Effect of Tele-nursing -Based Self-management Program on Cardiac Self-efficacy and Heart Health Indexes among Myocardial Infarction Patients

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Abstract

Background: Myocardial infarction (MI) is the most common type of CAD and defined as ischemic necrosis of cardiac muscle that occurs when the heart's perfusion is suddenly reduced due to occlusion of a coronary artery that is already narrowed by atherosclerosis **Aim**: This study aimed to examine the effect of tele-nursing- based self- management program on cardiac self-efficacy and heart health indexes in MI Patients. **Methods**: A quasi-experimental pre/posttest design included a purposive sample of sixty MI inpatients at the cardiology department scheduled for discharged, attending outpatient's follow-up visits of Mansoura University Hospitals. The participants received the telenursing-based self-management program, which included a 45-minute face-to face education session in the first visit to outpatient. Thereafter, telephone follow up call twice a week and six text messages were sent weekly for the patients. Sessions were performed for 12 weeks with an average call duration of 15 minutes. Data were collected before and after 12 weeks of telenursing using cardiac self-efficacy scale and heart health indexes. Data were statistically analyzed using Paired t-test and Wilcoxon test using the SPSS version 26. **Results**: The studied patients showed statistically significant differences in mean scores of cardiac self-efficacy and heart health indexes after 3 months of telenursing where p<0.001. **Conclusion**: Telenursing -based self-management program is a convenient way, cost effective strategy in improving cardiac self-efficacy and heart health indexes of MI patients in developing countries as Egypt. **Relevance to practice**: Because of the reliability, availability, and low cost of a telenursing based self-management program, this technique can be incorporated into the care and follow-up of patients with myocardial infarction who have been discharged from the hospital.

Keywords: Tele-nursing, Self-efficacy, self-management, Heart health indexes, Myocardial Infarction.

Introduction

Coronary artery disease (CAD) is the most leading cause of death in developed and developing countries (Rejeh, Heravi-Karimooi, & Taheri Kharame, 2015). According to the latest reports of the World Health Organization published in 2018, CAD deaths in Egypt reached to 163,171, or 29.38% of the total deaths (Reda et al., 2019).

Unfortunately, a quarter of people with acute MI die, and most survivors complain of angina pain and deterioration in quality of life. The incidence of MI increases due to the presence of cardiac risk factors such as hypertension, diabetes, obesity, uncontrolled cholesterol levels, stress, smoking, and aging is another risk factor (Kaibab, Mirzaei &, Dabiran ,2017).

Despite the availability of advanced diagnostic and treatment methods, one third of myocardial infarction patients still die, and two thirds of survivors have not fully recovered and need rehabilitation as well as other treatment modalities. Therefore, myocardial infarction imposes economic burdens on hospitals to treat the disease and its complications (Vahedian-azimi, Alhani & Goharimogaddam, 2015).

Optimal treatment for MI includes the use of aspirin, control of risk factors and lifestyle modification. Fortunately, we can control most of the risk factors for myocardial infarction by adopting a healthy lifestyle. The primary goal of managing risk factors is to decrease the risk of further heart attacks, improve heart health indexes, quality of life, and increase life expectancy (Boroumand, Shahriari & Abbasi Jebel,2015).

Self-efficacy can be considered as a cognitive behavioral factor in health promotion in patients with MI. From the perspective of social cognitive theory, self-efficacy is defined as the awareness of a person's ability to successfully modify or continue behavior. Promoting self-efficacy is a critical factor conditioning the success of therapy and improving self-care behavior (Zand & Rafiei, 2013). Repeatedly, there is a direct relationship between self-efficacy, healthy behavior, and goal achievement. Accordingly, nurses can enhance patients' self-efficacy by improving self-management behaviors (Baljani, Rahimi, Amanpour, Salimi & Parkhashjoom, 2011).

A careful review of several studies has confirmed that enhancing cardiac self-efficacy through self-management (SM) programs can be useful in modifying unhealthy behaviors, controlling risk factors, and preventing rehospitalization of patients with cardiovascular disease, particularly for high-risk patients (Park, Howie-Esquivel, Chung & Dracup,2014; Petrie, Guzik & Touyz,2019).

