Effect of Foot Reflexology on Pain, Fatigue, and Sleep quality for Patients with Acute Myocardial Infraction

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Abstract

Background: A myocardial infraction (MI) is characterized by myocardial necrosis caused by an inadequate oxygen supply. Patients with acute myocardial infarction frequently experience chest discomfort, fatigue, and sleep problems. In chronic conditions like MI, reflexology improves sleep quality and decrease discomfort and fatigue. **Study aim**: Evaluate effect of foot reflexology on pain, fatigue, and sleep quality for patients with Acute Myocardial Infarction. **Design**: A quasi-experimental design (pretest-posttest) was applied. **Setting:** The study was carried out at Zagazig University Hospitals' outpatients' cardiac clinics. **Subjects**: A purposive sample of (60) patients with Acute Myocardial Infraction. **Tools: Tool I:** Patients assessment Questionnaire to assess socio demographic data, medical history, and patients' complaints with myocardial infraction (**Pre/Posttest**). **Tool II:** Assessment of Pain by using a pain numeric rating scale. **Tool III**: Fatigue Severity Scale (FSS). **Tool IV:** Sleep Quality Assessment by using Pittsburg Sleep Quality Index (PSQI). **Results:** The study's findings showed that the mean age of the studied patients was mean ±SD 53.3 ±6.7. Furthermore, the patients' complaints before and after the reflexology program differed statistically significantly. A statistically significant difference in the mean score for pain, fatigue, and sleep quality were observed between the pre and post foot reflexology periods among the studied patients. **Conclusion:** Foot reflexology program for myocardial infarction patients significantly reduced patient complaints, and improved sleep quality, while decreasing fatigue and pain. **Recommendation:** In order to generalize, future research and a replication of this study with a larger sample size.

Key words: Fatigue, Foot Reflexology, Myocardial Infarction, Pain Intensity, &Sleep Quality

Introduction

Acute Myocardial Infarction (AMI), commonly known as a heart attack, happens when the coronary arteries supplying blood to the heart muscle become narrowed or blocked due to coronary heart disease. A disorder known as myocardial infarction occurs when a part of the heart muscle has either no blood flow at all or minimal blood flow, which impairs cardiac muscle function (**Singh & Jat, 2022**).

Acute myocardial infarction is one of the most common causes of mortality in developed countries. The illness affects almost three million individuals worldwide and causes more than one million fatalities in the

United States each year. (**Alkhaqani &Ali, 2022).**

According to the most recent data, it is projected that by the year 2030, the frequency of these events will increase by 120% among females and 137% among males in less developed countries, in comparison to the 30-60% rate seen in more developed countries. (**WHO, 2020**). Individuals suffering from acute coronary syndrome frequently describe a range of symptoms, such as chest discomfort, anxiety, and heightened stress levels. Addressing these symptoms may require a combination of pharmacological and non-pharmacological treatment strategies. Message therapy represents a non-pharmacological approach that can be utilized for patients experiencing acute myocardial infarction. This intervention is simple to administer, safe, and cost effective (**Isworo & Upoyo, 2021**).

The primary symptoms associated with acute myocardial infarction (MI) are chest pain. The pain can significantly impair mobility and pulmonary ventilation, hinder recovery, and extend the duration of hospitalization. While analgesic medications are the most effective method to nurses' staff, they are not the only method of alleviating chest pain, due to the potential side effects of opioids and the variability in patient responses to these medications. It is crucial to incorporate non pharmacological methods a long side analgesics to alleviate chest pain effectively (**Sayari, et al.,2021**).

Fatigue is a common complaint among myocardial infarction patients, and it can be difficult to manage. The primary symptom is weakness on the mental, emotional, and physical levels. It might cause sleep disturbances. Sleep problems have a detrimental effect on MI patients' outcomes and significantly lower their quality of life (**Jiao, et al., 2023**)

Fatigue and sleep disturbances are frequent in patients with acute myocardial infarction (AMI), and they might increase risk of recurrent MI and arrhythmias. (**sayari, et al.,2021**). Sleep is important for quality of life; there is a need to find effective methods to improve their sleep quality. Foot reflexology (FR) is one such technique Complementary and alternative therapies have included the use of foot reflexology. It is applied as massage therapy, where pressure is applied with fingers—particularly the thumb—to reflex points, typically found on the feet. It is believed that FR will help people relax and release endorphins, dopamine, and serotonin to reduce pain, stress, and anxiety. This will likely improve the quality of their sleep (**Ivaki, &Nesami, 2023**).

