2016).

Ganong (2018) states that the sympathetic autonomic nerves make arteriolar and venous vasoconstriction and increase the frequency of heart rate and stroke volume releasing loads with a tonic way, and blood pressure is adjusted according to speed variations of the tonic. Sympathetic and parasympathetic activities in the heart and blood vessels cannot be separated from the influence of epinephrine and norepinephrine hormone activity (adrenalin). Increased secretion of this hormone will induce and excite the sympathetic nerves to perform vasoconstriction resulting in an increase in heart rate followed by an increase in blood pressure.

c. Respiratory Rate (RR)

The blood pressure measurements in ACS patients who were not given early mobilization treatment obtained an average RR of 17.81. Respiratory Rate (RR) is the number of breaths taken per minute. In a resting state, the respiratory rate is about 15 breaths per minute (Pearce, EC, 2014).

Pulmonary respiration is the exchange of oxygen and carbon dioxide occurring in the lungs. Lungs function as the place for exchanging oxygen and carbon dioxide in breathing through the lungs/external respiration. Oxygen is collected through the nose and mouth. When breathing, oxygen enters through the trachea and bronchial tubes to the alveoli and can be closely associated with the blood in the pulmonary capillaries (Pearce, EC, 2014)

Decreased cardiac output causes an increase in respiratory rate. This occurs as a compensatory effort due to the increased demand for tissue oxygen. In heart failure, respiratory works increase due to

2.

a. Blood Pressure

The results showed a significant increase ($p<0.05$) in hemodynamics in ACS patients who were given early mobilization treatment in which systolic blood pressure increased by 6.75 and diastolic blood pressure increased by 6.00.

This is in line with the theory proposed by Vollman (2017) that mobilization can improve cardiovascular function so that it can increase peripheral venous circulation and accelerate blood circulation and even have an impact on changes in blood pressure. Putri (2018) reveals that before early mobilization, the average systolic and diastolic blood pressure was 108.22 mmHg and 71.66 mmHg respectively. Then, after early mobilization, the average systolic and diastolic blood pressure was 114.66 mmHg and 78.66 mmHg respectively. There is an effect of early mobilization on blood pressure. Suyati (2019) shows that mobilization can increase blood pressure. Thus, mobilization can be used as one of the treatment interventions to increase blood pressure with an easy and safe decrease in consciousness.

The mobilization is expected to be used as rehabilitation for the patient. Mobilization provides patients with activities to maintain muscle strength and prevent adverse changes in cardiovascular response. Changes in blood pressure can be caused by cardiac metabolism which is influenced by myocardial load, myocardial tension, and myocardial contractility. All these factors change during the given physical activity. The increase in coronary flow coincides with the increased myocardial demand for nutrition and oxygenation. Physical activity is beneficial for muscle strength and maintaining cardiovascular health (Aswad, 2019).

b. Pulse

The results showed a significant increase (p <0.05) in hemodynamics in ACS patients who were given early mobilization treatment with an increase in the pulse of 5.31. This is in line with the theory of Tambunan and Kasim (2017) that early mobilization has benefits on the cardiovascular system by increasing cardiac output, improving myocardial contraction, strengthening the heart muscle, lowering blood pressure, and improving venous return. Putri (2018) reveals that before early mobilization, the patient has an average pulse rate of 71.22 x/minute before the mobilization and an average pulse rate of 78.44 x/minute after the mobilization. Thus, there is an effect of early mobilization on pulse rate.

This mobilization can be said successful as the patient's pulse should not be above or below normal. Based on the theory proposed by Roveny (2017), in providing early mobilization to patients, it is necessary to pay attention to each phase, which is to closely monitor hemodynamic status such as the maximum pulse should not be > 100 x/minute or < 60x/minute and also monitor systolic blood pressure if it increases to more than 10mmHg of the normal range (110-140mmHg). Mobilization activities should be postponed or temporarily canceled until the hemodynamic status returns to normal and no problems of chest pain or arrhythmias that complicate early mobilization.

c. Respiratory Rate (RR)

The results obtained a significant increase (p<0.05) of hemodynamics in ACS patients who were given early mobilization treatment with an increase in RR by 1.09. Patients with heart disease require cardiac rehabilitation to restore optimal physical, medical, psychological, social, emotional, sexual, and vocational conditions (Roveny, 2017).

