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The effect of foot massage on quality of sleep in ischemic heart disease patients hospitalized in CCU

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ABSTRACT

Aims: Poor quality of sleep is the predictor of adverse outcomes in ischemic heart disease patients. Nursing measures have been important for improvement of quality of sleep in these patients and these measures are effective in reducing their mortality rate .The purpose of this study is determining "the effect of foot massage on quality of sleep in ischemic heart disease patients hospitalized in CCU".

Methods: It was a clinical trial study which was done in 2013. In this study 60 patients with ischemic heart disease were selected through convenient sampling and they were randomly divided into two experimental (n=30) and control (n=30) groups. In experimental group, foot massage was performed 20 minutes for each patient in two consecutive nights and control group was under usual care. Data collection tools included; demographic questionnaire and St. Mary's Hospital Sleep Questionnaire (SMHSQ). Data analysis was done by using descriptive and inferential statistical tests (chi-square, independent t-test, Paired t-test) through using SPSS16 software.

Results: Results showed that there is a significant difference between the scores mean of quality of sleep before and after foot massage in experimental group (p=0.002). But there was no significant difference between the scores mean of quality of sleep before and after receiving usual care in control group (p= 0.964). There was no significant difference between the scores mean of quality of sleep in the two experimental and control groups before foot massage (p=0.64). But there was significant difference after the intervention (p= 0.01).

Conclusions: Foot massage improves sleep quality in heart patients and considering low cost, lack of complications and easy procedure of this method; it is recommended for improvement of sleep quality in patients with ischemic heart disease.

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1. Introduction

Coronary artery disease is one of the cardiovascular disorders that are caused because of occlusion of heart coronary arteries. In this problem, the wall of one or more heart coronary arteries is blocked fully or partially because of precipitation of some materials

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called plaque (fat or fiber material) and blood flow to different parts of the heart is stopped permanently or temporarily [1].

According to the global health organization report in 2002, 22% of deaths in the world and 37% of deaths in Iran have been because of cardiovascular diseases. This amount of death was reached to 41.3% in 2005 and unfortunately, it is predicted that this amount is going to reach to 44.8% until 2030 [2]. Patients with heart disease usually are suffering from sleep disorders because of disease procedure and fears due to that. This issue deteriorates their disease [3].

Sleep is an active process that is regulated through central nervous system, neutral factors, endocrine glands and behavioral factors [4]. Sleep and rest are essential components of physical health, mental comfort and energy saving. Convenient and appropriate sleep accelerates process of individual's physical and mental improvement [5, 6]. Some studies found out a kind of relationship between sleep disorders and heart events, for example Gustafsonfi quoted from Mason (2000) that disruption of the sleep onset is a kind of dependent risk factor in creating cardiac events in men [7].

People hospitalized in intensive unit have poorer sleep quality in compare with their sleeping at home [8]. Poor sleep quality is the predictor of adverse outcomes in patients with heart coronary artery disease and reforming factors that cause poor quality of sleep may decrease complications and death in patients with coronary artery disease [9], so that poor quality of sleep as a stressful situation causes epinephrine and norepinephrine release which leads to increase of heart rate, respiratory rate, blood pressure level, the amount of myocardial oxygen requirement, heart dysrhythmia and decrease of renal perfusion and these factors finally lead to exacerbation of myocardial ischemia and infarction [10].

Nurses should pay more attention to patients' need to sleep and rest in ICUs. Many patients' sleep is disturbed by different factors and there are different ways for dealing with these factors. Despite all the emphases and warnings about adverse effects of sleep deprivation in hospitalized patients specially those who are hospitalized in CCUs, still there are many patients who are suffering from problems due to sleep and rest disorders which cause increase of medical expenses and patients' long-term hospitalization [11]. So one of the nurses' measurements and responsibilities for promoting patients' health is performing some measurements for improving their sleep quality [12]. Although pharmacotherapy influences improvement of patients' sleep quality, drugs complications and difference in patients' responses to drugs are important, the solutions is decreasing drugs dose and using other nursing measurements [11].

Different nursing measurements have been performed as complementary health methods for helping patients to meet their physical and mental needs which include; mental imagery, gradual and progressive relaxation, music therapy and massage [13]. Actually massage is a standard nursing intervention and it is an important part of health care [14]. Using massage in different parts of the body for increasing patients' comfort was common in nursing long time ago.