One of the most popular types of complementary therapy available today is massage therapy. Reflexology of reflection therapy is one kind of massage therapy. Reflexology is a unique type of massage in which pressure is applied to the reflex points, which are typically found in the feet. These points are thought to be connected to every part of the body, and applying pressure to them can cause physiological reactions in the body. (**Vindis, et al., 2024**)

Reflexology is a manual therapy method that is non-invasive and involves applying specific manipulations and pressure levels to

specific reflex spots on the hands, feet, or ears. Foot reflexology has always been part of the nursing care. Since a nurse can use massage in a convenient and straightforward manner, it is a way to enhance nurse-patient interaction. (**Joseph &Lobo, 2023**). By applying varied amounts of pressure during specialized manipulations, it establishes the psychological standardization of the body. It enhances day-to-day functioning, improves quality of life and wellbeing, and lessens stress, anxiety, and pain.

Reflexology is regarded as a component of nursing care and has the potential to enhance the nurse-patient bond. Nurses are essential members of clinical teams when it comes to managing complications. Reflexology can also be viewed as a component of nursing care because it is a subspecialty of integrative medicine. (**Salahshour, et al.,2019**).

One of the most prominent types of supplemental therapy nowadays is massage therapy. Reflexology therapy is one of the types of massage therapy. A unique type of massage called reflexology involves applying pressure to reflex points, which are often found in the feet. It is thought that these points are related to every area of the body and that pressing on them can trigger the body's physiological reaction. (**Vindis, et al., (2024).**

Significance of the study

Nearly 15% of cardiovascular deaths occur in Egypt, the most populous nation in the Middle East and North Africa.A quarter of the patients were female. Because acute coronary syndrome (ACS) affects 43% of men under 55 and 67% of women under 65, the prevalence of premature cardiovascular disease is significant. The majority of men (49%), however, experienced ST-elevation myocardial infarction (STEMI), whereas a higher proportion of women reported unstable angina and non-ST elevation myocardial infarction. (**Ahmed, et al., 2022).** Globally, acute myocardial infarction (AMI) is a major contributor to early mortality and morbidity. The impact on health care systems is significant. (**Coull &Pugh, 2021**). Immediately following a myocardial infarction, there is typically an abrupt decline in cardiovascular health. This decline may result in a poor of life quality, a reduction in functional ability, and an increased risk of further acute cardiovascular events. (**Tetzlaff, et al., 2021).** Consequently, the extent, and seriousness of the disease are high while early treatment early treatment is crucial to reduce complications to the heart tissue. for these patients, non-pharmacological treatment may help in reduce pain, fatigue and improve quality of sleep**. Therefore,** the study was evaluating effect of foot reflexology on pain, fatigue, and sleep quality for patients with acute myocardial infarction.

Aim of the study:

Aim: To evaluate effect of foot reflexology on pain, fatigue, and sleep quality for patients with Acute Myocardial Infarction.

Objective:

- Assess patient’s complain of myocardial infraction
- Assess pain, fatigue and sleep quality for patients with acute myocardial infarction.
- Design, implement, and evaluate the effect of foot reflexology program on pain, fatigue and sleep

quality for patients with acute myocardial infarction.

Methodology

Research Hypothesis:

H1: Patients complaints will be reduced after implementing the foot reflexology program than before.

H2: Patients' fatigue and pain will be modified after implementation of foot reflexology program than before.

H3: Sleep quality for patient with acute myocardial infarction will be improved after implementation of foot reflexology program than before.

Subjects and Methods

Research design: A quasi-experimental design (pretest-posttest) was applied to attain study aim. The purpose of a quasi-experimental study design is to determine if independent and dependent variables are causally related. To put it simply, an influence variable is an independent variable, while a variable that is being affected is a dependent variable. (**Loewen & Plonsky, 2016**).

Study setting: The study was carried out at Zagazig University Hospitals' outpatient cardiac clinic, which is located on the first floor and includes two classrooms, a waiting area, a stress ECG clinic, a clinic for hypertension, a clinic for cardiac disorders, a clinic for cardiothoracic surgery, and treatment room.

Subject: A purposive sample of (60) patients who are admitted to outpatient cardiac clinics with acute myocardial infarction, their age ranged between 18-65 years, conscious, and able to communicate. The exclusion criterion was the presence of any other chronic disease that may affect patient's sleep quality as cancer, ischemic heart disease, chronic obstructive pulmonary disease, and stroke in addition patients with any medical issues affecting their feet were also excluded.

