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The effect of change in body condition on blood pressure in Cardiac Care Unit

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ABSTRACT

Aims: the ultimate aim in myocardial infarction is exact monitoring and minimizing its aspects such as blood pressure that may be under the effect of body position in measuring time. The present study had been done with the aim of determining the effect of change in body condition on blood pressure of the patients with acute myocardial infarction hospitalized inCardiac Care Unit.

Methods: This study is an experimental study that 85 patients who suffer from acute myocardial infarction had been chosen with the available method from 22nd of Bahman hospital of Gonabad in 2012. Patients for 15 minutes were in supine sleeping position, in the Right and left Lateral, Semi-Fowler's and Fowler's position and blood pressure had been measured in every one of these positions. Data had been measured with the version 14 of SPSS software and nonparametric tests (Friedman tests) and descriptive statistic including: indicators of central tendency and distribution.

Results: Data analysis showed significant difference between blood pressure amounts in different positions. In a way that right hand and left hand systolic and diastolic blood pressures in sitting position had the most average and in the right-side sleeping position had the least average.

Conclusions: According to the importance of regular blood pressure monitoring in these patients, choosing appropriate body position for determining real blood pressure and to be informed of its changes in different positions of body in patients who suffer from myocardial infarction is very essential.

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1. Introduction:

Cardiovascular diseases are the most prevalent reasons of mortality in most of the world and in Iran [1]. Every year about 51 million and 100 thousand deaths happen that among these numbers, about 12 million and 775 thousand cases are related to cardiovascular deceases [2]. Also in Iran number of the people who suffer

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from cardiovascular diseases like other industrial countries of the world is increasing [3]. More stats of cardiac patients include myocardial infarction. Myocardial infarction is called to a process that in that process some parts of myocardial tissue are damaged and destroyed under the effect of complete occlusion of the coronary because of atherosclerotic plaque rupture and thrombus formation in the zone [4, 5, 6].

Despite the appearance of progressed treatment techniques for coronary artery disease and remarkable progress in taking care of the patients suffering from myocardial infarction, death due to this illness has not been decreased and it is still responsible for decreasing people's lifetime and years of productivity of their life before 65 years old[7,8,9]. So the most important action for these people is to minimize complications due to this disease [8]. While all the reasons of myocardial infarction has not been known, but clinical evidences indicate that several reasons participate in starting the disease process [4]. Destruction and necrosis of heart muscle that happen with every reason is an irreversible and dangerous complication that makes it necessary to hospitalize patients in CCU and to monitor and manage patient during all his/her lifetime [5].

One of the important and prevalent indicators in diagnosing, taking decision and continuing treatment and also preventing dangerous complications is the patients' blood pressure [10, 11]. Measuring and monitoring systolic and diastolic pressures of these patients have been used daily by treatment staff (doctors and nurses), because increase in blood pressure can cause increased cardiac workload and increased need for oxygen and following that exacerbation of symptoms [4]. So early diagnose of high blood pressure can prevent outbreak of serious complications in these patients [12].

Blood pressure during day is under the effect of several factors and once measuring of that cannot reflect real blood pressure of the patient [13]. So knowing the factors that effect on blood pressure can guarantee more accurate interpretation of the achieved measurements because many of the decisions and necessary measures for the patient are taken according to the measured blood pressure [12, 14, 15, and 16]. So it should be noted to the importance of measuring real blood pressure and health staff specially nurses who are present on the patient's bedside day and night should control or minimize environmental factors that can effect on measuring blood pressure [10, 11, and 17]. Among the most important factors, consuming drugs and increasing body metabolism [12], change in body temperature [18], daily rhythm [19], body position [20] and accuracy of devices [18] can be named. One of the factors that are discussed is the position of body in the blood pressure measuring time [20]. Patients who are suffering from myocardial infarction are limited to rest in the bed because of some reasons such as decrease in oxygen consumption [4].

Although semi-sitting position is not recommended for these patients [12], but the fact is that putting patients on the CCU bed in this position during all the hospitalizing time and during night and day is not possible and practicable and most of the time treatment team for assessing these patients and determining cardiovascular indicators encounters with different positions of the patients and in measuring indicators and decision for patients' treatment-care protocol usually it is not considered and reported that what was the position of the patient exactly before measuring. From the other side this long-term bed rest and in semi-sitting position is hard and impossible to impose for many of the patients. So according to the central role of the nurses in preventing and taking care of these patients and regarding that the studies about the effects of change in body position, there was no study with this form in the information banks . the present study had been designed and performed with the aim of determining the effect of change in body position on the blood pressure of the patients who suffer from myocardial

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infarction in order to make an effective action for improving care quality and in the way of controlling the effect of treatment and preventing complications of these patients.

