

## Counseling program Based on Pender's Health Promotion Model for Patients with Myocardial Infarction

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### Abstract

**Background:** Myocardial infarction is a serious medical emergency, which leads to irreversible myocardial tissue death. Counseling based on health promotion model achieve higher level of well-being and behavior changes. **Aim:** To evaluate the effect of counseling program based on pender's health promotion model for patients with myocardial infarction. **Design:** the study design was a quasi-experimental **Setting:** The current study was conducted at cardiac outpatient clinic, affiliated to Benha University Hospital, Qalyubia Governorate. **Sample:** A purposive sample of 188 myocardial infarction patients was recruited. **Tools:** Three tools were used. I. A structured interviewing questionnaire , II. Health promoting lifestyle profile II. And III. Pender's determinants of healthy behaviors. **Results:** Regarding patients' knowledge; pre program only 1.1% of the studied patients had good total knowledge regarding myocardial infarction, which increased to 71.3% post program. Pre program 9% of the studied patients were highly adhered to health promotion lifestyle, which increased to 55.3% post program. 28.2% of patients had good total behavior according to Pender's health promotion model pre program, which increased to 90.4% post program. **Conclusion:** The counseling program had a significant effect on the improvement of myocardial infarction patients' knowledge, health promotion lifestyle and pender's healthy behavior . **Recommendations:** - Further researches are required on a large scale on health promotion behavior for patients with myocardial infarction.

**Keywords:** Counseling program, myocardial infarction patients, Pender's health promotion model

### Introduction

A myocardial infarction (MI), often known as a heart attack, happens when blood flow to the heart's coronary artery is reduced or interrupted, harming the heart muscle. (Ojha and Dhamoon, 2022). Globally, cardiovascular diseases (CVDs) constitute the leading cause of death. According to estimates, 17.9 million deaths worldwide in 2019 were attributable to CVDs, or 32% of all fatalities. And heart attacks and strokes were to blame for 85% of these fatalities. The majority of CVD fatalities occur in low- and middle-income nations (World Health Organization, 2021).

Chest pain which may radiate to the arm, neck, shoulder or back jaw. usually lasts longer than a few minutes and is located in the centre or the chest left side . Sometimes the discomfort may feel like heartburn. Other signs and symptoms could include fatigue, shortness of breath, nausea, feeling dizzy, and cold sweats. High blood pressure, lack of exercise , obesity ,high cholesterol, a poor diet, diabetes, smoking, and excessive alcohol consumption

are all risk factors for myocardial infarction. (Center for Disease Control and Prevention, 2022).

Cardiac enzymes and isoenzymes, patient history, and symptoms are typically used to make the diagnosis of MI. Along with blood testing for certain heart proteins, chest X-rays, echocardiograms, coronary catheterizations, and cardiac CT or MRI, the Electrocardiogram (ECG) continues to be a key diagnostic tool. Aspirin to prevent blood clotting, nitroglycerin to alleviate chest discomfort and oxygen, as well as medicines like morphine, are all part of the urgent treatment for MI. By regulating fatty food, salt ,cholesterol, alcohol, smoking, monitoring blood pressure, losing weight, and engaging in daily exercise MI can be avoided. (Khadse et al., 2020).

In addition to reducing the patient's confusion and empowering them to make their own decisions that will result in positive changes in their attitude and behavior that will improve their health and prevent complications, counseling is the act of assisting

the client in seeing things more clearly, possibly from a different perspective, and bringing about change in life, thought, emotion, and behavior. (Sutton, 2021).

The major strategy for motivating people to assume a healthy lifestyle and avoiding negative health effects is health promotion. Negative health behaviors raise a person's sensitivity to ill health and increase their vulnerability to it. On the other hand, adopting healthy habits lowers mortality and morbidity rates and raises or maintains an individual's wellbeing. (Alzahrani et al., 2019).

Dr. Nola J. Pender created the Health Promotion Model (HPM) in 1982. Pender considered that The aim of nursing care was to assist patients in achieving the highest level of health and wellbeing. According to the HPM, each person's criteria and life experiences directly influence their health-related decisions. (Butts & Rich, 2018). The HPM construct is based on social cognitive theory, that include cognitive-perceptual factors as: Perceived benefits, self-efficacy, and barriers that are affect engagement in behaviors that promote health, as well as modifying factors like behavioral ,demographic characteristics, and interpersonal influences, which considered to interact with each other to influence cognitive perceptual processes and commitment to a plan of action (Faroughi et al., 2021).

The nurse plays a crucial role in the prevention and management of MI patients. As she evaluates healthy lifestyle choices to stop the progression of MI through give guidelines on discharge and home care, follow-up, and adherence to dietary restrictions and prescribed medications. As well the nurse delivers patient education about importance of compliance (Mechanic et al., 2022).