Epi Info (Epidemiological Information system) Software Version 6 was used to calculate the sample size and power. The data collected had a 95% confidence level, and the study's power was 80%. The sample size can be calculated using the formula n = [(Zα/2 + Zβ)2 × {2(SD)2}]/ (mean the difference between the two groups)2, where SD = standard deviation obtained from the previous study; Zα/2, for 5%, this is 1.96, and Zβ, for 80%, this is 0.84. Consequently, n = [(1.96 + 0.84)2 × {2(2.07)2}]/ (1.26)2= 40.1 Based on the formula above, the total sample size required was 60 patients who received foot reflexology program.

Tools for data collection:

Three tools were used in this study as follows:

Tool I: Patient Assessment Questionnaire: After reading relevant literature, the researcher designed this tool, which was written in plain Arabic to prevent misunderstandings (**ogobuiro etal., 2020**), and (**Taggart& Puskas, 2021**). This questionnaire contained three parts as follows:

Part I: **Demographic characteristics** included the ten questions were those about age, sex, education, marital status, current jobs, living status, residence, income, crowding index, and regular follow-up.

Note: Calculation of crowding index adopted from **(WHO, 2021) as follows:**

Crowding Index = Number of co-residents (excluding newborn) divided by number of rooms (excluding kitchen and bathrooms).

Part II: Medical History of Patients with MI: It was contained six closed

ended questions about duration, onset of disease, suffering from other chronic disease, what are the comorbidity disease, smoking, and exercise.

Part III: Patients' Complaints of Myocardial Infarction (Pre/ Posttest): It included six items related to complaints and its suffering level, including: chest pain, insomnia, fatigue, Dyspnea, nausea, and vomiting. The studied patients were asked for frequency and their suffering which was categorized using a three point of Likert scale, scored as: " never" = 0, " rarely" = 1, "sometimes" = 2, and " often " = 3 with a total score = 18, and classified as the following: Mild patients' complain level <50%, Moderate patients' complain level from 50%-65%, and sever patients' complain level >65%. Classification based on statistical analysis.

Tool II: Assessment of Pain by using A Pain Numeric Rating Scale (PNRS) (Pre/ Posttest): it was adopted from **Downie , et al (1978)** The numeric rating scale (NRS) is a commonly used, standardized tool for assessing patients' pain levels, used a scale of 0 to 10 to convey pain where zero represents no pain and ten expressing the worst pain **(Farrar, et al 2008)**. PNRS has good test-retest reliability in both literate and illiterate patients (r = 0.96 & 0.95, respectively). So, NPRS was used to quantify pain severity before and after each foot message session. According to the scoring method, 0 indicates no pain, 1–3 indicates mild pain, 4–6 indicates moderate pain, and 7–10 indicates severe pain (**Karcioglua, Topacogluo, Dikma & Dikmea, 2018**) .Regulatory criteria for pain evaluation and documentation are fulfilled by the information gathered by NRS, which is also easy to comprehend and document.

Tool III: Fatigue Severity Scale (FSS) (Pre/ Posttest): It was established by **Krupp et al. (1989),** assess the severity of fatigue and its effect on a person's activities and lifestyle in patients with several types of disorders. It was initially developed for individuals with acute myocardial infarction. Nine questions concerning fatigue, its intensity, and how it affects specific activities are included in the self-report scale. With 1 denoting significant disagreement and 7 denoting strong agreement, answers are graded on a seven-point scale. Thus, the lowest possible score is nine, and the maximum is 63.**Scoring system interpretation:** The mean of all the scores, with the lowest score being 1 and the highest score being 7. The mean (SD) FSS scores for healthy persons are 2.3 (0.7). A cutoff score of 4 or higher is suggestive of problematic fatigue. A score of ≥4 indicates abnormal fatigue, whereas a score of ≥5 signifies severe fatigue.

Tool IV: Sleep Quality Assessment: by using Pittsburg Sleep Quality Index(PSQI) (Pre/ Posttest): which was adopted from **Buysse, et al.,(1989), Dudley,(2004), and Osorio,(2006)**. A The PSQI is a 19-item self-report questionnaire that scores seven components that measure sleep quality and difficulties during the last month using a four-point Likert Scale from 0 to 3. Subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disruption, usage of sleeping medications, and daytime dysfunction. The PSQI total score, which varies from 0 to 21 points,

is calculated by aggregating the components, with higher scores indicating worse sleep quality. The authors' requirements for the instrument were utilized to categorize the quality of sleep. They determined that a global PSQI score of 6 or higher had a diagnostic sensitivity of 89.6% and a specificity of 86.5% in discriminating between individuals with good or worse sleep quality.