Agustin (2021) reveals that there is a significant difference in Respiratory Rate (RR) between before and after mobilization. Mobilization is given to improve the patient's quality of life by considering the patient's hemodynamic status. There is an increase in hemodynamic status after mobilization within normal limits.

Patients with heart disease require cardiac rehabilitation to restore optimal physical, medical, psychological, social, emotional, sexual, and vocational conditions. Cardiac rehabilitation is also useful for training mobility and heart work as well as restoring conditions to meet the daily needs (Badriyah, Kadarsih, & Permatasari, 2015).

Early mobilization can increase muscle strength, and reduce oxidative stress and inflammation, during activity or exercise, it will maximize 60%-75% oxygen intake and increase antioxidant production. Early mobilization increases muscle strength and respiratory significantly in three and six weeks, and even it can improve the patient's functional outcomes (Muhamat & Adhinugraha, 2016).

d. Oxygen Saturation

The results showed a significant increase (p<0.05) in hemodynamics in ACS patients who were given early mobilization treatment with an increase in oxygen saturation by 0.81. Mobilization has different benefits in each system. The mobilization respiratory system functions to increase the frequency and depth of breathing, increase alveolar ventilation, decrease the work of breathing, and increase the development of the diaphragm. Thus, mobilization is expected to increase oxygen transport throughout the patient's body (Rifai, 2015).

A study by Mugi et al (2017) shows an increase in oxygen saturation of 2.5% before and after mobilization. Another study by Suyanti et al (2018) reveals that the oxygen saturation before and after is 96.88 and 98.56 respectively and there is an increase of 2.32. Therefore, there is an effect before and after mobilization on oxygen saturation.

Regular physical exercise can increase lung functions due to an increase in the use of oxygen in the blood. Regular physical exercise also increases muscle strength, especially the respiratory muscles which produce sufficient intensity during inspiration so that there is an increase in respiratory muscle function. Lung function has a close relationship with physical exercise activity. Patients with pulmonary function disorders such as asthma or chronic obstructive pulmonary disease, and other lung disorders, will affect physical exercise. But, if physical exercise is carried out regularly, it can improve the quality of lung function, especially exercise which has a large role in increasing lung capacity (Dumat, Engka, & Sapulete, 2016).

3. **Effect of early mobilization on hemodynamics in ACS patients**

The results showed that there is an effect of early mobilization on hemodynamics (systole, diastole, pulse, and RR) (p<0.05) but no effect on oxygen saturation (p>0.05) in ACS patients at RSUD dr. Sudirman Kebumen. The intervention group experienced a higher hemodynamic improvement compared to the control group with an increase in systolic and diastolic blood pressure of 4.19 and 3.54 respectively, and pulse of 3.66, RR of 0.77, and oxygen saturation of 0.21.

Early mobilization is a procedure given to a wide range of diseases such as neurological, cardiovascular, musculoskeletal, metabolic, trauma, and others (Kress & Hall, 2014). Mobilization measures are carried out in all treatment rooms including intensive care to ordinary care. Early mobilization is important and many studies have been done to prove the impact of early mobilization, especially in an effort to shorten the treatment period (Rawal, Yadav, & Kumar, 2017).

The ability to move is an important human need. Moving makes the body be in an anabolic reaction whose ultimate goal is cell regeneration. Generally, high physical activity followed by good regeneration power makes the body can function optimally (Hashem, Nelliot, & Needham, 2016; Hunter, Johnson, & Coustasse, 2014;

Early mobilization therapy is beneficial for AMI patients, but its implementation should be based on the patient's level of awareness and individual needs. Besides, nurses need to consider that early mobilization programs should be monitored based on blood pressure targets and perceived exertion (Yenni, Nurchayati & Sabrian, 2015).

Early mobilization is highly needed to optimize the health status of ACS patients. A previous study by Kusyati (2019) on Hemodynamics of Patients with AMI in the Critical Care Units reveals that the average systolic blood pressure of 113.96 mmHg, diastolic blood pressure of 73.21 mmHg, MAP of 86.76 mmHg, heart rate of 116 bpm, oxygen saturation of 92%, and Lethal ECG of 43 respondents (80.8%). Another study by Wahyu Rima et al (2020) at Karanganyar Hospital involving 19 respondents reveals that there is a significant difference between Heart Rate (HR), Respiratory Rate (RR), Oxygen Saturation (SaO2) blood pressure, and Mean Artery Pressure (MAP) before and after mobilization.