### Significance of the study:

Myocardial infarction emerging as a major health problem in the Eastern Mediterranean region as: Bahrain, Iran, Egypt, Cyprus, Iraq, Oman , Kuwait, Jordan, Qatar and the United Arab Emirates (Jaralnabi et al., 2017). Egypt is the most overcrowded country in the North Africa and Middle East and has more than fifteen percent of the deaths

due to cardiovascular problems in the region (Reda et al., 2019).

Myocardial infarction can leading to deterioration and rapid death due to may be silent, and go undetected, also Life after MI can be challenging and overwhelming for the patient. (Terrie and Pharm, 2018). Pender's health promotion model is focused on the promotion of health and individual empowerment for better health behavior and illness prevention through practicing changes. Counseling is a key element in changing the faulty behaviors and promoting the health. So, there is a need for performing research to evaluate the effect of counseling program based on pender's health promotion model for patients with myocardial infarction.

### Aim of the study

To evaluate the effect of counseling program based on pender's health promotion model for patients with myocardial infarction through:

- 1- Assessing patient's knowledge about myocardial infarction to determine educational needs.
- 2- Assessing level of health promotion lifestyle among patients with myocardial infarction.
- 3- Assessing patients' healthy behaviors regarding myocardial infarction.
- 4- Planning and implementing counseling program based on pender's health promotion model for patients with myocardial infarction.
- 5- Evaluating the effect of counseling program on patients with myocardial infarction.

### Hypotheses:

- H1.** The counseling program based on pender's health promotion model will improve patients' knowledge regarding myocardial infarction.
- H2.** The counseling program based on pender's health promotion model will have a significant effect on myocardial infarction patients' health promotion lifestyle and healthy behaviors.
- H3.** There will be a significant correlation between patients' knowledge, health

promotion lifestyles and healthy behaviors regarding MI.

## Subjects & Methods

### Research design:

A quasi-experimental design was used in this study.

### Setting:

The study was conducted at cardiac outpatient clinic, affiliated to Benha University Hospital, Qalyubia Governorate, Egypt.

### Sample:

A purposive sample of 188 patients were selected according to the inclusion criteria which included patients diagnosed with myocardial infarction, able to communicate and answer questions and Willing to participate in the study.

**Exclusion criteria:** Patients who had neurological or psychiatric problems.

### Sample size calculation:

The flow rate of cardiac outpatient clinic, Benha University Hospital from information system within the previous year = 354. By using the following equation:

$$n = N / 1 + N (e)^2 = 188 \quad \text{Where:}$$

n = Sample size.

N = Population size.

e = Margin of error, e = 0.05, based on the research condition (Yamane, 1967).

### Tools for data collection:

#### Tool I- Structured interview questionnaire:

It was designed based on current related literature and filled in by the researchers after written in simple Arabic language. It included three parts as follows:

**Part 1:** Patient's demographic characteristics included: Age, gender, level of education, marital status, residence, and employment.

**Part 2:** Patient's past medical history covered: Family history of heart disease, history of smoking, presence of high cholesterol level and duration of the disease.

**Part 3:** Patients knowledge regarding myocardial infarction as: Meaning, causes, risk group, signs and symptoms, diagnostic

tests, complications, treatment, prevention, and regular follow up.

### Scoring system for knowledge:

The knowledge included nine questions, obtained from patients and checked with a model answer and scored as the following: Complete correct answer takes "two", while the incomplete answer takes "one" and a wrong answer or don't know takes "zero". The total score ranged from (0-18) converted into percentage and interpreted as follows:

- Poor < 50%
- Average 50 - 75%
- Good >75%

### Tool II: Health promoting lifestyle profile

**(HPLP):** This tool was adopted from Walker et al., (1987) to measure health promoting lifestyle behaviors (HPLBs).

### Scoring system for health promoting lifestyle profile:

This tool consists of 52 items within six dimensions including: Health responsibility (9 items), physical activity (8 items), nutrition (9 items), spiritual growth (9 items), interpersonal relationships (9 items), and stress management (8 items). These items are scored based on a Likert scale, ranging from 1 (never) to 4 (always). Higher scores refer to higher adherence levels to healthier lifestyle.

The total score ranged from (52 to 208). The total score was classified into three levels as follows:

- Low level of adherence to HPLP (30% < 60%)
- Moderate level of adherence to HPLP (60% < 80%)
- High level of adherence to HPLP (80%-100%)

**Tool III: Pender's determinants of healthy behaviors** among the studied patients adapted from Pender et al., (2011), Sriyuktasu, (2018) and El-kest et al., (2022) and modified by the researchers.

The components of the Pender's HPM, including 56 items divided into perceived benefits (5 items), perceived barriers (10

items), perceived self-efficacy (10 items), and behavior-related affect (9 items), interpersonal influences (10 items), situational influences (5 items) and commitment to action (7 items) with five-point likert scale ranging from disagree= 1 to strongly agree =5, except for the perceived barriers ,which the score of its items was reversed.