Moreover, the reports of the European Society of Cardiology [ESC] and the American Heart Association [AHA] have emphasized the need to improve self-efficacy and self-care behaviors to adhere to drug therapy and eliminate complications in patients with CAD. (McMurray et al., 2012).

Key principles of self-management behavior in patients with MI include recognizing and managing symptoms, adherence to medication, and control cardiac risk factors as blood pressure, smoking cessation, lipid and body mass index control, abstinence from alcohol, and regular exercise (Riegel et al.,2009). Many rehabilitation centers for patients with chronic diseases such as CAD, hypertension and diabetes have used Self-management based on telenursing approach on a large scale due to its effectiveness in improving patient outcomes (Kim,2018). Self-management has been defined as the patient's daily care of himself in all aspects of the disease, in cooperation with the nurse and family doctor where the patient must acquire and practice effective management (Grady & Gough, 2014). In this context, the members of health team, particularly, nurses, can assist MI patients by developing a telenursing self-care training programs (salavati, khatiban & moghadari kosha, 2017).

Tele-nursing allows patients to consult, guide, follow-up from a distance. This approach imposes on the patient the responsibility to self-manage the disease at home after discharge from the hospital. The patient's outcome cannot be improved

without receiving the necessary guidance and follow-up, the tele-nursing allows them to face these issues (Elham, Samadi & Mehrnush, 2011). Self-management based on tele-nursing is an effective nursing approach undertaken by outpatient nurses to help chronically ill persons adhere to an ongoing health care behavior (Dadgari, Hoseini, Aliyari & Masoudi, 2017).

In the same context, telenursing or remote health as defined by American Nurses Association (ANA), It means providing nursing care through the use of the Internet, computers, and telephones, in what is called communication technology. Among the advantages of this technology, is an improvement in the quality of the health service provided, with quick access to it, all at a lower cost for coronary artery patients. Telephone calls after discharge participate in identification and correction of care gaps that may occur due to nursing shortages (Forouzesh, Sanagoo, & Ghavidel, 2017).

Different studies conducted on patients with MI asserted that, tele-nursing is a reliable, low-cost tool for patient education and follow-up care, which improves cardiac self-efficacy, heart health indexes and compliance to treatment regimen, in developing countries (Shirkosh & Rostami, 2017).

Not surprisingly, self-management based on tele-nursing is still the critical missing element in the successful management of MI. In particular, patients living in rural areas faced difficulties in accessing medical services, including shortage of nurses, compared to residents of major cities. To solve these dilemmas in an effective and positive way, telenursing can help in speeding up patients' access to health service and we can expect

satisfactory health results (Bradford, Caffery & Smith,2016).

Significance of the Study

Moving from hospital to home is a special challenge for patients with MI. They must control cardiac risk factors and actively participate in their self-care (Kahkonen, Kankkunen & Saaranen, 2015). Unfortunately, some studies have reported that, it is not easy to fully control cardiac risk factors, and it is also often difficult to achieve optimal self-management (Fernandez, Griffiths & Juergens, 2006). Lack of participation in self-management behaviors or failure to control cardiac risk factors leads to poor health outcomes, frequent readmissions, increased mortality rates, and a higher burden of health service costs. (Madadkar Dehkordi, Okhovat & Karimiankakolaki, 2021). Accordingly, it is imperative to develop an effective nursing intervention that supports myocardial infarction patients to properly manage their disease. Telenursing based self-care is the main key with which patients can seriously participate in their care plan in contemporary societies (Jiang et al.,2020).

