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HEMODYNAMIC STATUS STABILITY: BLOOD PRESSURE, MEAN ARTERY PRESSURE AND RESPIRATORY RATE IN ACUTE MYOCARDIAL INFARCTION PATIENTS IN CRITICAL CARE UNIT, SURAKARTA

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ABSTRACT

The most important monitoring of acute myocardial infarction patients is monitoring the hemodynamic system because it affects the function of oxygen delivery in the body and involves heart function. This research aimed to find out the condition of the stability of blood pressure, mean artery pressure and respiratory rate in Acute Myocardial Infarction patients in the critical care unit, Surakarta. The method used an analytical observation design with a cross-sectional approach. The samples were 56 subjects. The results show statistical tests of respiratory aids, namely nasal cannula and non-rebreathing mask on hemodynamic status including systolic, diastolic blood pressure, mean artery pressure, and respiratory rate in the critical care unit, Surakarta, there is a significant relationship between the use of respiratory aids and hemodynamic status as evidenced by the value (p value <0.05). The conclusion suggests that it's better the fulfillment of oxygen therapy needs with the proper respiratory aids (nasal cannula and non-rebreathing mask, the better the patient's hemodynamic status, especially in terms of blood pressure, mean artery pressure, and respiratory rate which are important indicators in the stability of acute myocardial infarction patients.

Keywords: blood pressure; mean artery pressure; respiratory rate; acute myocardial infarction

Introduction

Patients diagnosed with critical illness with one or more life-threatening deficiencies in the human vital organ system with high morbidity and mortality requiring intensive treatment and monitoring, one of which is cardiovascular disease, is a disease that needs to be followed up immediately, especially during critical phases. (1)

Cardiovascular disease, one of which is Acute Myocardial Infarction, is one of the health problems included in the government's handling program in health transformation. The percentage of premature death from various cardiovascular diseases, namely AMI, is 16.6% and has increased by up to 25% in each country. (2) The most important monitoring of conditions in patients with acute myocardial infarction is monitoring the hemodynamic system. Based on Muhamarian's presentation in (3), the role of nurses in providing close monitoring is important in the emergency management of AMI patients. To reduce the risk of death in IMA patients, it can be minimized by carrying out close hemodynamic monitoring within 24 hours from the onset of patient symptoms, from 3 to 12 hours until it starts to stabilize again within 48 hours. However, if the patient's hemodynamic status continues to decline, the patient's risk of death increases. In the implementation of hemodynamic monitoring, nurses have a very important role. In cases of hemodynamic disorders, proper monitoring and treatment are required because hemodynamic conditions greatly affect the function of oxygen delivery in the body and involve heart function. In patients with heart disorders, unstable hemodynamic status is a dangerous condition and if not treated properly, the patient is at risk of multiple organ failure and death. (4) This critical condition must be handled by nurses in order to maximize the provision of comprehensive nursing care.

The research conducted by Erniody in (3) the use of hemodynamic monitoring in AMI patients is important to help nurses detect and identify physiological abnormalities early and evaluate the treatment carried out by considering information about body homeostasis.

Hemodynamic system instability characterized by an increase in the patient's MAP, heart rate, respiratory rate, and decreased oxygen saturation often occurs in critical patients treated in the ICU. (1) One of the hemodynamic monitoring in patients with acute myocardial infarction is monitoring the patient's blood pressure. The patient's blood pressure is what affects the patient's MAP value.

Methods

The type of research method used in this study is quantitative with a descriptive design. This study aims to determine the hemodynamic picture of Acute Myocardial Infarction patients, especially systolic, diastolic, MAP (mean artery pressure) and RR blood pressure values in the critical care room, Surakarta with a cross-sectional approach. The sampling technique used accidental sampling with 56 respondents. The measuring instrument used was an observation sheet. The analysis test used a univariate test in the form of a frequency distribution table used for data analysis. The research design is a research strategy before the final planning of data collection in identifying problems.

Results and Discussion

70. **Respondent Characteristics**

Table 1. Distribution of Characteristics of Acute Myocardial Infarction Patients (N = 56)

Variable	n	%
Gender		
Male	46	82,1
Female	10	17,9
Age		
45-59 year (Pre-elderly)	29	51,8
60-69 year (Young elderly)	19	33,9
70-89 year (Middle aged)	8	14,3
Medical Diagnosis		
STEMI	48	85,7
NSTEMI	8	14,3

Breathing Aids

Nasal Cannula	51	91,1
NRM (*Non Rebreathing Mask*)	5	8,9

Based on table 1, the characteristics of respondents in terms of gender are mostly male, namely 46 respondents (82.1%). The most common age range is 45-59 years (Pre-Elderly) of 29 respondents (51.8%). The most common medical diagnosis suffered is STEMI, namely 48 respondents (85.7%). The use of breathing aids in this study mostly used nasal cannula, namely 51 respondents (91.1%).