### Scoring system:

The total score was 280 points classified into two levels as follows:

Good behavior  $\geq 60\%$

Bad behavior  $50\% - < 60\%$

### Content validity

The study tools were tested for validity by a panel of five experts of Community Health Nursing for judgment of clarity, comprehensiveness, relevance of sentences, and appropriateness of content.

### Reliability of the tools

The tools that used in this study showed high reliability based on the values of Cronbach's Alpha coefficient test as follows: Knowledge items = 0.875, health promotion lifestyles tool= 0.939 and Pender's health promotion model = 0.917.

### Ethical considerations

Prior to collecting the data a formal consent was obtained. Patients informed about the aim ,benefits and data collection procedures of this study. Also patients had ability to withdraw at any time without any reason. Also, they were assured that the information given will be remained confidentially and utilized only for the research purpose.

### Pilot study

A pilot study was conducted on 10 % (19) of the patients to test the applicability and clarity of the tools . No modifications were done on the tools. So those who participated in pilot study were included in the study sample.

### Preparatory phase

Included reviewing the available literatures and diverse studies related to health promotion model and myocardial infarction patients using books, articles, and internet to develop tools of data collection.

### Field work

Data collection was completed within six months, and done through the following steps:

\* Official letter delivered from the Faculty of Nursing, Benha University, including the aim of the study, was forwarded to the administrator of cardiac outpatient clinic, to obtain permission to conduct the study.

\*The researchers interviewed the patients then introduced themselves to them. Patients were available at the clinic 2 days /week.

\*The time needed for collecting the study tools about 30- 40 minutes for each patient.

### Counseling program based on Pender's health promotion model was constructed in four phases as the following:

**1. Assessment phase:** The initial stage was done by using pretest to assess myocardial infarction patient's knowledge, lifestyle and healthy behaviors to determine the baseline and build up the counseling program sessions to promote behavior of myocardial infarction patients.

**2. Planning phase:** Based on the outcome of the assessment phase, the counseling program sessions were designed after reviewing of the related literature. The booklet included knowledge about myocardial infarction as: Meaning, causes, risk group, sign and symptoms, diagnostic tests, complications, treatment, prevention and regular follow up. Also contain practices to promote healthy lifestyle such as: Preparation of nutritional meal to help in improve MI patient condition, how to perform physical activity and how to control stress. The teaching methods were: Lectures, and group discussions. And teaching media were booklet and pictures.

**3. Implementation phase:** The data was collected before and after counseling program, it takes 6 months from the beginning of September 2021 to end of February 2022, done in 2 days / week in cardiac outpatient clinic from 9 a.m. to 12.00 p.m.

The counseling program was introduced in sessions. The total number of patients were 188 patients divided into 15 groups each

group consisted of 12-13 patients, and the counseling program were applied through four sessions for each group (2 theoretical and 2 practical). Each session takes about 30- 45 minutes according to presented items. The researchers interviewed 2-3 groups/week.

**4. Evaluation phase:** This phase was done by using the same tools of pre-test, immediately after completing all sessions, the effect of the counseling program was measured by posttest to evaluate the effect of counseling program on patients.

#### **Administrative approval**

The official permission was gotten from the administrator of Benha University Hospital to conduct the study in cardiac outpatient clinic. This by letters of request delivered to them from Faculty of Nursing, Benha University, with clarification of the goal and the study predictable outcome.

#### **Statistical design**

The collected data were organized, tabulated and statistically analyzed by using the Statistical Package for Social Sciences (SPSS), version 21. For Numerical data, the range, mean and standard deviation were calculated. Qualitative data were presented as frequencies and percentages. Comparison between groups was done by chi-square test. A p-value  $\leq 0.05$  was considered statistically significant.

#### **Results:**

**Table (1):** Clears that; 52.1% of the studied patients aged from 45 - 50 years old with mean age  $50.26 \pm 3.07$ . 50.5% of the studied patients were males and 39.9% of them had secondary education. 60.1% were married, and 56.4% were living in rural areas. Also, 52.1% were employed.

**Table (2):** Reveals that; 38.3% of the studied patients had family history of heart diseases, and 41.5% of them had history of smoking. 43.1% of the studied patients had high cholesterol level, and 51.1% of them suffered from disease since more than 5 years

**Table (3):** Shows that; There were highly statistically significant differences between pre

and post counseling program regarding to all knowledge items ( $P < 0.001$ ).

**Figure (1):** Displays that; at pre counseling program 1.1% of patients had good total knowledge level regarding myocardial infarction, which increased to 71.3% post counseling program. While, 48.9% of patients had poor total knowledge pre counseling program, which decreased to 1.6% post counseling program.

**Table (4):** Indicates that; there were highly statistically significant difference regarding health promotion lifestyle dimensions between pre and post counseling program ( $p < 0.001$ ).

