Effects of Early Mobilization Program on the Frequency of Pain and Duration of Hospitalization of Patients with Myocardial Infarction

Mohammad Reza Asgari (Ph.D), Hasan Ali Jafarpoo (M.Sc), Mohsen Soleimani (Ph.D), Raheb Ghorbani (Ph.D), Rahimeh Askandarian (M.D), Iraj Jafarypoor (M.D)

Background: Today, cardiovascular diseases are the major life-threatening and human health factors. Among cardiovascular diseases, myocardial infarction (MI) is a medical emergency case that causes high mortality. One of the medical and therapeutic priorities in patients with myocardial infarction is pain reduction and prevention of complications of immobility. The present study is performed aiming at determining the impact of the early ambulation program on the frequency of pain and hospitalization in patients with myocardial infarction. Materials and methods: In a clinical trial, 38 patients with myocardial infarction admitted to the CCU of one of the hospitals of Babol city were included to the study. Among available patients, samples with inclusion criteria were selected using purposeful sampling method and they were included into experimental and control groups randomly. The experimental group included 12 patients and his hospitalization period, and the control group were out of the bed within 48 hours of admission as routine. Frequency of chest pain expressed by the patient was recorded in the nursing report and hospitalization period in patients' case routinely, and the two groups were compared based on it. Findings: Mean pain frequency in the experimental group was 1.4±1.6 and control group was 2.7±1.9 which was significantly different (P=0.02). The mean duration of the hospitalization for test group was 4.4±1.1 and control group 6.1±1.4 that were significantly different (P<0.001). Conclusion: The results showed that the early ambulation program was effective in reducing the patients' pain frequency and his hospitalization period, therefore, based on the results of this study, the use of this program can be recommended to care for patients suffering from myocardial infarction and increase their comfort.

INTRODUCTION

Cardiovascular disease is one of the most important causes of mortality at older ages [1]. Despite the great progress that has been made in medicine, cardiovascular diseases are still one of the main causes of death in the developed countries and the third world societies [2].

Today, cardiovascular disease is as a problemmatical epidemic due to the phenomenon of modernization and technological progress and population density in developed or developing countries. According to different statistics, 20-45% of total mortality in different communities raises from cardiovascular events and diseases [3]. It is estimated that by 2020, cardiovascular disease continues to be the leader in the diseases worldwide which reduced the performance of people due to disability and premature death [4]. Although by 2020, heart disease will kill 25 million people annually [5].

Corresponding Author: Mohsen Soleimani, Dept. of Medical-Surgical Nursing, Faculty of Nursing and Allied Health, Semnan University of Medical Sciences, Semnan, Iran. E-mail address: soli257@yahoo.com., Tel & Fax: +98 23 33654191
According to the studies in Iran, cardiovascular diseases are the most common causes of death and it is as a major health and social problem. Mortality caused by cardiovascular diseases with 4.6 per 10,000 populations, accounted for the largest share [6]. Statistics of mortality in Iran show that 38% of all deaths and 23.4% of life lost is due to cardiovascular disease [7].

Among cardiovascular disease, myocardial infarction (MI) is the most common. MI causes following occlusion of one of the coronary arteries and interrupting blood flow to the heart tissue part causes necrosis and tissue death [8]. The major cause of coronary artery disease is atherosclerosis. Coronary artery atherosclerosis can interfere the blood supply to the heart tissue, and causes serious disorders such as angina pectoris, MI, congestive heart failure, and sudden death [9].

MI is often associated with symptoms such as chest pain, sweating, weakness, nausea, arrhythmias, and in some cases with loss of consciousness and death [8]. Chest pain is a common symptom of MI which exists in 80% of patients. The intensity of the pain was too much, so the patients know it as the most severe pain during their lifetime. In the treatment of MI, relieving pain is prior to other actions because continuity of pain is a sign of progress in MI. Pain is considered as a stressor because increases catecholamine by stimulating the sympathetic nervous system, resulting in increased heart rate and cardiac contractility, and generally increases the myocardial oxygen demand and increases the size of the MI [10].

An effective health care strategies and recommended for MI in the early hours of the onset of symptoms is bed rest [11]. Although bed rest reduces the workload of the heart and avoids impaired myocardial profusion and its repair and it is recommended as a method of care and treatment for patients with MI, however, prolonged immobilization can cause certain side effects that may prolong the recovery process and discharge [12].

The rest more than 6 to 20 hours in bed is called prolonged bed rest. [13] Historically, since 1900, patients with MI rest in bed for 6 to 8 weeks and this continued until 1960 to improve MI, unlike in the past, today it is recommended that to neutralize the negative effects of bed rest, the patient must start activity from the first day after MI monitored and controlled [14]. The benefit of early ambulation is that it increases the comfort of the patients [12]. Also, early ambulation reduces hospitalization thus causes nursing workload reduction [15].