Content validity and reliability

The tools' content validity was assessed by five experts in the fields of medical surgery nursing, medicine, and physiotherapy, who provided feedback on the tool's items to determine relevance, comprehensiveness, and application. Experts agreed completely, and only minor changes were made based on suggestion. The reliability of the tools was evaluated using Cronbach's alpha coefficient test, which indicated that each tool had moderate to high reliability, indicating that the contents were fairly homogeneous. The pain intensity, fatigue severity, and PSQI scales all had Cronbach's alpha values of 0.896, 0.902, and 0.899, respectively

Pilot study

An assessment of clarity, ambiguity, applicability, objectivity, relevance, and feasibility was performed on 10% of the patients (six patients) within the previously outlined contest as part of a pilot study. Consequently, modifications were implemented. Pilot study participants were not included in the research sample.

Ethical Consideration

The Ethical Committee of Zagazig University's Faculty of Nursing approved the study request under permission ID 243 on May 14, 2024. The researcher implemented strategies to protect the privacy and confidentiality of the study participants, who were patients. Patients were fully informed about the nature and goal of the study, and their ability to decline participation was stressed. In order to participate in the study, patients had to give their verbal consent.

Field work

An official letter from the dean of the nursing faculty asking for approval to gather data was given to the research site directors. It is expected that the data collection procedure will take five months, starting in June 2024 and ending at the end of September 2024. From 9:30 a.m. to 12:30 p.m., three days a week, researchers will be on site. The study was conducted in four phases:

Assessment phase:

During the initial interview, the researchers introduced themselves to the participants in order to initiate communication, clarify the purpose and nature of the study, get their consent, involvement, and fill out research tools.

Following recruitment, the researchers performed individual interviews with each patient who had an acute myocardial infarction to obtain data on their demographics and medical history.

This is done using an organized interviewing questionnaire (Tool I). This assessment took about 20 to 25 minutes to complete. Before implementing the foot reflexology, a pain numeric rating scale, sleep quality index, and fatigue severity scale was performed. For four weeks, the patients received instructions to come three times a week.

Planning phase: Following the initial patient interview, the researchers designed a technique for effectively

presenting information about reflexology techniques, points, and advantages by developing a simple booklet in Arabic with colorful illustrations based on literature a review. Before the study, the researcher received two hours of foot massage instruction from a specialist in the Faculty of Medicine's Physiotherapy Department at Zagazig University.

Implementation: A foot reflexology was administered for 12 sessions, three times a week for four weeks. Each session lasted 30 minutes, with 15 minutes given on each leg for every patient. The researchers organized the environment and the studied patients as follows before applying foot reflexology:

- To prepare for a foot reflexology, make sure that the room (treatment room) is comfortable, quiet and well-ventilated.
- For the patients who are being studied, provide a thorough explanation of the foot reflexology massage procedure, including its importance, advantages, duration, and particular reflexology zones.
- Make sure you advise studied patients to clean their feet with warm water and soap prior to beginning the process.

The researchers should avoid wearing any jewelry and make sure their nails are clean and clipped. It is essential to properly wash and warm your hands before handling patients. After that, use a moisturizer. Then, examine the feet carefully by feeling their warmth, observing any changes in the skin's texture, and examining their color. Finally, move your feet to evaluate their flexibility and range of motion. **(Ruth Hull, 2011).**

The patient sat in front of the researcher in a very calm and comfortable position. Telling the patient to lie down in a posture that was comfortable for them—typically supine—was the next step. A little pillow was placed beneath the patient's foot. The initial step was to assess the patients' feet for sensitivity and discomfort was. The researcher then massaged her right foot first using just a small amount of non-therapeutic lotion on her hand. Then, massage the feet generally to get them warmed up. In addition, the researcher repeatedly used the palm and fingers of one hand to massage the patient's leg sole, back, and toes. By relaxing the feet and legs, this method enables the patients to get ready for comprehensive reflexology. Two minutes were required. **(Mansouri et al., 2017)**