**Figure (2):** Displays that; at pre counseling program 9% of the studied patients had high level of adherence to health promotion lifestyle, which increased to 55.3% post counseling program. While, 61.2% of patients had low level of adherence to health promotion lifestyle pre program, which decreased to 13.3% post counseling program.

**Table (5):** Denotes that; highly statistically significant difference was found regarding all Pender's determinants of healthy behaviors between pre and post counseling program ( $P < 0.001$ ). Also, the mean scores of all items of pender's health promotion model determinants improved post counseling program rather than pre program.

**Figure (3):** Illustrates that; 28.2% of the studied patients had good total behavior level according to Pender's determinants of healthy behaviors pre counseling program, which increased to 90.4% post counseling program. While, 71.8% of patients had poor total behavior pre counseling program compared to 9.6% post counseling program.

**Table (6):** Indicates that; there were positive correlation between studied patients' total knowledge, total health promotion lifestyle and total pender's healthy behavior pre counseling program implementation with no statistically significant difference, ( $P > 0.05$ ). While, post counseling program there were highly statistically positive correlation between total knowledge, total health promotion lifestyle and total pender's healthy behavior of studied patients post counseling program ( $P < 0.001$ )

**Table (1):** Frequency Distribution of the Studied Patients according to their Demographic Characteristics (n = 188).

Demographic characteristics	No.	%
<b>Age (years)</b>		
45 – 50	98	52.1
> 50	90	47.9
<b>Mean ±SD</b>	<b>50.26 ±3.07</b>	
<b>Gender</b>		
Male	95	50.5
Female	93	49.5
<b>Level of education</b>		
Can't read or write	27	14.4
Basic education	56	29.8
Secondary education	75	39.9
University or more education	30	16.0
<b>Marital status</b>		
Single	15	8.0
Married	113	60.1
Divorced	24	12.8
Widowed	36	19.1
<b>Residence</b>		
Rural	106	56.4
Urban	82	43.6
<b>Employment</b>		
Employed	98	52.1
Unemployed	90	47.9

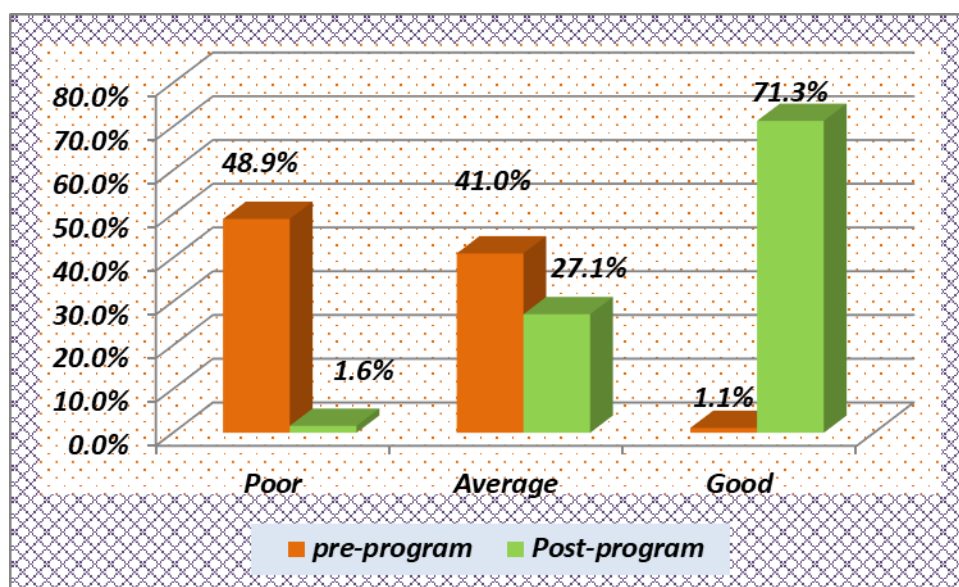
**Table (2):** Frequency Distribution of the Studied Patients according to their Past Medical History (n=188).

Past medical history	No.	%
<b>Family history of heart diseases</b>		
Yes	72	38.3
No	116	61.7
<b>History of smoking</b>		
Yes	78	41.5
No	110	58.5
<b>Presence of high cholesterol level</b>		
Yes	81	43.1
No	107	56.9
<b>Duration of the disease (in years)</b>		
≤5	92	48.9
>5	96	51.1

**Table (3):** Distribution of the Studied Patients according to their Knowledge Pre and Post Counseling program about Myocardial Infarction (n= 188 )