A study by Hasan, Arvind, and Fiona (2017) explains that the application of mobilization can improve the patient's ability to move and improve functional status. Besides, Klein et al. (2015) reveal that the application of the mobilization intervention twice a day shows an increase in mobilization, functional status, and reduced length of stay (LOS). A study by Ningtyas (2017) at a hospital in East Java found that mobilization has an effect on the hemodynamic status of patients including breathing, blood pressure, pulse, and temperature.

CONCLUSION AND SUGGESTION

Hemodynamics in ACS patients who were not given early mobilization treatment both before and after treatment were in the normal category, namely 32 respondents (100%).

Hemodynamics in ACS patients who were given early mobilization treatment both before and after treatment were in the normal category, namely 32 respondents (100%).

Early mobilization affects hemodynamics in ACS patients with an increase in systolic blood pressure of 6.75, diastolic blood pressure of 6.00, pulse of 5.31, RR of 1.09, and oxygen saturation of 0.81.

For hospitals, exposure to the positive impact of early mobilization in ACS patients can be used as evidence-based practice to organize an early physical exercise program for ACS patients both in the hospital and follow-up programs in the form of home visits after the patient is discharged from the hospital.

REFERENCES

I. Abdul, (2014). Penyakit kardiovaskuler. (online) https:/books.google.co.id/ books.penyakitka+kardiovaskuler

II. Andrayani (2016). Exercise pada pasien dengan St Elevasi Miokard Infark (STEMI). Jurnal Kesehatan Prima Volume : 10, No.2, Agustus 2016, Halaman : 1672-1681

III. Ari (2020). Pengaruh musik klasik terhadap status hemodinamik pada pasien dewasa postoperasi jantung bawaan di Ruang ICU Paediatrik Dan Kongenital Rumah Sakit Jantung Dan Pembuluh Darah Harapan Kita. Jurnal Penelitian Universitas Muhammadiyah Jakarta, 25 (2). pp. 51-60. ISSN 0853-6007

IV. Asgari, et al., (2015). Effects of Early Mobilization Program on the Heart Rate and Blood Pressure of Patients With Myocardial Infarction Hospitalized at the Coronary Care Unit. Middle East Journal of Rehabilitation and Health, Vol. 2, No. 1, Januari 2015, page 1-6.

V. Bhalla, S., Sharma, K., Yadave, R. D., Desai, H. D., Vora, T., Khan, E., Shah, P., Jadeja, D., & Bhandari, V. (2020). Prevalence and Patterns of Obstructive Sleep Apnea in Asian Indians With Congestive Heart Failure. Cureus, 12(11).

VI. Burchell, PA. (2011). Focus on central venous pressure in acute care setting. Journal of Nursing.

VII. Farahdika, Amelia (2015). Faktor resiko yang berhubungan dengan penyakit jantung koroner pada usia dewasa madya http://journal.unnes.ac.id/ sju/index.php/ujph

VIII. Farshidi, H., Rahimi, S., Abdi, A., Salehi, S., & Madani, A. (2013). Factors associated with prehospital delay in patients with acute myocardial infarction. Iranian. Red Crescent Medical Journal. *https://doi.org/10.5812/ircmj.2367*

IX. Fergusson, D. (2018). Clinical assessment and monitoring in children. Hongkong: Blackwell Publishing

X. Gálvez-Barrón, C., Villar-Álvarez, F., Ribas, J., Formiga, F., Chivite, D., Boixeda, R., Iborra, C., & Rodríguez-Molinero, A. (2019). Effort Oxygen Saturation and Effort Heart Rate to Detect Exacerbations of Chronic Obstructive Pulmonary Disease or Congestive Heart Failure. In Journal of Clinical Medicine (Vol. 8, Issue 1, p. 42).

XI. Ganong, W. F. (2018). Buku ajar fisiologi kedokteran. Jakarta: EGC.

XII. Isrofah, Indriono, A., & Mushafiyah, I. (2020). Tidur dan saturasi oksigen pada pasien congestiv e hearth faillure. In Jurnal Ilmiah Permas (Vol. 10, Issue 4, pp. 557–568).