- Following that, particular foot pressure spots associated with the body's comfort and discomfort were targeted and treated. The brain, adrenal glands, pituitary, and solar plexus are the four key locations. Using the rotating thumb method, the researcher massaged the sole of the patient's foot with the thumb free while placing four fingers on the top. Before applying pressure to the area that needs attention, bend the thumb at the initial joint to a 75-90 degree angle to avoid the thumbnail cutting into the skin. Press firmly to turn the thumb clockwise, then raise it, proceed to the next step, and repeat. Consequently, the basic movements were lift, move, rotate, and press in. The researcher performed reflexology on each foot for 15 minutes. The identical 15-minute foot reflexology cycle used for the first patient's foot was used for the second patient's foot **(Louise Keet 2008).**

- This point has the ability to significantly relax the body since it interacts with the neurological system throughout the body. The cardiac reflex point is located on the big toe of the plantar portion of both feet. The precise location raises cardiac capacity and enhances blood flow. The lung reflex point regulates oxygen levels, breathing rate, and the opening of the chest and lungs

Evaluation: Using the same study tool, the researcher evaluated the patients' complaints of myocardial infarction, degree of pain, fatigue, and sleep quality one month following the foot reflexology intervention.

Statistical analysis

Version 20.0 of SPSS for Windows was used for all statistical analyses (SPSS, Chicago, IL). The mean ± standard deviation (SD) was used to express continuous data that had a normal distribution. Numbers and percentages were used to represent categorical data. When comparing variables with categorical data, the chi-squared test (or fisher's exact test, if applicable) was applied. Two variables with continuous data were tested for relationships using the correlation coefficient test. The study's questionnaire's reliability (internal consistency) test was computed. A significance level of $P<0.05$ was established.

Results:

Table (1): shows demographic characteristic of the studied patients with acute myocardial infraction. It was found that (46.7%) of studied patient aged more than 55 years with **Mean ±SD was** 53.3 ±6.7. In addition, most of patients (96.7%) were married, as well as (66.7%) were male. (45%) of studied patients had secondary educational level, and majority of them living with family (93.3%). Regarding recurrent job (30.0%, and 31. 0%) respectively of studied patients had work that requires physical effort and house wife. As regards residence (73.3%) of studied patients reside in ruler area. Furthermore, (70.0%) of studied patients didn't have enough income, and majority of patients didn't follow up regularly (86.7%).

Table (2): clears that, myocardial infraction occurred more than two years ago in 46.7% of the patients analyzed. In 70.0% of the patients in the study, the myocardial infraction had a chronic onset. Additionally, 31.7% of the patients in the study had diabetes mellitus, and 60.0% of them had a history of hypertension. Furthermore, 56.7% of the patients in the study smoked, and none of them exercised.

Table (3): indicates that, in the pre foot reflexology, 91.7% of patients with myocardial infarction frequently complain of fatigue, which is followed by insomnia and chest pain (88.3% and 85.0%, respectively). Following the implementation of the reflexology program, all of the studied patients experienced sometimes complaints of chest pain, insomnia, and fatigue (95.0%, respectively). However, 66.7% of the patients reported sometimes breathing difficulties, which decreased to a rare occurrence (71.7%) after the program. The same table shows that 91.7% of the studied patients had severe complaints prior to the program, whereas 45.0% had mild complaints following the program. Additionally, A statistically significant difference was noticed between the patients' complaints before and after the reflexology program.

Table (4) reveals that 20% of the patients had mild pain intensity following the foot reflexology program, compared to 58.3% of the studied patients who had severe pain intensity during the pre-program. A statistically significant difference in the mean score for pain intensity was observed between the pre and post foot reflexology periods among the patients under study (P value<0.001**).

Table (5) illustartes that, fatigue severity significantly decreased in the studied patients. Before the foot reflexology program, fatigue severity levels were categorized as moderate to severe in 66.7% and 21.7% of the patients, respectively. After participating in the foot reflexology program, the fatigue severity improved, with 73.3% and 26.7% of patients reporting mild to moderate levels, respectively. Additionally, there were notable differences in the mean fatigue severity scores among patients with acute myocardial infarction before and after the foot reflexology program, with a statistically significant p-value of <0.001**.

Table (6) compares that there was a significant difference in sleep quality before and after the foot reflexology program, with 83.3% of the patients experiencing poor sleep prior to the program, while this percentage decreased to 70.0% after the program, as assessed by the Sleep Quality Index. Importantly, the proportion of poor sleepers reduced from 83.3% to 30%, while the number of normal sleepers increased to 70%. Furthermore, improvements were noted in sleep latency and daytime dysfunction, with rates dropping from 86.7% to between 66.7% and 71.7%, respectively. Additionally, subjective sleep quality, sleep duration, and the utilization of sleep medication showed noteworthy improvement, decreasing from 85.0% to between 63.3% and 70.0%, respectively. There was also a statistically significant improvement observed between the mean scores before and after the reflexology program among the patients regarding sleep quality, with a p-value 0.001**.