In Egypt, to the best of our knowledge, tele-nursing has been used on a small scale. In developing countries, such as Egypt, due to the high mobile index and fixed phones, tele-nursing services are more appropriate. It is more popular and accepted because the use of phones as a means of mass communication is available daily and can also be less expensive. Because of the increasing cost of health care and the necessity for long-term follow-up of MI patients, health service organizations should strive to provide their services at lower costs and greater patient access. Telenursing based self-management is one of the most appropriate

methods of monitoring and educating a patient with myocardial infarction (Mohsen et al., 2020). For all these reasons, there was an urgent need to carry out this study, which aims to

Aim of the study

This study aimed to examine the effect of a telenursing based self-management program (TBSMP) on cardiac self-efficacy and heart health indexes in MI Patients.

Research Hypotheses

Research hypotheses were determined as following:

H1: Myocardial infarction patients who complete telenursing program will have a significant improvement in cardiac self-efficacy mean scores post program implementation compared with pre-program mean scores.

H2: There was a statistically significant changes in heart health indexes mean score post telenursing program among MI patients who completed the study when compared to mean score pre- program implementation.

Operational Definitions

Tele-nursing: In this study, tele-nursing was defined operationally as the use of telecommunications technology to facilitate the practice of remote nursing through phone follow-up and text messages for a period of 3 months.

*Cardiac self-efficacy***:** It was defined based on a cardiac self-efficacy scale developed by Zhang et al. (2018) as the individual's confidence in his ability to manage his health condition imposed by

CAD and the higher the scores, the better the self-efficacy of the heart

*Heart health indexes***:** According to study questionnaire heart health indexes were defined as representing seven cardiac risk factors including total cholesterol, HDL, LDL BMI, systolic & diastolic blood pressure and triglyceride levels.

Theoretical Framework

Self-efficacy theory

One of the most famous theories that predicts and describes behavior is Bandura's theory of social learning (Chen et al., 2014). It is one of the most widely used theories of behavior change and is a cognitive process based on the role of individuals' self-confidence in their abilities. Self-efficacy is the most important building block of Bandura's theory, which refers to people's confidence in their ability to do a particular task (Bandura ,2004). This theory gives a theoretical framework for changing behavior. A nurse can use it to create planned programs to bring about behavioral change. In fact, there is a significant correlation between self-efficacy, healthy behavior changes and effective health promotion (Lee, Arthur & Avis,2008).

Self-efficacy theory was applied in educational planning as necessary prerequisite for behavior change, and the effects of a self-efficacy theory on enhancing self-care behaviors among cardiac patients was evaluated (Peyman, Shahedi, Abdollahi, Doosti & Zadehahmad, 2020).

Figure (1): Bandura (2004) Self-Efficacy concepts

Methods

Study design

A quasi-experimental, pre/post-test design was used to achieve the study's objective.

Setting

The study was carried out at cardiology inpatient department and outpatients' clinics in Specialized Medical Hospital, Mansoura University Hospitals, Egypt.

Sample selection

A purposive sample of 60 patients with myocardial infarction referred to the previously mentioned settings who met the study's inclusion criteria. Sample size was calculated using MedCalc Software 15.8. Calculation relied upon previous similar research, with alpha error of 5%, power 80% and confidence 95%, 15 patients were added to compensate for expected drop-out, and then the sample size was 60 patients.

The inclusion criteria: were myocardial infarction patients diagnosed for the first time by a cardiovascular specialist, willing to participate in the study, both sexes, aged from 20 to 60 years; physically stable and discharged to follow up clinic, never participated in any coronary artery disease education program, availability of a mobile and home phone; The ability to speak, read and write.

Exclusion criteria: were, refusal to participate in the study; mental or motor impairment, hearing and/or visual difficulty, death during the study period; re-hospitalized patients due to complications of the disease.

Study Tools

1. Heart Health Indexes Questionnaire

This questionnaire was developed and prepared by the researcher after extensive literature review (Madadkar Dehkordi et al., 2021; Jiang et al., 2020 & Kim ,2018). The first part collected the demographic characteristics and health relevant data form of the studied patients including age, sex, weight and height, telephone number, education level, living condition, job, residence place, marital status, history of chronic and acute illness, history of hospitalization, income, smoking, family history, and hospitalization records etc. To calculate height and weight, the same scale was also used before telenursing and after 12 weeks of intervention.