Massage in Nursing Intervention Categorization (NIC) which was provided by Iowa University and national institute of nursing researches is among non-invasive simple and relaxing treatments which is done by nurses and other health care providers with the aim of decreasing unpleased symptoms and signs such as pain, muscle strain, anxiety, improvement of blood flow and relaxation [15]. Massage decreases stress and anxiety, relives pain, causes physical relaxation and causes patient-therapist energy transferring and it is used as a general manipulation of soft tissues of body for restoring metabolic balance in these tissues.

Short-term usage of massage can have therapeutic effects for hands, feet, neck and shoulders. But many massage therapists focus on foot massage because of lack of adequate

time for massaging all the body; among its benefits, it can be pointed out to physical and mental relaxation, decrease of stress and improvement of sleep [13]. Some mechanisms that make massage therapy effects are determined, for example pain relieving effects can be because of valve control mechanism that according to this theory, pressure massage reaches brain faster than pain. From the other side, increase of serotonin, dopamine and decrease of P substance during massage lead to improvement of depression. Also it seems that; the effects of sleep improvement are related to the mechanism of stimulating production of endorphins [16].

Since inappropriate sleep quality as a stressful situation increases pulse rate, respiratory rate, blood pressure, myocardial oxygen demand, cardiac dysrhythmia, decrease of renal perfusion and all these factors finally lead to exacerbation of myocardial ischemia and infarction and considering central role of the nurses in helping patients for meeting their needs to sleep and rest and since according to the available information, there are little studies about the effect of foot massage on sleep of the patients hospitalized in CCU, the researcher decided to conduct a study with this topic and in the case of positive results, suggests it as a non-pharmacological intervention for improvement of sleep quality of these patients and the study was done with the aim of determining "the effect of foot massages on quality of sleep in ischemic heart disease patients hospitalized in CCU".

2. Methods

It was a clinical trial study with two experimental and control groups and the study population was patients who had the inclusion criteria and were hospitalized in CCU of Ekbatan hospital in Hamedan in 2013. The researcher started to select sample after achieving permission from the Medical Sciences University of Hamedan and patients' satisfaction. For calculating samples, study of Naji et al. [17] was used and they were calculated with the following formula:

$$n = \frac{\sigma^2 \left(z_{1-\frac{\alpha}{2}} + z_{1-\beta}\right)^2}{\left(\mu_1 - \mu_2\right)^2}$$

In this formula $\sigma^2 = \sigma_1^2 + \sigma_2^2 - 2\rho\sigma_1\sigma_2$, $\sigma_1 = 0.81$, $\sigma_2 = 0.76$, $\mu_1 = 1.47$ and $\mu_2 = 0.75$ are standard deviation and mean score of sleep quality before and after intervention and P is considered equal to 0.1. Test confidence and test power are considered respectively; 95% and 90%. The least number of the samples for every group was estimated 23 and for more accuracy 30 people were randomly chosen for every group through convenient sampling (quaternary randomized blocks, Balance Block randomization).

Intervention and control groups were randomly allocated to A and B letters, in this way that for every block with four patients, a 2-assignment different randomized order was provided for every treatment. For this purpose 6 sheets were used and all the possible states were written on these sheets like this: AABB for number 1, ABAB for number 2, ABBA for number 3, BBAA for number 4, BABA for number 5 and BAAB for number 6, then choosing numbers was done by the table of random numbers that for this purpose 1 to 6 are selected randomly. In this regard, allocation of the treatments to the patients is done).

Samples were divided into two experimental (30 people) and control (30 people) groups. Inclusion criteria included: being in 30 to 80 years old, being sober, not being susceptible to foot massage and the ability to endure massage, lack of suffering from coagulation disorders and diabetes, lack of addiction to drugs and alcohol, lack of lower-extremity amputation, no broken legs, wound, infection and skin disease and exclusion criteria include: death, discharge, patient's deteriorated condition and the history of chronic sleep disorders. Data collection tools

included; a two-part questionnaire, the first part measures demographic information and includes; diagnosing disease, age, marital status, educational level, occupation, smoking and using drugs, number of the family members, believing or not believing in traditional and complementary medicine and history of depression and anxiety (according to the psychiatrist's opinion) and face validity of this part is confirmed. The second part is St. Mary's Hospital Sleep Questionnaire (SMHSQ) that is designed for evaluating sleep quality of the hospitalized patients in the last night and includes 8 questions about sleep quality.