Knowledge items	Pre counseling program						Post counseling program						Chi square	P value
	Don't know		Incomplete		Complete		Don't know		Incomplete		Complete			
	No	%	No	%	No	%	No	%	No	%	No	%		
Meaning of MI	110	58.5	57	30.3	21	11.2	4	2.1	39	20.7	145	77.1	194.56	<0.001**
Causes of MI	96	51.1	78	41.5	14	7.4	2	1.1	57	30.3	129	68.6	184.91	<0.001**
At risk group	96	51.1	80	42.6	12	6.4	3	1.6	57	30.3	128	68.1	187.33	<0.001**
Signs& symptoms of MI	104	55.3	68	36.2	16	8.5	2	1.1	47	25.0	139	73.9	199.59	<0.001**
Diagnosis of MI	108	57.4	65	34.6	15	8.0	3	1.6	44	23.4	141	75.0	205.13	<0.001**
Complications of MI	85	45.2	85	45.2	18	9.6	2	1.1	61	32.4	125	66.5	163.19	<0.001**
Treatment of MI	90	47.9	82	43.6	16	8.5	3	1.6	60	31.9	125	66.5	169.05	<0.001**
Prevention of MI	67	35.6	93	49.5	28	14.9	2	1.1	47	25.0	139	73.9	150.12	<0.001**
Regular follow up	70	37.2	85	45.2	33	17.6	3	1.6	45	23.9	140	74.5	139.98	<0.001**

\*\*Highly statistically significant at  $p \leq 0.001$

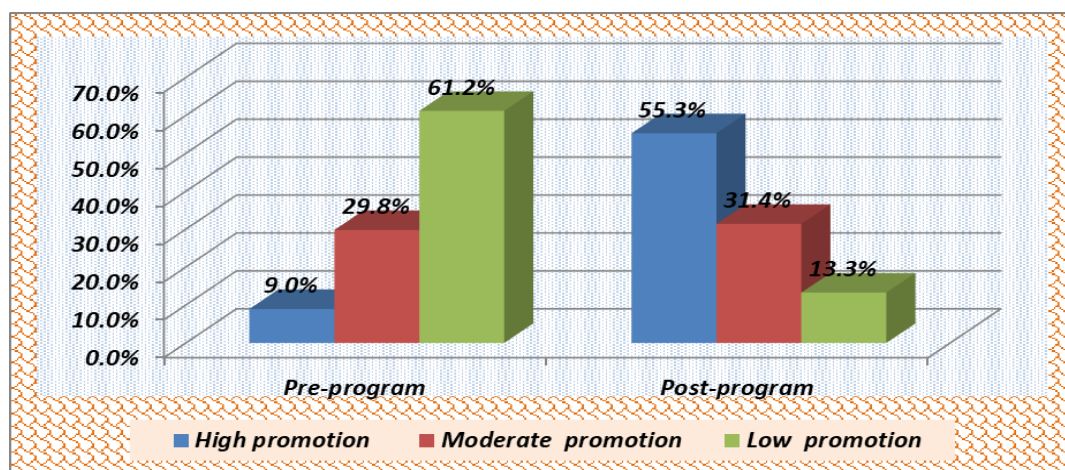


**Figure (1):** Percentage Distribution of the Studied Patients regarding Total Knowledge Level about Myocardial Infarction Pre and Post Counseling Program (n=188).

**Table (4):** Frequency Distribution of the Studied Patients according to Health Promotion Lifestyles Level about Myocardial Infarction Pre and Post Counseling program (n=188)

Dimensions of Health Promotion Lifestyles	Pre program						Post program						Chi square	p-value
	High		Moderate		Low		High		Moderate		Low			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Health responsibility	9	4.8	90	47.9	89	47.3	86	45.7	84	44.7	18	9.6	109.73	<0.001**
Physical activity	6	3.2	44	23.4	138	73.4	136	72.3	40	21.3	12	6.4	225.04	<0.001**
Nutrition	9	4.8	45	23.9	134	71.3	125	66.5	42	22.3	21	11.2	182.90	<0.001**
Spiritual growth	26	13.8	91	48.4	71	37.8	68	36.2	77	41.0	43	22.9	26.81	<0.001**
Interpersonal relations	42	22.3	29	15.4	117	62.2	98	52.1	48	25.5	42	22.3	62.46	<0.001**
Stress management	12	6.4	36	19.1	140	74.5	116	61.7	60	31.9	12	6.4	192.28	<0.001**