2. Methods

This study was a semi-experimental study that in this study samples included patients with acute myocardial infarction hospitalized in CCU in 2012. In order to determine number of the samples similar studies had been used. With considering 95% confidence and Power of Test in 80%, 85 people had been estimated as the samples of the study and they had been chosen by available method (because of limitation in the number of the patients with acute myocardial infarction. This study did not have control group. The considered criteria for choosing every one of the participants included: conscious participation in the study, absolute disease of myocardial infarction, within 24 hours myocardial infarction outbreak , to have appropriate conditions for changing the position with detection of cardiologist, not having abnormalities of thyroid hormone, not having congestive heart failure, not having orthostatic hypotension, not having cardiogenic shock and underlying lung disease, not having cardiopulmonary resuscitation (CPR) experience, not having physical limitations such as fracture, any shift or special disease for patient during the study that with the cardiologist's idea body position changes for the patient is not allowed or possible are among exclusion criteria. These conditions were controlled by the research team and specially cardiologist that as the responsible therapist and doctor was the member of the research team. Before doing the research and in the sampling stage taking work permit from regional committee for research ethics of Medical University of Gonabad and coordination with the research environment had been done.

Data collection tools included information form: including two parts (1.demographic information and figures related to the patient 2. Form of recording blood pressure after every change) that it had been given to 10 professors for justify ability and it had been collected after achieving the ideas and had been confirmed and reviewed by faculty advisors. Also reliability of the tools had been determined by test retest method (t=0.74) and internal coherence of tools had been determined by Cronbach's alpha (α=0.89).

After choosing the samples that had the conditions of entering the study and their informed consent, at first through interview and assessing the patients' records, the forms had been completed by the researcher and they (right hand systolic blood pressure, left hand systolic blood pressure, right hand diastolic blood pressure, left hand diastolic blood pressure) had been measured by standard barometer (made in Iran from Sadat company). For barometer reliability, reliability equivalent had been used, in this way that every day before doing the work, the accuracy of the device had been controlled by another barometer device. Then the patient was in semi-sitting position for 15 minutes and the patient's blood pressure had been measured and documented. Then the patient was in semi-sitting position and after 15 minutes blood pressure was measured and documented again. For supine position, left side sleeping position, right side sleeping position also this process of measurements had been repeated and documented in the checklist. So every patient in every stage was compared with himself/herself in the last stage.

In order to analyze the data version 14 of SPSS statistical software had been used. About quantitative variables at first their distribution from neutrality point of view had been assessed by using Smironoph Kolmogroph that it had been cleared that the documented numbers of Systolic and Diastolic blood pressure do not obey the normal distribution. So for comparing these variables, nonparametric equivalent such as Friedman test had been used and the average of the variables had been determined by using average and standard deviation. P in the level less than 0.05 had been considered significant.

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Table 1: Distribution of the samples of the study according to the average and standard deviation of age, size, weight and hospitalization time.

indicator	Average and standard deviation
age (year)	67.22±10.12
size(cm)	161.46±5.81
weight (kg)	61.6±8.69
hospitalization time	3.0(day)

Table 2: comparing of right and left hand systolic blood pressure in different positions of the body

indicator / position	Average and standard deviation	Statistical test result (Friedman)
Right hand:		p<0.001 df=4
Right side sleeping	101.75±15.01	
Left side sleeping	106.79±15.57	
Semi-sitting	113.63±17.73	
Sitting	118.98±21.7	
Supine	110.05±16.15	
Left hand:		
Right side sleeping	102.75±23.16	
Left side sleeping	111.87±15.39	
Semi-sitting	119.69±17.1	
Sitting	126.75±20.7	
Supine	114.88±15.67	

Table 3: comparing of right and left hand diastolic blood pressure in different positions of the body

indicator / position	Average and standard deviation	Statistical test result (Friedman)
Right hand:		p<0.001 df=4
Right side sleeping	59.44±13.3	
Left side sleeping	63.30±12.8	
Semi-sitting	66.70±11.95	
Sitting	70.55±15.45	
Supine	63.88±12.01	
Left hand:		
Right side sleeping	66.40±13.85	
Left side sleeping	68.05±12.2	
Semi-sitting	73.65±13.98	
Sitting	8088±14.06	
Supine	70.38±12.18	

3. Results

Findings of the study showed that most of the samples of the study were men (67.1%) with the average age of 67.22. (23.5%) of the patients had the history of smoking. (42.4%) were the people with primary education. 72.4% of the patients did not have history of hospitalization. Other patients' demographic specifications are in table 1.

Regarding the effect of change in body position on patients' systolic blood pressure suffering from acute myocardial infarctions between levels of right hand systolic blood pressure in different positions of the body, statistical test showed significant difference.

Also the results of the test showed that different positions of the body regarding the effect on left hand systolic blood pressure have significant difference. Table (2) shows the average of documented systolic blood pressure in both right and left hands in different positions of the body.

Regarding the effect of different positions of the body on diastolic blood pressure also statistical test results showed that after change in patients' position in semi-sitting, sitting, supine, left side sleeping, and right side sleeping , there is remarkable decrease in the average of right hand diastolic blood pressure. Regarding left hand diastolic blood pressure also the results showed that in positions of right side sleeping, left side sleeping, semi sitting, sitting and supine the average of blood pressure is different that the acquired difference was significant statistically ($p<0.05$) (table 3).