The second part included short questions as body mass using BMI formula, Triglyceride, HDL-cholesterol, LDL-cholesterol, total cholesterol level, and systolic & diastolic blood pressure using the same sphygmomanometer before and at the end of the study. The scientific validity of the instrument was evaluated by content validity. The reliability of the tool indicated a Cronbach's alpha coefficient of 91%.

2. Cardiac Self-Efficacy Scale (CSES)

The Cardiac Self-Efficiency Scale (CSES) was primarily developed by Sullivan, the validity and reliability have been well demonstrated among CHD patients in different countries (Fors, Ulin,

Cliffordson, Ekman, & Brink, 2014). Increasingly, CSES has been largely used in evaluating cardiac self-efficacy and has the best specificity in calculating the self-efficacy of cardiovascular patients. The CSES was consists of 13 elements divided into three sub-levels: disease control, symptom control, and maintenance of function. A 5-point Likert scale was utilized, ranging from (not at all confident =0) to (exactly confident =4), the higher the score, the better cardiac self-efficacy. The validity and reliability of the scale was assessed and confirmed. The content validity index of the scale was 98.8% in terms of relevance, clarity, and simplicity. Internal consistency was also used to assess the scale's reliability (Zhang et al., 2018).

Data Collection Procedure (Field work)

Setting up a Telenursing-Based Self-Management program (TBSMP)

In the current study, the program was designed for MI patients guided by previous disease management programs to improve self-management (SM) skills and control their risk factors, which has shown great efficacy. The contents of program were prepared based on the needs of patients with MI and previous research studies (Inglis, Clark, Dierckx, Prieto-Merino & Cleland, 2017).

Description of telenursing SM Education Program.

The program consisted of 1. Face-to-face educational training sessions to build confidence, reassurance, and improve self-care behaviors of the participating patients, in which the pre-test was conducted before the patient was discharged from the hospital. 2. Telenursing, which included telephone consultations and text messages that were sent to patients over a period of three months.

The program contents were established and revised in coordination with the cardiology department doctors, a TBSM plan was elaborated by the researcher according to the requirements of each patient, that was prepared according to the Egyptian Heart Association guide for patients with myocardial infarction, including medication intake, cardiac risk factors, self-management behavior, physician referral time, outpatient follow-up schedule, and cardiac rehabilitation meeting schedules. The guide was given to patients as well. The content of the program has been validated by two professors from the cardiac unit and three professors in the medical -surgical nursing.

Data collection (implementation)

The program was implemented from the beginning of March 2020 to the end of 2020. The purpose and nature of the research were clarified to the participating patients, after which informed consent was obtained. Sociodemographic data and subjects' weight, height, lipids, systolic & diastolic blood pressure and HbA1c levels were assessed pre and post 3 months of the program by an independent researcher for further comparison.

The mobile number and the home phone were confirmed for easy follow-up of patients during telenursing. Subsequently, all patients completed group training in myocardial infarction self-management in one face-to-face session for 45 minutes within a hospital hall.

In face-to-face session, Patients were educated and trained on risk factors, symptoms and complications of myocardial infarction and the importance of lifestyle modification such as smoking cessation, avoidance of sedentary life, healthy foods, and adherence to medication, hypertension control, weight reduction and pain management was emphasized. Text messages and phone follow-up were done for three months, the researcher asserted the importance of follow up visits to cardiology clinic regularly according to appointment schedule. Also, a mobile phone number was provided to respond to their questions and inquiries immediately.

Over the course of 3 months of phone follow-up, a 20-minute telephone counseling and education session was conducted once a week, which included counseling, education, question, & answer and assessing the self-efficacy of the heart of the participating patients through messages sent to them during every session. Within 12 weeks of follow-up text messages, a daily message was sent to the study participants. The educational content of text message and telephone counselling were conducted using educational booklet, and medical records.

Evaluation

After 3 months, data were collected again by the researcher assistance for analysis.