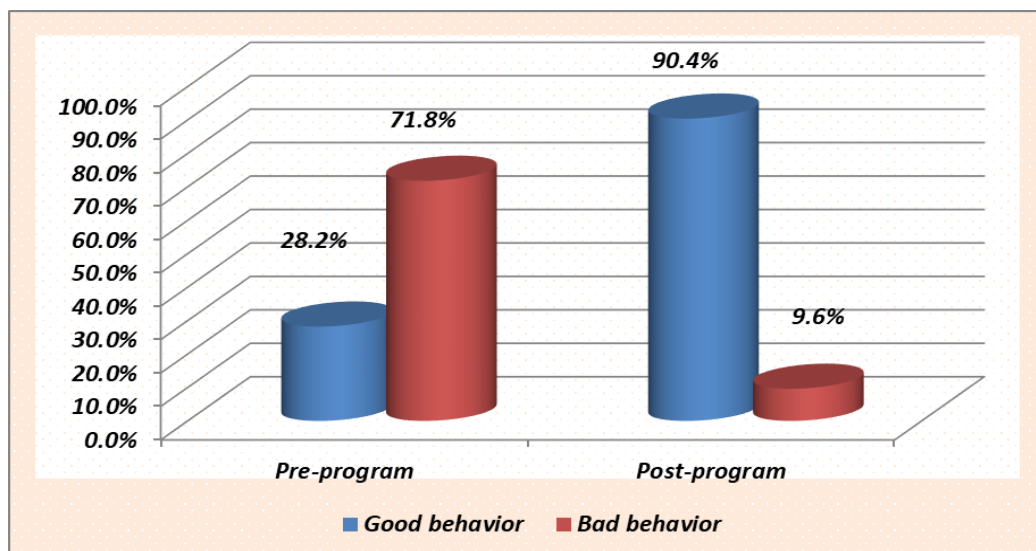
\*\*Highly statistically significant at  $p \leq 0.001$

**Figure (2):** Percentage Distribution of the Studied Patients regarding Total Health Promotion Lifestyle Level of Adherence Pre and Post counseling Program (n=188).**Table (5):** Mean Scores of Pender's Determinants of Healthy Behaviors for the Studied Patients Pre and Post Counseling program about Myocardial Infarction (n=188 )

Items	Pre program	Post program	Paired t-test	p-value
	Mean $\pm$ SD	Mean $\pm$ SD		
Perceived benefits	10.957 $\pm$ 3.451	20.053 $\pm$ 6.956	20.687	<0.001**
Perceived barriers	23.723 $\pm$ 8.894	36.223 $\pm$ 6.234	16.145	<0.001**
Perceived self-efficacy	21.755 $\pm$ 8.050	37.101 $\pm$ 5.321	22.466	<0.001**
Behavior related affect	19.016 $\pm$ 6.778	35.319 $\pm$ 6.367	23.137	<0.001**
Interpersonal influences	24.946 $\pm$ 6.183	32.446 $\pm$ 7.229	11.453	<0.001**
Situational influences	10.292 $\pm$ 3.066	17.313 $\pm$ 4.083	21.845	<0.001**
Commitment to a plan of action	18.085 $\pm$ 4.207	25.744 $\pm$ 6.456	24.739	<0.001**
Total Pender's	128.776 $\pm$ 19.190	204.202 $\pm$ 2.268	46.916	<0.001**

\*\*Highly statistically significant at  $p \leq 0.001$





**Figure (3):** Percentage Distribution of the Studied Patients regarding Total Behaviors according to Pender's Determinants of Healthy Behaviors Pre and Post Counseling Program (n=188).

**Table (6):** Correlation between Total Knowledge, Total Health Promotion Lifestyle and Total Pender Healthy Behavior of Studied Patients Pre and Post Program

Variables	Total Knowledge			
	Pre-program		Post-program	
	r	P value	r	P value
Total health promotion lifestyle	0.023	>0.05	0.352	<0.001**
Total pender's healthy behaviors	0.105	>0.05	0.287	<0.001**

\*\*Highly statistically significant at  $p \leq 0.001$

**Discussion:**

Globally, coronary artery disease (CAD) is a leading cause of adult death, morbidity, and disability and is responsible for a sizeable portion of health expenditures. Patients who have already been diagnosed with CAD account for 70% of fatalities from heart disorders and 50% of deaths from myocardial infarction. Additionally, maintaining proper physical function and preventing additional coronary episodes and the re-hospitalization that they cause are significant issues in preventive healthcare that need for a systematic strategy. Adjustments in lifestyle, including dietary and pharmaceutical changes, are crucial in this regard. The Pender's Health Promotion Model is comprehensiveness and application in recognizing behavioral determinants to predict health-promoting behaviors (Ehlken et al., 2020).

Regarding demographic characteristics of the studied patients, the current study cleared that; more than half of the studied patients aged from 45 - 50 years old with mean age  $50.26 \pm 3.07$ . About half of the studied patients were males and about two fifth of them had secondary education. About three fifth of the studied patients were married. Also, more than half of them were employed (table 1). This results greed with Faroughi et al., (2021) who studied "the impact of an educational intervention based on Pender's HPM on adherence to medication among CAD patients in Iran (n=64) and stated that; the mean age of the studied patients was  $58.75 \pm 8.83$ , and 55.20% of them were male. 48.90% of the studied patient had moderate education. On the contrary, these results disagreed with Luu et al., (2019) who studied "the myocardial infarction patients' compliance with ant platelet medication following coronary intervention

attending national heart institute" in Vietnam (n=175) and declared that; about two third of the studied patients were  $\geq 60$  years, 72.99% of them were male, and 80.57% of the studied patients had high education. Regarding occupation, 50% of the studied patients were retired.