Table (7) notices that in the studied patients with acute myocardial infarction, there was a positive correlation between overall global sleep quality, pain intensity, and fatigue. Following the implementation of the foot reflexology program the P value showed a statistically significant difference (0.010*, <0.001**).

Results:

Table 1. Frequency and Percentage Distribution of Demographic Characteristics of the Studied Patients (n=60)

Demographic Characteristics	No	%
Age (years)		
< 45	8	13.3
45 – 55	24	40.0
> 55	28	46.7
Mean ±SD	53.3 ±6.7	
Sex		
Male	40	66.7
Female	20	33.3
Educational level		
Illiterate	17	28.3
Basic	13	21.7
Secondary	27	45.0
University	3	5.0
Marital Status		
Married	58	96.7
Unmarried	2	3.3
Current job		
Work that requires physical effort	18	30.0
Office work	9	15.0
Self – employment	14	23.3
Housewife	19	31.7
Living status		
Alone	2	3.3
With family	56	93.3
With roommates	2	3.3
Residence		
Urban	16	26.7
Rural	44	73.3
Crowding index		
Minimal crowding	5	8.3
Moderate crowding	8	13.3
Severe crowding	47	78.3
Mean ±SD	2.7 ±0.9	
Income		
Enough	18	30.0
Not enough	42	70.0
Regular follow up		
Yes	8	13.3
No	52	86.7

Table 2 Frequency and Percentage Distribution of Medical History of studied Patients (n=60)

Medical History	No	%
The duration of myocardial infraction (years)		
< 1	7	11.7
1 – 2	25	41.7
> 2	28	46.7
The onset of myocardial infraction		
Sudden	18	30.0
Chronic	42	70.0
What chronic diseases are you suffering from?		
Hypertension	36	60.0
Rheumatic heart disease	5	8.3
Diabetes mellitus	19	31.7
Are you smoking?		
Yes	34	56.7
No	26	43.3
Are you performing exercises?		
Yes	0	0.0
No	60	100.0

Table 3 Frequency and Percentage Distribution of Patients' complaints of myocardial infraction pre and post foot reflexology program (n=60)

Patient's complain	Pre (n=60)		Post (n=60)		Fisher's exact test	
	No	%	No	%	X^2	P
Chest pain						
Sometimes	9	15.0	60	100.0		
Often	51	85.0	0	0.0	88.696	<0.001**
Insomnia						
Rarely	0	0.0	3	5.0		
Sometimes	7	11.7	57	95.0		
Often	53	88.3	0	0.0	95.063	<0.001**
Fatigue						
Rarely	0	0.0	3	5.0		
Sometimes	5	8.3	57	95.0		
Often	55	91.7	0	0.0	101.613	<0.001**
Difficulty of breathing						
Rarely	10	16.7	43	71.7		
Sometimes	40	66.7	17	28.3		
Often	10	16.7	0	0.0	39.828	<0.001**
Loss of appetite						
Never	0	0.0	23	38.3		
Rarely	17	28.3	32	53.3		
Sometimes	36	60.0	5	8.3		
Often	7	11.7	0	0.0	58.031	<0.001**
Vomiting						
Never	2	3.3	28	46.7		
Rarely	32	53.3	31	51.7		
Sometimes	25	41.7	1	1.7		
Often	1	1.7	0	0.0	45.703	<0.001**
Patients complain level						
Mild complain level	0	0.0	27	45.0		
Moderate complain level	5	8.3	32	53.3		
Sever complain level	55	91.7	1	1.7	98.774	<0.001**

Data are expressed as numbers (N) and frequency (%). $\chi 2$: Chi-square test, FET: Fisher's exact test , P is significant if ≤ 0.05.

Table 4 Comparison of pain among studied patient pre and post foot Reflexology Program (n=60)

	Pre n=60		Post n=60		Fisher's exact test	
	No	%	No	%	X^2	P
Numeric pain level						
Mild pain	0	0.0	12	20.0		
Moderate pain	25	41.7	48	80.0		
Severe pain	35	58.3	0	0.0	54.247	<0.001**
Mean ±SD	6.2 ±1.8		4.0 ±1.1		8.200	<0.001**

χ2: Chi-square test, FET: Fisher's exact test, P is significant if ≤ 0.05.