Since the bed rest, as a treatment item has systemic and local effects, it is necessary to consider the effects [16]. Several studies have shown that in surgical wards, early ambulation in patients after surgery is very effective in reducing the side effects and causes a feeling of satisfaction in the patients [17]. Other studies have also shown that early ambulation in patients after coronary angiography is not only safe and doesn’t enhance the vascular complications, but also increases patient comfort [18, 19].

Although the effect of early ambulation in patients with MI during hospitalization is not clear, but some studies have shown that this procedure can reduce mortality in these patients by 15% [13]. Results of other studies indicate that rehabilitation in the acute phase of MI can reduce the adverse effects after prolonged bed rest and reduces the length of stay in the hospital [11, 12].

Today, some experts suggest that in the absence of complications, patients with MI without ST-segment elevation does not need to be limited in bed more than 12 hours, unless they have problem hemodynamically [20]. By virtue of the foregoing, today the early ambulation programs have been recently developed by nurses (as part of cardiac rehabilitation programs in hospitals). Not only the programs have improved physical and heart status, but also improve the mental condition of the patient before discharge from the hospital [13].

Despite the positive effects of early rehabilitation programs and physical activity in reducing complications and improving the patients mentality in other clinical situations has been proven [18, 21, 22], but the effect of early ambulation in patients with MI during hospitalization is not still clear, although it is clinically important. Given the importance of determining the effects of early ambulation of patients as part of the initial treatment on the outcomes of the disease [13], we decided to conduct a study with the purpose of "measuring the effectiveness of early ambulation on the frequency of pain and hospitalization in patients with myocardial infarction".

MATERIALS AND METHODS

This quasi experimental study – type clinical trial- (clinical trial registration No.: IRCT201201138717N1) was conducted in 2012. In this study, 38 patients with MI admitted to the CCU one of the hospitals of Babol city, were selected as samples who had the conditions appropriate for entry into the study (including: age less than 75 years, the absence of hemodynamic impairment, lack of atrioventricular block types two and three, absence of heart complications, no acute psychiatric disorders and movement disorders). The sample size, according to the formula of estimating the sample size

\[ n = \frac{(\sigma_1^2 + \sigma_2^2)(\alpha_1 + \alpha_2)^2}{(\mu_1 - \mu_2)^2} \]

with a confidence coefficient 95% and 80% test power, was estimated at least 24 people, but for more accuracy, sampling was continued up to 38 (19 in the test group and 19 in the control group). In this study, among the patients available, samples with inclusion criteria were selected by purposive sampling method and were randomly divided into experimental and control groups. In addition to control the age and sex variables, randomized block design was
used. In a randomized block design for age, two cases equal to or above 60 years and below 60 years were considered. For sex, men and women were considered.

In the research, data collection was done by the questionnaire. Questionnaire consists of two parts. Part one was about patient demographic information (including age, gender, education level, weight, medical history, type of stroke, patient stroke level), and the second part was about the frequency of chest pain in patients (expressed by the patient in the nursing report) and the duration of hospitalization (recorded in the case of patients). Comparing the two groups was performed on the basis of the information.

Ethical considerations were considered in this study. The sampling was started after the approval of the ethics committee of the department of medical sciences, University of Semnan and permission of the hospital authorities and the CCU ward. Researcher, referring to the relevant ward, selected patients who were suitable for inclusion. By introducing himself to the samples, the researcher explained to them the confidentiality of the data and the objectives of the study. Then their written consent was obtained to participate in the study.

In the test group, the early ambulation program that was designed by the researcher and based on reliable sources (10, 20), was started with the help and supervision of the researcher, and 12-18 hours after hospital admission and can be up to 72 hours afterwards. In the control group, patients' ambulation was done according to the routine schedule, 48 hours after admission and with the help and supervision of the researcher.

In all patients in both groups, the patient's chest pain was recorded in the nursing report accurately. The patient's hospitalization duration in at the time of discharge was recorded in his case. The two groups were compared on the basis of the recorded information.

To analyze the data, the descriptive - inferential statistics methods were used. Using absolute and relative frequency tables, the research data were described, categorized, and compared. Using SPSS version 16 and Kolmogorov - Smirnov tests (to verify the data normalization) and T independent (to verify the difference between the means), data analysis was performed at asignificant level (P < 0.05).

Findings:

In this study, 38 patients were diagnosed with MI who was included in control and test groups. The two groups were matched in terms of sex, age, education, and disease background and had no statistically significant differences. The mean age of the subjects in the experimental group was 57.1 and in the control group was 63.

In this study, the results obtained are shown in Tables 1 and 2. Table 1, in relation to the relative and absolute frequency distribution of subjects on the frequency of pain shows that in the experimental group, the majority (47%) had no pain, whereas in the control group, the majority (47%) had pain for three times or more. T-test results showed that the frequency of pain in both experimental and control groups was significantly different (P = 0.02).