Concerning past medical history of the studied patients, the present study revealed that; more than one third of the studied patients had family history of heart diseases, and more than two fifth of them had history of smoking. More than two fifth of the studied patients had high cholesterol level (**table 2**). These results were in accordance with **Khodaminasab et al., (2019)** who studied "the use of a health promotion model to anticipate patients undergoing coronary angioplasty's compliance with self-care" " in Bushehr, Iran (n= 200) and found that; 39.1% of the studied patients had a family history of heart diseases, and 32.1% of them had high cholesterol level. While, these results were in difference with **Kamal et al., (2019)** who conducted a study in Assiut to "assess of knowledge and practices of MI patients after primary percutaneous coronary intervention at outpatient clinic in heart hospital" (n=150) and found that; more than half 53.3% of the studied patients had family history of cardiovascular disease, and 83.3% of them had history of tobacco use.

As regards distribution of the studied patients according to their knowledge items pre and post counseling program about myocardial infarction, the current study showed that; more than one tenth of the studied patients had complete knowledge about meaning of myocardial infarction at pre counseling which increased post counseling to more than three fourths. Furthermore, less than one tenth of the studied patients had complete knowledge about treatment of MI at pre counseling which increased to about two thirds at post counseling. Less than fifth of the studied patients had complete knowledge about regular follow up at pre counseling, which increased to about three fourths at post counseling. There were highly statistically significant differences regarding all knowledge items between pre and post counseling ( $P<0.001$ ) (**table 3**).

These findings were similar to **Abdullah et al., (2017)** who studied "the impact of an educational intervention on patient self-efficacy with MI" in Zagazig, Egypt (n=50) and found that; 22.5% of the studied patients had correct knowledge about definition of MI at pre counseling, while this percent increased to 82.5% at post counseling. Moreover, 37.5% of the studied patients had correct knowledge about treatment of MI, which increased to 80.0% at post counseling. 17.6% of the studied patients had complete knowledge about regular follow up pre counseling, which increased to 74.5% at post counseling. There were highly statistically significant differences regarding all mentioned knowledge items between pre and post counseling.

In the name of total knowledge level of the studied patients about myocardial infarction. The current study displayed that; at pre counseling program minority of the studied patients had good total knowledge level regarding myocardial infarction, which increased to less than three fourths at post program, while, less than half of the studied patients had poor total knowledge pre program, which decreased to minority at post program (**figure 1**). These results agreed with **Kamal et al., (2019)** who revealed that; 8.9% of the studied patients had good knowledge, 52.7% of them had poor knowledge about myocardial infarction and primary percutaneous coronary intervention at pre educational program.

Also **Elsayed & Mohamed (2021)** who did a study entitled "impact of multi modal cardiac rehabilitation program on patients after acute MI" in Egypt (n=60) and found that; 26.7% of the studied patients had satisfactory knowledge regarding myocardial infarction at preprogram which increased to 80% at post program. While, 73.3% of the studied patients had unsatisfactory knowledge about myocardial infarction at pre program, which decreased 20% of them at post program. Also, **Hisam et al., (2022)** said that; 46% of the studied patients had sufficient knowledge about MI before counseling, while improved to 100% of them after counseling. While, more than half had unsatisfactory level about MI, which decreased to zero percent after counseling. The rational for knowledge improvement might be related to the distribution of educational booklet and / or verbal instructional information.

Regarding health promotion lifestyles level about myocardial infarction pre and post counseling, the existing study indicated that; pre counseling, less than one fourth, and more than one tenth of the studied patients were highly adhered to interpersonal relations, and spiritual growth which increased post counseling to more than half, and more than one third, respectively ( $P < 0.001$ ) (table 4). These findings in agreement with **Habibzadeh et al., (2021)** who examined "the effect of educational intervention based on Pender's health promotion model on quality of life and health promotion in patients with heart failure", in Iran ( $n=80$ ) and said that; there was a statistically significant difference in the mean scores of the interpersonal relations, and spiritual growth domains pre and post intervention among the studied group ( $p < 0.05$ ).

Also, the present study revealed that; less than three fourths of the studied patients were low adhered to stress management, physical activity, and nutrition pre counseling that decreased post counseling to around one tenth. Also, there were highly statistically significant difference regarding health promotion lifestyle dimensions between pre and post counseling ( $p < 0.001$ ) (table 4). These results were similar to **Faroughi et al., (2021)**, who found that; the treatment adherence was  $108.82 \pm 21.68$  at pre counseling and increased to  $144.82 \pm 22.03$  at post counseling. Dietary adherence increased from  $72.03 \pm 8.65$  pre counseling to  $85.75 \pm 8.26$  post counseling. Exercise adherence increased from  $26.43 \pm 6.40$  pre counseling to  $37.82 \pm 4.36$  post counseling.