The questions were about the amount of a day and night sleep, depth of sleep, sleep quality, the amount of satisfaction with sleep, the amount of waking consciousness, waking numbers during sleep. This questionnaire is measured according to the following scale: 1 for never, 2 for very little, 3 for a little and 4 for many. The lowest score for sleep disorder is 8 which mean lack of problem and the highest score was 32 which means the highest amount of sleep disorder. Scores 8 to 16 show slight sleep disorders, 16 to 24 moderate sleep disorders and 24 to 32 severe sleep disorders.

In this study content validity method was used to determine validity of the checklist and data recording sheet. For this purpose 15 of the questionnaires were given to the faculty members of Nursing and Midwifery College of Medical Sciences University and health services of Hamedan and 2 cardiologists and two respectful staffs of CCU and one statistic advisor. Considering their reform suggestions and the supervisor professors and consultant, some changes were performed and it was used after achieving its final approval. This questionnaire has been evaluated in many studies. For example Moyeenie et al. (2010) [18] and Gergour et al. (2005) [19] used this questionnaire and achieved its reliability 0.91 by using Chronbach's alpha and approved its validity and in this study it was 0.87.

At first, sleep quality of the patients in the two groups (control and experimental groups) that are hospitalized in the same unit is going to be measured by SMHSQ questionnaire. After achieving written consent and physician's permission, the researcher refers to the experimental group at night at about 9-10 P.M, and after pulling the curtain or partition, the researcher put the patient in supine position and made the patient's foot fat for one minute by using baby oil, it is while patients' feet were straight on the bed and metatarsus is almost perpendicular to the bed surface.

Foot massage is going to be done through slow movements from the ankles to down part of the foot for twenty minutes (every foot 10 minutes) in two consecutive nights. It should be mentioned that patients were massaged by their same gender. The next morning at 8 o'clock, the researcher measured patient's sleep quality, by using the same initial questionnaire. The method of foot massaging was like this: 1. while patient's foot is upward by using thumb or other fingers, slow pressure between tendons of the wrist and fingers 2. Metatarsus from heel to the lump under toes was rubbed by thumb. 3. Patients' toes were stretched along each finger and then bent forward and backward. 4. The base of every toe is held between thumb and other fingers and the toes were stretched along each one to the top and pulled outward and rotated.

After the end of massaging one foot, the above measures were respectively started and performed for another foot [13]. There was no foot massage intervention in control group and only in the parallel hours with experimental group, sleep quality questionnaire was given to them for answering. It should be mentioned that sleep medications were used for these patients (experimental and control groups) in CCU routinely, in addition the amount of receiving sleep medications in both groups were measured according to other studies [20]. Placebo group was not used since the aim of this study was assessing the effect of merely metatarsus massage on sleep quality and special points of the body (false points) were not considered. Data analysis was done by using

SPSS 16 software and ($p<0.05$) was statistically significant. Chi-square, independent t and paired t tests were used for analyzing data.

3. Results

In experimental group, 46.7% (14 people) of the patients were male and 53.3% (16 people) of the patients were female and in control group 66.7% (20 people) were male and 33.7% (10 people) were female. 35% of all the participants of the study were housekeepers and the least occupational situation was related to unemployed people (8.33%), also 100% of experimental group (30 people) and 96.7% (29 people) of control group were married. 73.3% of all the participants were living in the city and 26.7% of them were living in the country. 40% of experimental group and 13.3% of control group had the experience of sleep medications or anticonvulsants.

16.7% in experimental group and 10% in control group had the experience of depression according to the psychiatrist. 26.7% in experimental group and 10% in control group had the experience of anxiety according to the psychiatrist. 63.3% in experimental group and 60% in control group believed in traditional and complementary medicine (table 1).

Statistical paired t-test showed that there is significant difference between scores mean of sleep quality before and after metatarsus massage ($p=0.002$) in the experimental group, but there was no significant difference between scores mean of sleep quality before and after receiving usual cares in control group ($p=0.964$). Also independent t-test showed that there is no significant difference between scores mean of sleep quality before metatarsus massage ($p=0.64$), but after intervention, there is a significant difference between scores mean of sleep quality in the two groups ($p=0.01$) (table 2).

Considering assessment of sleep quality in the two groups (by assumption of equal variance) before intervention in the form of $p=0.633$ and $F=0.233$, the two groups were homogeneous.