Ethical Considerations and patients' rights

The Scientific Research Ethics Committee of the Faculty of Nursing, Mansoura University, reviewed and approved the study with a reference number (Ref. No. P.0223), according to the principles of the Helsinki Declaration. Before starting the study, oral informed consent was obtained from all patients who agree to participate in the study. The purpose and nature of the study was clarified to them, their anonymity, confidentiality, and the right to withdraw from the study at any time without giving any reason were guaranteed. The values, beliefs and culture of the participants were respected.

Data analysis

The collected data were organized, tabulated, and statistically analyzed using Statistical Package for the Social Sciences, [SPSS] software version 26. Categorical variables were represented as frequency and percentage. Continuous variables were represented as mean and standard deviation. Paired t-test was used to examine the difference between a pair of parametric variables (pre & post) and Wilcoxon test was conducted to test the difference between a pair of non-parametric variables (before & after). Statistical significance was taken at p-value ≤ 0.01.

Results

Sixty-seven eligible patients were recruited for the tele-nursing program. However, seven refused to participate, resulting in a final sample of 60 participants. Table1. clarified sociodemographic and health relevant variables and showed that, more than two thirds of study sample age was ranged from less than forty to less than sixty years (n=40, 66.7%), male patients (n=32, 53.3%) and were married (n= 34 , 56.7%). Most patients were lived with family (n=57, 95%), and seventy percent were

resident in rural areas. Most subjects had low income (n=50 ,83.3%) and 43.3% were illiterate. Only 53.3% were employed. As regards comorbidities, most of patients 96.7% had history of hypertension , and 61% had previous history of   hospitalization.

According to Table 2, telenursing improved total cardiac self-efficacy and its three categories; in particular; control illness, symptoms control, and function preservation. The table indicated a highly statistically significant difference between overall cardiac self-efficacy mean scores of patients before and after 12 weeks of TBSMP. The patients' mean score of cardiac self-efficacy after 12 weeks of telenursing (37.91±4.51) were higher than before program scores (17.18±5.13) where

$p \leq$ 0001*. Interestingly, there were marked improvement in cardiac self-efficacy subscale after 12 weeks of program where $p < 0.001$.

Regarding efficacy of TBSMP on heart health indexes, table 3. and figure 2. demonstrated that, there were highly statistically significant changes between the mean scores for body mass index pre and post 3 months of program implementation $p < 0.001$. Simultaneously table 3. Clarified that there were statistically significant changes between the mean scores of Triglycerides, HDL-cholesterol, total cholesterol, LDL-cholesterol $p < 0.001$, and blood pressure reading $p < 0.001$ before and after 12 weeks of telenursing.

Table (1): Socio demographic characteristics of the studied patients (n=60)

Variables	n	%
Age years:		
▪ 20-<40	18	30·0
▪ 40-<60	40	66.7
▪ ≥ 60	2	3.3
Gender		
▪ Male	32	53.3
▪ Female	28	46.7
Marital status		
▪ Single	7	11.7
▪ Married	34	56.7
▪ Divorced	5	8.3
▪ Widowed	14	23.3
Living status		
▪ Living with family	57	95.0
▪ Living alone	3	5.0
Resident		
▪ Rural	42	70.0
▪ Urban	18	30.0
Income		
▪ <3000 EP	50	83.3
▪ 3000 EP	9	15.0
▪ >3000 EP	1	1.7
Housing type		
▪ Rent	24	40.0
▪ Owner	36	60.0
Level of education		
▪ Illiterate	26	43.3
▪ Read and write	16	26.7
▪ Secondary education	12	20.0
▪ University education	6	10.0
Employment Status		
▪ Employed	32	53.3
▪ Unemployed / retired	28	46.7
Co-morbidities		
▪ Diabetes mellitus	29	48.3
▪ Hypertension	58	96.7
▪ Angina	30	50.0
▪ Smoking	27	45.0
▪ Heart failure	4	6.7
Previous hospitalization	37	61.7

Table (2): Cardiac self-efficacy of myocardial infarction patients before and after 12 weeks of telenursing program (n=60).