XIII. Jeremias, A., & Brown, D. (2019). Cardiac Intensive Care. In Cardiac Intensive Care. Elsevier. https://doi.org/10.1016/B978-1-4160-3773-6.X0001-8

XIV. Jevon & Ewens. (2014). Pemantauan Pasien Kritis. Jakarta: Erlangga

XV. Kawamoto Kris R, Davis Melinda B, Duvernoy, Claire S.(2016). Acute Coronary Syndromes: Differences in Men and Women. Current Atherosclerosis Report, 18, 73 DOI

XVI. 10.1007/s11883-016-0629-7

XVII. Kusyati (2019). Hemodinamik Pasien Akut Miokard Infark (AMI) di Ruang Perawatan Kritis. Journal Of Holistic Nursing Science Vol. 6 No. 1 (2019) pp. 22-27

XVIII. Marik, P. E., & Baram, M. (2017). Noninvasive hemodynamic monitoring in theIntensive Care Unit. Critical Care Clinics, 23, 383-400

XIX. Marliani. (2013). Hipertensi. Jakarta: PT. Gramedia

XX. Marshall K. (2011). Acute coronary syndrome : diagnosis, risk assessment and management, 47–58.

XXI. Matondang. (2014). Diagnosis Fisik Pada Anak. Jakarta:Sagung Seto

XXII. Mirzaaghazadeh, M., Bahtouee, M., Mehdiniya, F., Maleki, N., & Tavosi, Z. (2014). The Relationship between Nocturnal Hypoxemia and Left Ventricular Ejection Fraction in Congestive Heart Failure Patients. In Sleep Disorders (Vol. 2014, pp. 1–6). Hindawi Publishing Corporation.

XXIII. Muhamat, N., & Adhinugraha, T. S. (2016). Pengaruh Tindakan Mobilisasi Dini Terhadap Denyut jantung dan Frekuensi nafas pada pasien kritis di ICU RSUD Sleman Yogyakarta. Media Ilmu Kesehatan Vol 5, 213-223

XXIV. Musliha. (2011). Keperawatan Gawat Darurat. Yogyakarta : Nuha Medika

XXV. Nelwan, E.J., Widjajanto, E., Andarini, S. and Djati, M.S., (2017). Modified Risk Factors for Coronary Heart Disease (CHD) in Minahasa Ethnic Group From Manado City Indonesia. The Journal of Experimental Life Science, 6(2), pp.88-94

XXVI. Pearce, E. C. (2014). Anatomi dan Fisiologi Untuk Paramedis. Jakarta: Gramedia Pustaka Utama

XXVII. PERKI. (2015). Pedoman Tatalaksana Sindrom Koroner Akut. Jakarta: Perhimpunan Dokter Spesialis Kardiovaskular Indonesia.

XXVIII. Pinsky, MR. (2019). Hemodynamic Monitoring. Spinger : Switzerland

XXIX. Potter & Perry. (2010). Fundamental Of Nursing edisi 7. Jakarta : Salemba medika.

XXX. Putri (2018). Pengaruh mobilisasi dini terhadap tekanan darah dan denyut nadi pada pasien post sectio caesarea dengan spinal anestesi di RSUD Muntilan. Yogyakarta: Politeknik Kesehatan Kementerian Kesehatan Yogyakarta

XXXI. Riskesdas. (2018). Riset kesehatan Dasar 2018. Retrived from https://www.depkes.go.id/resources/download/infoterkini/materi_rakorpop_2018/Hasil%20Riskesdas%202018.pdf

XXXII. Santos-gallego, C. G., Picatoste, B., & Badimón, J. J. (2014). Pathophysiology of Acute Coronary Syndrome. *https://doi*. org/10.1007/s11883-014-0401-9

XXXIII. Vollman KM. (2013). Understanding CriticallyIill Patients’ Hemodynamic Response to Mobilization: Using The Evidence to Make it Safe and Feasible. Criticall Care Nursing Quarterly. 2013 January; Vol. 36 No 1

XXXIV. Waly, Tegusti Muhammad and Pujo, J. L. (2014). Prevalensi Pasien Infark Miokard Akut Yang Menjadi Cardiac Arrest di ICU/ HCU RSUP Dr. Kariadi Semarang. Universitas Diponegoro

XXXV. Waugh, A. and Grant, A. (2017). Dasar-dasar Anatomi dan Fisiologi. Elly Nurac. Edited by E. Nurachmah. Singapore: Elsevier.