4. Discussion

Results of this study indicate that the scores mean of sleep quality has been decreased significantly in intervention group after massage therapy; it is while there was no

Table 1: Comparison of the two experimental and control groups in terms of some demographic information,

Variable	Control group	Experimental group	Test results
Age	50.50±11.40	64.17±12.04	T=4.18 p=0.000
History of drug addiction	6.7%	3.3%	χ^2=0.554 p=1
Gender	66.7% Male	46.7% Male	χ^2=0.118
	33.7% Female	53.3 Female	p=0.192
History of using sleep medications or anticonvulsants	13.3%	40%	χ^2=0.2 p=0.39
History of anxiety	10%	26.7%	χ^2=0.095 p=0.182
History of smoking	16.7%	13.3%	χ^2=0.71 p=1.00
Marital status	96.7%	100%	χ^2=0.313 p=1
History of depression	10%	16.7%	χ^2=0.448 p=0.706

significant difference before and after intervention in control group. Also comparison of the mean between the two interventions and control groups after massage therapy showed significant statistical difference.

Results achieved form different studies also state that massage therapy improves patients' sleep quality in different conditions; in this regard, Helena Hachul (2011) conducted a study with the title of the effect of massage on insomnia of postmenopausal women. According to the results of this study, anxiety and depression of the samples after intervention were decreased and also their sleep quality was improved ($p<0.05$) [21].

The above results were in consistent with the study of Naji et al. (2010) which was done with the aim of assessing the effect of massage therapy on sleep quality of the women with Multiple Sclerosis in Isfahan [17]. In this regard, Nerbass et al. (2010) also achieved that massage therapy influences and accelerates patients' recovery after Coronary artery bypass surgery because it improves sleep and decreases fatigue [3]. In the study of Song RH, Kim DH (2006) that assessed the effect of foot reflexology massage in elderlies, sleep quality in intervention group was better than control group ($p=0.001$) an it is in consistent with the results of the present study [22].

Lee's study similarly showed that massage can be used as an effective nursing intervention in sleep quality of the mothers with sleep disorders in the postpartum period [23]. Also results of the study of Fild et al. (2007) which is in consistent with the aim of comparing the effects of the two massage therapy and relaxation methods on back pain, depression, anxiety, sleep disorders and improvement of the body range of motion showed that massage therapy group had less pain, anxiety depression and sleep disorders in compare with relaxation group and range of motion in massage therapy group was better than relaxation group [16]. Also Tesai and Chen conducted a study with the aim of assessing the effect of massage on sleep quality of End Stage Renal Disease (ESRD) patients and they observed significant effect of using massage on decreasing sleep problems of ESRD patients that is in consistent with the results achieved from the present study [24].

But in the study of Jane S-W et al. (2011) about massage therapy, there was no statistical significant difference in patients with bone metastases pain. In this study, because of the experience of bone pain, their effects had interfered with massage therapy. It seems that useful effects of massage have been increased during the extra sessions and these effects had been reported before in the studies about cancer patients [25].

The study of Wiliams with the aim of determining the effect of massage with aromatic oils on sleep onset, sleep period and sleep disorders of the children with autism showed that massage does not influence sleep improvement of the children with autism. Williams considered short period of intervention and children's absence at home

Table 2: the effect of foot massage on sleep quality in the two experimental and control groups.

Groups	Sleep quality score		Result of paired t-test
	Mean±standard deviation before intervention	Mean±standard deviation After intervention	
Control	18.93±5.87	18.90±5.66	T=0.046 P=0.964
Experimental	19.67±6.25	15.33±4.87	T=3.457 P=0.002
Result of independent t-test	T=0.468 P=0.64	T=-2.616 P=0.01	

during the study as the cause of his hypothesis reject [26].

Actually touching and skin contact can cause the body to release endorphins or endogenous and it makes the whole body to feel relaxed and also makes energy for the person to face the events. Following this relaxation, messages about stress and anxiety are blocked and sympathetic nervous system activity is decreased. So it is assumed that; patients who receive foot massage have better sleep quality due to decreased level of stress and anxiety in compare with those who do not receive this intervention [11].

According to the researchers' idea, improvement of sleep quality may be due to massage mental effects, but usually massage may make different levels of relaxation in the people under massage which can improve their sleep quality [27]. Unfortunately, nowadays, massage is less considered because of different reasons such as time limitation, shortage of manpower, using advanced technologies and increasing complexity of required cares. This treatment method and its importance can be taught through holding nursing education classes for nursing staff and providing appropriate environment. In addition Results of this study can be an introduction for conducting next studies.

5. Conclusions

According to the results of the study regarding inappropriate sleep quality in CCU, it can be said that; massage therapy can be recommended for improvement of sleep quality of heart patients as a non-pharmacological measure that like other complementary and alternative treatments, despite its low cost, almost in all the cases do not have any serious complications and pharmacological interventions, its performance is simple and it is accepted by the patients.

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