Cardiac self-efficacy (CSE)	Before tele-nursing Mean±SD	After 12 weeks of tele-nursing Mean±SD	t/ or z	P value
▪ **Illness control**	6.11±2.71	12.58±1.51	6.75	0.000**
▪ **Symptom's control**	6.65±2.44	14.51±1.84	6.75	0.000**
▪ **Function maintenance**	4.41±1.17	10.81±2.93	6.69	0.000**
▪ **Overall CSE**	17.18±5.13	37.91±4.51	34.03	0.000**

     ** $p<0.01$ highly significance   N.B / CSE i.e., Cardiac self-efficacy

Table (3): Comparing mean scores of heart health indexes of myocardial infarction patients before and after 12 week of telenursing (n= 60)

Heart Health Indexes	Before tele-nursing Mean±SD	After 12 weeks of tele-nursing Mean±SD	z	p
▪ **BMI**	33.21±5.37	31.41±4.57	6.55	0.000**
▪ **Total cholesterol**	188.08±37.99	172.78±34.06	6.14	0.000**
▪ **LDL- cholesterol**	146.22±175.08	117.80±35.56	6.11	0.000**
▪ **HDL- cholesterol**	35.27±9.04	48.47±11.66	6.58	0.000**
▪ **Triglyceride**	184.62±59.99	167.52±52.22	6.25	0.000**
▪ **Systolic blood pressure**	139.00±7.52	131.67±6.08	5.78	0.000**
▪ **Diastolic blood pressure**	84.75±6.97	79.42±8.49	4.33	0.000**

    ** $p<0.01$ N.B / BMI i.e. (Body Mass Index), LDL i.e. (Low Density Lipoprotein), HDL i.e. (Hight Density Lipoprotein)
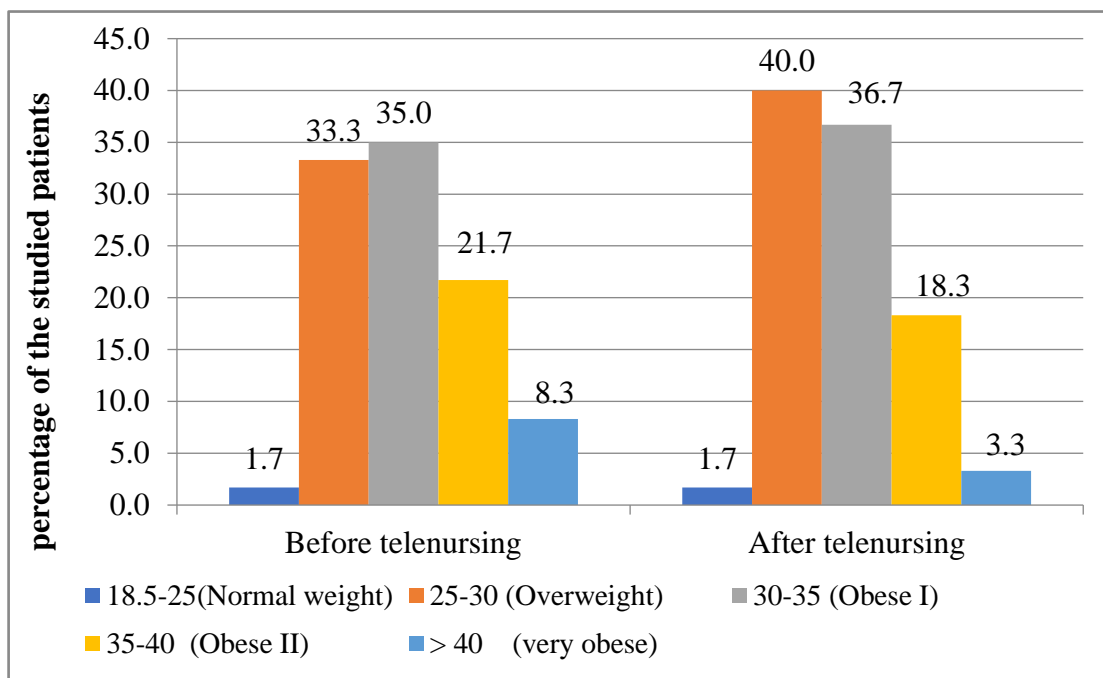
Figure (2): Body Mass Index of the studied patients before and after 12 weeks of telenursing