Also **Hakimzadeh & Adib-Hajbaghery, (2021)** who conducted a study to examine "the effects of health literacy on self-care behaviors and treatment adherence in patients with ischemic heart diseases" in Iran ( $n=50$ ) and found that; the health literacy has significantly improved the patients' self-care behaviors in the dimensions of diet from  $9.92 \pm 2.58$  pre counseling to  $18.40 \pm 1.32$  post counseling, and stress avoidance from  $12.44 \pm 3.74$  pre counseling to  $22.76 \pm 1.53$  post counseling.

Regarding total health promotion lifestyle level. The present study displayed that; at pre program less than one tenth of the studied patients had high level of adherence to health promotion lifestyle, which increased to more than half post program. While, more than three fifth of the

studied patients had low level of adherence to health promotion lifestyle pre counseling program, which decreased to more than one tenth at post counseling program (figure 2). This findings were in harmony with **Deif et al., (2015)** who studied "the impact of an educational program on adherence to therapeutic regimen among chronic kidney disease stage patients under maintenance hemodialysis" in Egypt ( $n=60$ ), and said that; the post total mean adherence scores of the study subjects is increased significantly in post compared to pre program from  $49.483 \pm 4.590$  to  $51.534 \pm 4.430$ , ( $P = 0.001$ ). Also, these results agreed with **Moshki et al., (2022)** who did evaluation of "an educational intervention based on Pender's health promotion model for patients with myocardial infarction" in Iran ( $n=50$ ) and showed that the mean lifestyle score of the myocardial infarction patients in the intervention group was significantly higher than the control group.

Regarding mean scores of Pender's determinants of healthy behaviors for the studied patients pre and post counseling program about myocardial infarction, the contemporary study denoted that; highly statistically significant difference was found regarding all Pender's health promotion model determinants of healthy behavior between pre and post counseling program. As table shows, mean  $\pm$  SD of perceived self-efficacy was  $21.755 \pm 8.050$  pre counseling that improved to  $37.101 \pm 5.321$  post counseling ( $P < 0.001$ ). (table 5). This result agreed with **Sevinc & Argon (2018)** who conducted a study entitled "application of Pender's health promotion model to post-myocardial infarction patients" in Turkey ( $n=70$ ), and reported that; self-efficacy level was  $19.498 \pm 6.435$  at pre counseling and increased to  $31.749 \pm 1.543$  at post counseling in the experimental group ( $P < 0.001$ ). Also, this results were parallel to **Tabataba et al., (2022)** who conducted a study about "the factors affecting the consumption of fruits and vegetables in a number of diabetic patients based on Pender health promotion model" in Iran ( $n=260$ ) and found that; self-efficacy increased from  $64.7 \pm 21.8$  pre counseling to  $69.8 \pm 20.6$ .

Pertaining to total behavior according to Pender's determinants of healthy behaviors, our study illustrated that; more than one fourth of

the studied patients had good total behavior level pre counseling program, which increased to the majority at post counseling program. While, less than three fourths of the studied patients had poor total behavior preprogram compared to nearly one tenth at post program (**figure 3**). These findings agreed with **Moshki et al., (2022)** who declared that; Pender's health promotion model had good effect on healthy behaviors of patients with myocardial infarction.

About the correlation among total knowledge score, total health promotion lifestyle score and total pender's healthy behaviors of the studied patients pre and post program, this study indicated that; there were positive correlation between studied patients' total knowledge score, total health promotion lifestyle and total pender's healthy behaviors pre counseling program implementation with no statistical significant difference ( $P>0.05$ ). While, post program there was highly statistical positive correlation between total knowledge, total health promotion lifestyle and total pender's healthy behavior of studied patients at post program ( $P<0.001$ ) (**table 6**).

This results agreed with **Abdo et al., (2019)** who did a study on "the effect of knowledge About cardiovascular diseases on healthy lifestyle behavior" in Zagazig ( $n=150$ ) and found that; a significant positive correlation was found between the post-intervention total cardiovascular disease knowledge score and health promotion life style behavior of the participants ( $p < 0.001$ ). From researcher point of view, the implementation of health promotion lifestyle based on pander model help patients to acquire knowledge of how to adapt with the disease through promoting their healthy behavior that enable them to modify lifestyle and increase their satisfaction.

### **Conclusion:**

Based on the present study results and hypothesis the counseling program based on Pender health promotion model had positive effect on myocardial infarction patients in addition there was a highly statistically significant correlation between knowledge and total health promotion lifestyle and pender's

healthy behaviors regarding myocardial infarction.

### **Recommendations:**

- Training programs to increase awareness for patient's about myocardial infarction prevention.
- Further researches are required on a large scale on health promotion behavior for patients with myocardial infarction.

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