Table 5 Comparison of Fatigue Severity among studied patient pre and post foot Reflexology Program (n=60)

	Pre n=60		Post n=60		Chi – square	
	No	%	No	%	X^2	P
level of Fatigue severity						
Mild fatigue	7	11.7	44	73.3		
Moderate fatigue	40	66.7	16	26.7		
Severe fatigue	13	21.7	0	0.0	50.129	<0.001**
Mean ±SD	5.8 ±1.3		3.6 ±0.8		11.408	<0.001**

χ2: Chi-square test, FET: Fisher's exact test , P is significant if ≤ 0.05

Table 6 Comparison of Sleep Quality Index among studied patient pre and post foot Reflexology Program (n=60)

Sleep quality	Pre				Post				Chi – square	
	Good Score		Poor Score		Good Score		Poor Score			
	No	%	No	%	No	%	No	%	X^2	P
Subjective sleep quality	9	15.0	51	85.0	41	68.3	19	31.7	35.108	<0.001**
Sleep latency	8	13.3	52	86.7	40	66.7	20	33.3	35.555	<0.001**
Sleep duration	9	15.0	51	85.0	42	70.0	18	30.0	37.135	<0.001**
Sleep efficiency	12	20.0	48	80.0	41	68.3	19	31.7	28.420	<0.001**
Sleep disturbance	10	16.7	50	83.3	41	68.3	19	31.7	32.770	<0.001**
Use of sleep medication	9	15.0	51	85.0	42	70.0	18	30.0	37.135	<0.001**
Date time dysfunction	8	13.3	52	86.7	43	71.7	17	28.3	41.773	<0.001**
Sleep quality level	10	16.7	50	83.3	42	70.0	18	30.0	34.751	<0.001**
Mean ±SD	8.9 ±2.7				6.7 ±3.2				4.031	<0.001**

$\chi 2$: Chi-square test, FET: Fisher's exact test , P is significant if ≤ 0.05

Table 7 Correlation Coefficient between Pain, Fatigue and Sleep quality among studied patients post foot reflexology

	Pain assessment Scale		Fatigue severity Scale		PSQI score	
	r	P	R	P	R	p
Pain			0.366	0.004*	0.331	0.010*
Fatigue	0.366	0.004*			0.440	<0.001**
Sleep quality	0.331	0.010*	0.440	<0.001**		

(**) Statistically significant at p<0.01. r Pearson correlation

Discussion:

Foot reflexology is a natural therapy that helps balance the body by applying a certain type of pressure to specific foot areas. Its foundation is the idea that every part of the body has reflexes that are mirrored in the feet. Relaxation, enhanced circulation, and a general sense of well-being are all benefits of reflexology. (**Kishore, et al 2021**).

In terms of demographic characteristics, the study's findings showed that the patients were older than 55, with a mean age of 53.3 ± 6.7. **Kolbadinejad et al. (2023)** found that patients over 50 had a mean ±SD of 60.39, which is consistent with the current study's findings. The current study's findings indicate that the risk of myocardial infarction is considerable in elderly people.

The current study's findings regarding sex showed that over two-thirds of the patients were men. This result may have to do with smoking, which is more common in men, and eating and working habits. In line with **Rahimi et al. (2020),** who discovered that more than three-quarters of the patients studied were men.

The present study's findings regarding the marital status of the patients under study revealed that the majority of them were married. **Akhlaghi et al. (2021)** found that most of the patients in their study and control group were married, which is consistent with these findings. This suggests that since almost everyone in this age group is married, the demands and burdens of the family may be the ultimate cause of heart disease and MI. Furthermore, according to the current study's findings, almost half of the patients had secondary educated. **Piterzykowski et al. (2020)** claimed that the majority of the patients under study were illiterate, which was contradicted by this. Perhaps this explains why MI can happen to anyone, regardless of education.

Regarding income, almost three-quarters of patients in the current study reported that their monthly income was insufficient to cover their living expenses. This may be because most patients come from rural areas where basic daily needs and treatment costs are higher. This is similar with the findings of **Lee et al (2021),** who concluded that not all patients evaluated had an adequate monthly income.

In the same context, a noticeable finding from the study result was that nearly half of the patients possess a secondary educational level, approximately three quarters reside in low – income rural areas, and one third of them required physical effort to work. This situation highlights the low social standards of patients, with a significant number originating from rural areas, which exacerbates the expenses associated with basic daily necessities and medical treatment. These observations align with study by **Hebeshy et al. (2022)**, which discovered that all patients examined lacked adequate monthly income and that secondary education was the most prevalent level of education among them.