Discussion

The aim of the current study was to examine the effectiveness of TBSMP on cardiac self-efficacy and heart health indexes in MI patients. In the present study, the program included of a face-to-face educational meeting as well as text message and telephone counseling. The effectiveness was examined by measuring cardiac self-efficacy behavior, and heart health indexes. The participants under study were sixty MI patients, out of which 32 persons were male and 28 persons were female, which agreed with the findings of Rahimi, Azizkhani and Vahedi (2020) who verified that MI is more common among males, and this reflected the ratio of male patients to females in the study.

In terms of age, more than two thirds of study sample age was ranged from less than forty to less than sixty year, this may be due to aging which is un-modifiable risk factor for MI. Since aging is a risk factor for heart disease, the mean age in the present study was aligned with Hatami, Hasanpoor and Salehi (2020) who stated that, 54 years was the average age of patients with myocardial infarction. Most of the patients in this study resided in rural areas; this was a reason for their lack of access to medical care, in addition to their poor living conditions, the results were proportionate with the study by Wan, Wu,and Kou (2020)**.**

Concerning educational level, the study findings demonstrated that less than half of the subjects were illiterate. This may be due to Lack of education is a risk factor for the development of CAD. This result is consistent with Bikmoradi, Masmouei, Ghomeisic, and Roshanaei (2016) who mentioned that half of their study subjects were at the elementary level. As regards patients' occupation, the present study result indicated that, less than half of subjects were not working. This may be due to increasing age level among the studied subjects and the fact that CAD patients refrained of job due to activity intolerance. This result agrees with Moriyama et al., (2021) who reported that half of the studied subjects were not working.

Considering medical history, the present study clarified that less than half of subjects had diabetes mellitus**.** This may be due to that most patients are between the fourth and sixth decades of age and this age group commonly is high risk for D.M. This result goes online with Moriyama et al., (2021) who found that nearly two third of studied sample had diabetes mellitus. In the same context, the present study indicated that most of study subjects had hypertension. This may be due to that hypertension is predisposing factor to CAD. This result is in accordance with Moon, Yim and Jeon (2018) who examined the impact of a TBSMP on cardiac index, self-care behavior and depression in heart failure patients, and find that more than two thirds of patients had hypertension.

When studying the effect of TBSMP on cardiac self-efficacy, our study results confirm the hypothesis (1) that "myocardial infarction patients who complete telenursing program will have a significant improvement in cardiac self-efficacy mean scores post program implementation compared with pre-program' mean scores". The present study found that TBSMP significantly improved the total cardiac self-efficacy of MI patients and it's all dimensions, including control illness, symptoms control, and function preservation. The findings indicated a highly statistically significant improvement in overall cardiac self-efficacy mean scores of patients after 12 weeks of program. The total cardiac self-efficacy mean score after 12 weeks of telenursing (37.91±4.51) were significantly higher than before program scores (17.18±5.13) where p< 0001*.

Interestingly, there were marked improvement in cardiac self-efficacy subscale after 12 weeks of telenursing-based care where p< 0.001. Remarkably, positive results in all aspects of cardiac self-efficacy observed in our study and confirmed the beneficial effect of adopting the TBSMP for MI patients. This positive effect may be due to the accuracy of the tele-nursing based on the needs of each patient as well as the appropriate length of the program.