4. Discussion

In the present study we assessed the effect of several positions on the changes of' systolic and diastolic blood pressure of the patients who suffer from acute myocardial infarction that the results clearly showed significant differences between achieved numbers of blood pressure in different positions of the body.

According to the findings right and left hand systolic and diastolic blood pressures in sitting position showed the most average and in right

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side sleeping showed the least average. Also changes in right hand systolic and diastolic blood pressure had lower average in compare with left hand.

Different studies know many factors involved in pathophysiology of the effect of change in body position although involved mechanisms in this subject is not still completely known [21,22,23] heart situation is one of these factors. The heart is located on the left side of the body, so when the patient is in the position of right side sleeping, heart is in higher level and less energy is consumed for pumping blood so may be blood pressure decreases [24].

Also venous return is another factor that decreases with the patient in sitting and semi-sitting positions in compare with supine and sides positions and causes to activate mechanism of baroreceptor action and in the result provoking the activity of sympathetic system [25].

Also in right side sleeping position, the activity of parasympathetic system decreases [24] that all the factors can cause difference in blood pressures in different positions of the body.

So the above cases are among the reasons that could cause difference in blood pressure in different positions in the present study.

Regarding this also Khorshidi in his study compared the effect of different positions on blood pressure of 157 healthy young men by measured blood pressure in three positions of supine, standing and sitting and achieved this result that blood pressure in standing positions has more tendency to decrease while blood pressure in supine position is higher than the other two positions [26].

It is not in consistent with the results of the present study from this point of view. Difference of the results of his study is probably because of the difference in physical condition of the people of the study that has influenced the average of the changes in blood pressure.

Also Park in his study showed significant difference in right and left hand blood pressure of the healthy people that was in consistent with the results of the present study.

In his study there was 1.01 mm Hg difference between right hand systolic blood pressure in right side sleeping and supine positions while this difference between left hand systolic blood pressure in right side sleeping and supine positions was 150/70 mm Hg. From one side the difference in right hand systolic blood pressure in left side sleeping and supine positions was reported 0.38 and about left hand diastolic blood pressure in right side sleeping and supine positions it was reported 100/86 mm Hg [27].

Najafian et al. in his study put the patients that suffered from myocardial infarction in sitting, supine and semi-sitting positions for 15 minutes.

Then in fifth and twelfth minutes after every change in position, their blood pressure had been measured and it did not have significant statistical difference.

Although the numbers of the average of the mentioned indicators showed a little increase at time of change in position from supine to semi-sitting and from semi-sitting to sitting. Difference of the present study with Najafian's study is probably because of the difference in the numbers of the samples (in Najafian's study the samples were 30) and difference in the method of doing the research that influenced in the average of blood pressure changes [28].

In another study that was done on 19 patients suffering from high blood pressure and with the age of 18-35 years old in order to assess the effect of sitting, prone and supine positions on blood pressure, the results showed that in comparing of supine and prone positions: blood pressure in prone position was higher than supine position.

Also it has been reported that blood pressure in prone position is higher than sitting position while number of heart rate in compare with that had been counted less [29].

Also John's et.al did a study with the name of the effect of change in position on the hemodynamic indicators of the healthy people

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that its results were in consistent with the present study.

They assessed the effect of change on blood pressure after that they put the samples for 15 minutes in positions of supine, sitting on the chair, right and left side sleeping, sleeping with the head 30 degrees down. Results showed that blood pressure in right side sleeping position (blood pressure=87/56) had the least number and in sitting position (blood pressure=103/73) had the most number [16].

In another study that was done in order to determine the effect of three positions of left side sleeping, sitting and semi-sitting on blood pressure, it was cleared that in left side sleeping position in compare with semi-sitting position and in semi-sitting position in compare with sitting position blood pressure has more tendency to decrease. In a way that blood pressure in left side sleeping, semi-sitting and sitting positions had been respectively measured 115/70, 120/79, 121/78 mm Hg [30].

Totally it can be said that in different studies the effect of body positions on blood pressure was different that this issue can show the importance of choosing proper position for taking blood pressure.

This issue is especially more important about patients who are hospitalized in CCU. Among the limitations of the present study it can be pointed to lack of using control group and lack of using randomly sampling because of limitation in the number of the patients with acute myocardial infarction.

We are hopeful that in the future with fixing these defects more coherent and exact studies are going to be done in order to confirm the effects of every one of these positions on blood pressure.

5. Conclusions

The results of this study showed that putting the patients in different body positions can have different effects on blood pressure of the patients who suffer from acute myocardial infarction. So nurses as the most pivotal care taker of these patients should be familiar with the effects of every one of these positions in order to be able to do the best and the most exact monitoring of the cardiovascular system with making proper position change for the patients and to prevent more complications in them.

Measuring, recording and reporting of the blood pressure without considering body condition cannot indicate the real amount towards other body positions and cannot be a basis for clinical decision.

So in addition to the measured amount every one of blood systolic and diastolic pressures of the patients suffering from myocardial infarction that even little changes of that are very important from clinical and decision taking point of view in treatment and medical interventions, also body condition at the time of measurement should be considered that in the present conditions it is mostly ignored.

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