2. Description of Systolic and Diastolic Blood Pressure Conditions in Acute Myocardial Infarction Patients

Table 2 Frequency Distribution of Respondents Based on Systolic Values

Systole	Characteristics	n	(%)
Pre-Test	Low	7	12,5
	Normal	10	17,9
	High	39	69,6
Post-Test	Low	4	7,1
	Normal	22	39,3
	High	30	53,6

Based on Table 2, the results of systolic blood pressure conditions in Acute Myocardial Infarction patients before being given oxygen therapy or breathing aids in high conditions were 39 respondents (69.6%). While the normal systolic blood pressure condition was 10 respondents (17.9%), and the rest were included in the low criteria, namely 7 respondents (12.5%). From the results of the frequency distribution above, the results of systolic blood pressure after being given oxygen therapy or breathing aids in high conditions were 30 respondents (53.6%). While the normal systolic blood pressure condition increased to 22 respondents (39.3%), and the rest were included in the low criteria, 4 respondents (7.1%).

Table 3 Frequency Distribution of Respondents Based on Diastolic Values

Diastole	Characteristics	n	(%)
Pre-Test	Low	56	100
	Normal	0	0
	High	0	0
Post-Test	Low	0	0
	Normal	18	32,1
	High	38	67,9

Based on Table 3, the results of diastolic blood pressure conditions in Acute Myocardial Infarction patients before being given oxygen therapy or breathing aids were overall in low conditions, namely 56 respondents (100%). From the results of the frequency distribution above, the results of diastolic blood pressure after being given oxygen therapy or breathing aids were also obtained in high conditions, namely 38 respondents (67.9%). While the condition of normal diastolic blood pressure increased to 18 respondents (67.9%).

3. Respiratory Rate Overview in Acute Myocardial Infarction Patients

Table 4 Frequency Distribution of Respondents Based on Respiratory Rate Values

Respiratory Rate	Characteristics	n	(%)
Pre-Test	Low	10	17,8
	Normal	29	51,8
	High	17	30,4
Post-Test	Low	3	5,35
	Normal	50	89,3
	High	3	5,35

Based on Table 4, the results of the respiratory rate (RR) condition in Acute Myocardial Infarction patients before being given oxygen therapy or breathing aids were the most, namely 29 respondents (51.8%). From the results of the frequency distribution above, the results of the respiratory rate (RR) after being given oxygen therapy or breathing aids in normal conditions increased by 50 respondents (89.3%).

4. Relationship between the Use of Respiratory Assistance Devices and Blood Pressure, MAP (Mean Artery Pressure) and RR (Respiratory Rate) in Acute Myocardial Infarction Patients

Table 5 Cross Tabulation of Systolic, Diastolic, MAP and RR Blood Pressure with Breathing Assist Devices at Critical Care Unit

Hemodynamic Status	Breathing Aid (liters/minute)

(Blood Pressure, MAP and RR)	Nasal Cannula		NRM		Total	
Systolic blood pressure	**n**	**%**	**n**	**%**	**n**	**%**
Low	4	100	0	0	4	100
Normal	27	90	3	10	30	100
High	20	90,9	2	9,1	22	100
X^2		***p value* = 0,032**				
Diastolic Blood Pressure	**n**	**%**	**n**	**%**	**n**	**%**
Low	16	88,9	2	11,1	18	100
Normal	35	92,1	3	7,9	38	100
High	0	0	0	0	0	0
X^2		***p value* = 0,038**				
MAP (*Mean Artery Pressure*)	**n**	**%**	**n**	**%**	**n**	**%**
Low	4	66,7	2	33,3	6	100
Normal	35	70	15	30	50	100
High	0	0	0	0	0	0
X^2		***p value* : 0,021**				
RR (*Respiratory Rate)*	**n**	**%**	**n**	**%**	**n**	**%**
Low (<16)	8	80	2	20	10	100
Normal (16-24)	34	100	0	0	34	100
High (>24)	9	75	3	25	12	100
X^2		***p value* : 0,013**				

Based on Table 5 regarding the statistical test of respiratory aids, namely nasal cannula and NRM on hemodynamic status including systolic, diastolic blood pressure, MAP, and RR in the Critical Care Room, Surakarta, there is a significant relationship between the use of respiratory aids and hemodynamic status as evidenced by the value (p value <0.05).