According to their medical history, nearly half of the patients in the study had a myocardial infraction more than two years prior, about three-quarters had chronic onset of the condition, approximately two thirds had hypertension and diabetes mellitus, more than half smoked, and none of them exercised. This clarifies why myocardial infarction is more serious and affects several bodily systems; diabetes mellitus and hypertension are risk factors for myocardial infraction. This result corroborated that of **Khorshid et al. (2022),** who found that about half of the patients in their research were smoker. Additionally, **Mtawea et al. (2023)** found that the majority of the patients in the study did not exercise, and more than two-thirds of them had a history of hypertension and diabetes mellitus.

Concerning patient’s complain of myocardial infraction, Based on the results of the study , the majority of patients with myocardial infarctions had severe complaints prior to the reflexology program, but over half of them had mild complaints following the program. This finding is inconsistent with study by **Rai and Beenish (2021),** which found that patients frequently complained of somatic health issues centered on fatigue, dyspnea, chest pain, and insomnia in the weeks following a coronary incident. Furthermore, **Ibrahim et al. (2024)** demonstrated

that almost two-fifths of the studied and controlled patients experienced dyspnea, and approximately half of the studied patients and nearly half of the controlled patients experienced chest discomfort.

In terms of the level of pain, the present findings demonstrated a statistically significant difference between the study patients' mean scores before and after foot reflexology. The researchers' findings demonstrate the effectiveness of the foot reflexology intervention, which supported the study's main premise by emphasizing the benefits of foot reflexology for patients' pain levels as well as how it reduced those patients' pain. These findings concurred with those of **Salahshour et al. (2024**), who showed that while there was not a significant difference between the study and control groups' levels of pain, the study groups' levels of pain were much lower than those of the control groups following a reflexology intervention.

Regarding the impact of foot reflexology on fatigue, the current study showed that the mean score of fatigue severity before and after a foot reflexology program varied statistically significantly among the patients with acute myocardial infarction. In reality, endorphin has strong analgesic effects, lowers stress, and controls the brain pathway, which may lessen fatigue in patients with AMI. Reflexology causes the release of endorphin, a relaxant and painkiller. **Pilozzi, (2021)**.The results were consistent with those of **Pasyar et al. (2024),** which demonstrated that the intervention and control groups differed significantly with regard to MFI and its aspects, including physical exhaustion, general fatigue, and decreased activity following the intervention.

According to the current study, the quality of sleep before and after implemented a reflexology program differed significantly. This difference was evident in the fact that the majority of the patients had poor sleep before the intervention, but the percentage of patients who had poor sleep after the program decreased to approximately three quarters. This result is backed up by **Ivaki & Nesami, (2023)** who found that foot reflexology significantly improved the quality of sleep for cardiac patients. This contradicts the findings of **Fazlollah et al. (2021),** who demonstrated that foot reflexology was unable to improve the quality of sleep following heart surgery.

The current study elobrated that, among patients with acute myocardial infraction, fatigue, pain severity, and overall sleep quality were positively correlated. once a statistically significant foot reflexology program has been implemented. This can be accounted for by using foot reflexology that helps the client feel more comfortable, applying reflexology techniques to appropriate trigger points to maintain power, enhancing blood circulation, and eliminating waste from the body, all of which can help participants feel less fatigued and get better bed rest. According to a study **by Samarehfekri et al. (2020),** there was a notable decrease in the mean pain and fatigue scores in the foot reflexology group following the intervention when compared to the control group. Additionally, the foot reflexology group's sleep quality score showed a significant improvement within a week of the intervention when compared to the control group. Additionally, this outcome was consistent with that of **Rejeh et al. (2020),** who found that following the intervention, a statistically significant change in the two groups' pain and fatigue levels was detected.

Conclusion:

Based on the study results and hypothesis of the present study, the implementing the foot reflexology resulted in statistically significant reduction in patient complaints pre/post program, it also improved sleep quality for acute myocardial infarction patients, and had a positive effect on decreased pain, fatigue. There was a positive correlation between overall global sleep quality, pain, and fatigue following the implementation of the foot reflexology program.

Recommendations:

Based on the results findings it recommended that:

1. Myocardial infraction patients and their families require ongoing education on the condition, its treatment, complications, and complementary and alternative therapies in order to ameliorate their problems.
2. Patients who have had myocardial infarction should have access to an illustrate handbook on reflexology method.
3. In order to generalize, future research and a replication of this study with a larger sample size

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