Table 2, in conjunction with the relative and absolute frequency distribution of subjects according to duration of hospitalization indicates that in the experimental group, the majority (37%) had a bed rest for 5 days and the majority of control group (58%) had a bed rest for 6 days or more. T-test results showed that the duration of the bed rest in test and control groups was significantly different (P < 0.001).

Discussion:

Different pharmacologic and non-pharmacologic strategies are performed to prevent side effects of long hospitalization of patients with MI in CCU. A non-pharmaceutical strategy to prevent these complications is the early ambulation and rehabilitation program for patients with MI. The study is done in line with the objectives to
determine the effect of the early ambulation on the frequency of pain and hospitalization period in patients with MI.

In connection with the first aim of this study that is, determining the frequency of pain in patients with MI in the early ambulation and control group and comparison of it in both groups, the results indicate that mean frequency of the pain in test group is 1.4 and in control group is 2.7. The independent t-test results showed that the frequency of pain in both experimental and control groups was significantly different ($P = 0.02$). In a study by Fayyazi entitled "effect of Benson relaxation technique on pain after coronary artery bypass surgery", the results showed that the mean severity of pain before and after the intervention of the case group and also between test and control groups was statistically significant [23]. Also the results of study by Mohammadifar entitled "effect of cardiac rehabilitation on lipid profile", Davoodvand entitled "effect of short-term cardiac rehabilitation on relapse, rehospitalization in patients with MI", and Husseini, entitled "effect of cardiac rehabilitation program on clinical outcomes and rehospitalization in patients after coronary artery bypass surgery" were consistent with our results showing that the pain in the treatment group compared with the control group was statistically reduced [24-26].

Evidences suggest that physical activity through increasing opioids may have beneficial effects on pain relief in certain conditions [27]. Some researches consider the favorable effects of physical activity in increasing the level of opioids of brain like β endorphin whose role in pain relief is proven. Enkephalins and androphinsare natural and internal neural peptides that have an opioid activity in the brain and the gut. This means that these peptides imitate the activity of morphine and other opium alkaloids active spatial isomers. Brain is able to build quasi-opioid compounds and any factor that increases these compounds in the brain and creates other opioid receptor agonists and morphine effects. Exercise increases the release of androgens opioid peptides, particularly beta endorphin and raises the pain threshold. It is assumed that the beta endorphin increases during exercise change the temperament and individual sensitivity to pain and release of endorphins create a quasi-opiate in person. It is also shown that exercise stimulates the release of endorphins approximately 30 minutes after starting the activity. Released endorphins tend to minimize the pain and suffering caused by sports activities and even is related to the sense of euphoria and pleasure, but there is some doubt whether endorphins are directly responsible for that or neurotransmitters such as dopamine and serotonin causes these effects [28].

One of the causes of pain increase in control group may be due to an increase in anxiety in the patients due to prolonged hospitalization following the MI. The results show that a significant correlation exists between the intensity of anxiety and pain in the chest, palpitations, myocardial insufficiency ($P < 0.001$) and the prevalence of symptoms increases by increasing the anxiety [29]. In fact, anxiety lowers the threshold of pain and the anxious feel the pain more than a normal person [30].

In relation to the second objective of this study based on determining the mean hospitalization period in patients with MI in early ambulation group and the control group and comparing the two groups, the results indicate that the length of hospitalization in both control and test groups was significantly different ($P < 0.001$). In a study by Lopes et al., in relation to the effects of early ambulation and early discharge of patients with acute myocardial infarction, the results showed that the group with a mean early ambulation of 16.2 days and the group with late ambulation with an average of 20.9 days are significantly discharged sooner from the hospital [11]. Mandy in another study, entitled "the effect of early ambulation in hospitalized patients with acquired pneumonia concluded that the length of hospitalization in early ambulation group was 5.8 and the late ambulation group was 6.9 days, respectively, and the difference was statistically significant [31].

The results of these studies are consistent with the results of our study and indicate that early ambulation in patients can discharge them sooner from the hospital. Increasing the duration of hospitalization in the control group may be due to the fact that longer rest increases anxiety in patients. Generally, a patient who is anxious has fewer roles in the care of himself and his hospitalization will be longer [32].

The limitations of this study were as following: due to the particular circumstances of this study in terms of limitation in the data collection and studies, it is not possible to follow and investigate the frequency of chest pain after discharge and in long-term, so it is recommended to conduct more comprehensive studies in future and to investigate the number of times of chest pain for at least 6 months after the onset of myocardial infarction and discharge from the hospital to present a better comparison and review of the long-term effect of the intervention.

**Conclusion:**

Based on the results obtained from this study, it can be concluded that, early ambulation is effective in the frequency of pain reduction and duration bed rest, sobased on the results, it can be suggested that the nurses consider the method in treatment and care of patients with myocardial infarction and increase their comfort.
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