These results were consistent with those of other previous studies that applied a TBSM intervention and confirmed that categories of heart self-efficacy for patients with myocardial infarction were significantly improved. (Keshavaraz, Naderifar, Firouzkohi, mohammad, & Akbarizade. 2020; Smeulders, van Haastregt & Ambergen, 2009). Other similar research has supported the results of the current study, for example, according to study conducted by Jiang et al. (2020) reported that, nurse-led individualized self-management was beneficial in enhancing self-efficacy, HRQoL and the control of cardiac risk factors among Chinese myocardial

infarction. The subjects in the study group had a greater ability to control the disease, and on the other hand, the daily telephone follow-up resulted in an improvement in the patients' diet and physical activity. Yan et al.'s (2014) obviously, asserted that, telenursing based self-management approach also had good impact and significantly improved the cardiac self - efficacy of myocardial infarction patients. These results are consistent with those of Najaf, Shaabani and Momennassab (2016) their results confirmed the beneficial effects of tele-nursing follow -up on cardiac self-efficacy.

It is also worth noting, these results supported other studies and confirmed that average self-efficacy scores in the study group were significantly enhanced after telephone follow-up empowerment program (Javanmardifard, Ghodsbin & Kaviani, 2017; Madadkar Dehkordi, et al., 2021).

When considering the effect of TBSMP on heart health indexes (i.e., cardiac risk factors) these indexes were measured to objectively evaluate the effectiveness of the program. The findings of the current study demonstrated that TBSMP caused patients to significantly control seven cardiac health indexes. In particular; improvements in total cholesterol, HDL, lowering LDL and BMI, controlling triglyceride, systolic and diastolic blood pressure post intervention. Obviously, results showed that there was a statistically significant differences in mean score of all heart health indexes at the end of 3 months of TBSMP where $p < 0.001$. This program likely had this beneficial effect because it markedly improved patient' self-care management and improving self-monitoring of their illness. Based on these results, we can accept the second hypothesis, which

assumed that " There were statistically significant changes in heart health indexes mean score post telenursing program among MI patients who completed the study when compared to mean score pre-program implementation".

These findings are consistent with Jiang et al. (2020) who found that self-care education through telenursing enhanced the health parameters and HRQOL of the patients, especially, improvements in BMI, systolic and diastolic blood pressure, lipids profile, and triglycerides. Similarly, the previous finding was proportionate with Asgari and associates who verified the effectiveness of telenursing in improving physiologic parameters of MI patients (Asgari, Bahramnezhad, Golitaleb & Mahmoudi ,2017).

In this regard, recent studies confirmed the effectiveness of telenursing in controlling cardiac risk factors conducted by Shahsavari and Bavarsad (2020) and Mohsen et al., (2020) who demonstrated that telenursing is a useful method to control SBP & DBP, BMI and reducing cardiac risk factors. In this context, Vardanjani et al. (2014) studied the effect of face-to-face education and educational booklet on cardiac indexes of MI patients, the results proved that there was a marked improvement after education period, in SBP, cholesterol level and BMI of intervention group compared with control group $P < 0.0001$.

Notably, recent studies conducted by Moon et al. (2018) and Kimble (2018) support our results and pointed out that, TBSMP is a useful measure to enhance self-behaviors and cardiac index in heart failure patients. Similar results were seen in Jiang et al. (2020) study, who demonstrated positive effects of telenursing on quality of life and control of

heart risk factors of MI participants. Overall, the present study findings are aligned with those of previous studies and highlight strong evidence for the adoption of TBSM intervention for myocardial infarction patients.

Limitations of the study

1.The study continued for 12 weeks only due to the lack of financial support.

2.Multicenter studies have not been conducted. **3**.Daily phone calls and text messages are expensive.

Conclusion

In conclusion, a TBSMP can enhance cardiac self-efficacy in terms of control illness, symptom control, and function preservation and improve heart health index as evidenced by improvements in total cholesterol, HDL, lowering LDL and BMI, controlling SBP& DBP and triglyceride levels in MI patients.

Implications for Practice

Unlike inpatients, it was difficult for outpatients to adhere to pharmacological and non-pharmacological regimen so, good management strategies are required for them. From this point of view, the results of the current study demonstrated that TBSMP is a convenient way, cost effective training and follow-up care for MI patients which can improve patients' cardiac self-efficacy and heart health indexes. Therefore, telenursing based self-management is recommended as an effective nursing measure for myocardial infarction patients after their hospital discharge.

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