Systolic and Diastolic Blood Pressure Conditions in Acute Myocardial Infarction Patients

Based on the condition of systolic and diastolic blood pressure in patients with Acute Myocardial Infarction (AMI) in this study showed that blood pressure decreased within the normal range. The condition of blood pressure in heart patients, especially in Acute Myocardial Infarction, there is an increase in afterload which will affect the heart's work process to be heavier. This will trigger hypertrophy in the left ventricle which will compensate for the increase in afterload, causing the need for oxygen in the heart to increase. (2).

The oxygen and respiration needs of Acute Myocardial Infarction patients can be met with breathing aids and patient positioning. This is in line with research that has been conducted that oxygen therapy is able to maximize patient needs with non-invasive nasal cannula aids according to the patient's condition (5). This management is carried out with the aim of stopping the development of a heart attack, reducing the burden on the heart, so that further complications do not occur. Therefore, the most important and first action in handling Acute Myocardial Infarction patients is the administration of oxygen therapy to maintain adequate oxygenation and be able to reduce the workload of the myocardium (2)

Respiratory Rate Conditions in Acute Myocardial Infarction Patients

The respiratory status of patients with acute myocardial infarction is the most important factor in one of the hemodynamic status monitoring. This monitoring is influenced by the provision of oxygen therapy. In addition to monitoring oxygen saturation, monitoring the respiratory rate is important. The provision of oxygen therapy greatly affects the hemodynamic status, one of the preventions for the expansion of AMI is by fulfilling oxygenation needs. Oxygen therapy is able to maintain adequate tissue and can lighten the workload of the heart muscles. Oxygen itself functions for cell sustainability. Handling AMI patients in achieving normal blood oxygen levels for tissue maintenance can reduce the workload of the heart's myocardium. In this study, the results showed that the respiratory rate of most patients had reached normal numbers (89.3%),

this was influenced by the provision of oxygen therapy and of course greatly influenced the increase in oxygen saturation. (2)

The respiratory rate itself is the respiratory rate that needs to be monitored for the hemodynamic stability of AMI patients. In AMI patients who experience a lack of oxygen, hypoxia will occur, causing the patient's respiratory rate to become irregular. (6)

Relationship between Use of Breathing Assist Devices and Blood Pressure, MAP (Mean Artery Pressure) and RR (Respiratory Rate) Conditions in Acute Myocardial Infarction Patients

Changes in hemodynamic status in Acute Myocardial Infarction are influenced by the composition of the central nervous system in the body. Hemodynamic status is controlled by the central nervous system, in this case the medulla oblongata. Changes in the patient's blood pressure, MAP, and RR status regulated in the medulla oblongata are influenced by systemic stimulation as a manifestation of changes in body physiology. The role of baroreceptors in receiving systemic stimulation will greatly influence the determination of changes in the hemodynamic status of blood pressure, MAP, and the patient's respiratory rate. The stimuli received by the baroreceptors are in the form of changes in pressure in the blood vessels that will be transferred to the heart control center in the medulla oblongata. The heart center will determine the frequency and strength of the heart in pumping which will ultimately result in compensation in maintaining balance in the patient's systolic, diastolic, MAP, and respiratory rate blood pressure. (7)

Conclusion

Based on the research that has been conducted, the conclusion that can be drawn is the stability of systolic, diastolic blood pressure, mean artery pressure (MAP) and respiratory rate in Acute Myocardial Infarction patients in the critical care room, Surakarta, there is a relationship between the use of nasal cannula and non-rebreathing mask (NRM), as evidenced by the following results:

1. Patients who experience hemodynamic stability including systolic, diastolic blood pressure, mean artery pressure (MAP), and respiratory rate are patients with Acute Myocardial Infarction STEMI and Non-STEMI (p value <0.05)
2. The better the fulfillment of oxygen therapy needs with respiratory aids that suit the patient's needs, which in this case are nasal cannula and non-rebreathing mask (NRM), the better the patient's hemodynamic status, especially in terms of blood pressure, mean arterial pressure, and respiratory rate which are important indicators in the stability of the condition of Acute Myocardial Infarction patients.

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