The Effect of Implementing a Safety Nursing Measures on Clinical Outcomes of Patients with Acute Myocardial Infarction

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Abstract: *Background: - Acute myocardial infarction (AMI) is a life threatening condition. Safety nursing measures involved in AMI is critical and essential for better outcomes. Aim:-Evaluate the effect of implementing a safety nursing measures on clinical outcomes of patients with acute myocardial infarction. Design: - Quasi-experimental study. Setting: - This study conducted in coronary care unit at Tanta Main University Hospital. Subjects: - Convenience sample of 120 adult patients with AMI divided alternatively into two equal groups, study group: managed by safety nursing measures that implemented by the researcher and control group: received routine nursing hospital care. Tools:-Five tools had been used .Tool I Patients' socio demographic and clinical assessment. Tool II Nutritional assessment Tool III Beck anxiety inventory. Tool IV The Groningen sleep quality scale. Tool V Clinical outcomes of patient with acute myocardial infarction assessment. Results: There was statically significant difference between both control and study groups regarding daily dietary caloric intake, anxiety level, sleep pattern, and back pain while there was difference but it is not significant in relation to anthropometrics measurements and chest pain recurrence. Conclusions: – Safety nursing measures for patients with acute myocardial infarction had a positive effect on their clinical outcomes. Recommendations: - Safety nursing measures should carry out as a routine care for patients with acute myocardial infarction.*
Key words: safety measure, myocardial infarction, clinical outcomes

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I. Introduction

Worldwide, acute myocardial infarction (AMI) is a common cardiac emergency with the potential of substantial morbidity and mortality (1). The term myocardial infarction pathologically denotes the death of cardiac myocytes due to extended ischemia that exceeds a critical threshold (2). Approximately 15.5 million person's ≥20 years of age in the USA have coronary heart disease (CHD) according to American Heart Association (AHA) (3). While relatively few population based studies have examined recent temporal trends in the incidence of MI (4). According to the latest WHO data, CHD deaths in Egypt reached 78,879 or 21.73% of total deaths (5).

Management of myocardial infarction has improved dramatically over the past three decades (1). The goals of management are to minimize myocardial damage, preserve myocardial function, and prevent complications; this can be achieved by maintaining balance between the cardiac oxygen supply and oxygen demand. Management encompasses preventive, curative management that involves medical and surgical treatment, nursing management and complementary therapy (6, 7).

The nursing management involved in MI is critical, important and systematic; safety and efficiency are needed during implementation the care for better outcomes (7). Safety nursing practices are those that reduce the risk of adverse events related to exposure to medical care (8). Safety nursing measures for patient with AMI involve immediate measures to promote comfort and safety through life saving emergency practice, safe practice during administration of medications, safe nursing guidelines for patients undergone percutaneous coronary intervention (PCI), use a complementary therapy as foot reflexology massage to decrease stress, and health teaching about safe lifestyle.

When the initial screening suggests AMI, the patient transferred to cardiac care unit with a high level of supervision and resuscitation facilities. Keep the patient in complete bed rest then connect to ECG monitoring. Elevate patient's head 45 to 60 and give high flow 4-6 liters of oxygen, if patient has hypoxia (Sao2 < 90%) by nasal cannula should be provided (9). Insertion of intravenous lines and collecting blood samples for clinical investigations as cardiac markers and coagulation profile are also essential (6, 9).

Safe, effective and ethical medication practice is also an important component of client care. Nurses need the competence to assess the appropriateness of a medication for a client and manage adverse reactions (10, 11). The pharmacological treatments for patients with AMI mainly involve analgesics, anti platelet, anti coagulant, thrombolytic, anti arrhythmic drug (10). Evaluation of complications remains a key nursing intervention; the patient is monitored for evidence of re occlusion. Close observation of the patient for evidence of bleeding and other complications mainly hypotension, arrhythmia and allergic reaction, also monitoring coagulation profile values as prothrombin time (PT)and international normalized ratio (INR) during therapy is essential for patient safety (12, 13).

The role of surgical revascularization in the treatment of AMI has changed considerably with improvement in intraoperative management and techniques of myocardial protection. Surgical revascularization involve procedures as percutaneous coronary intervention (PCI), atherectomy, brachytherapy and coronary artery bypass graft surgery (14) .Guidelines of safe nursing practice for patient undergoing PCI start from pre to post procedure. After PCI, the coronary care unit nurse closely monitors the patient for vital signs, distal pulses and oxygen saturation (15).

Different arterial closure mechanical compression devices are widely used in clinical practice but applying manual compression for about 20-30 minutes after sheath removal with sterile pressure dressing remains the most effective and safe method for prevention of vascular complications as bleeding (16). Changing position of the patient after the first two hours post removal of the sheath and simple stroke of lumbosacral massage are shown to be effective and safe on reducing back pain post PCI (17, 18).

Sleep disturbance in ICU is a well recognized phenomenon that can cause respiratory dysfunction due to muscle fatigue and central respiratory depression; also induce sympathetic activation and elevation of blood pressure that increase patient morbidity. Many factors effect on sleep in ICU as pain, fear and anxiety, light and noise. The nurse must be aware with factors affecting sleep in ICU and establish care plan for sleep quality and followed by all ICU staff (19, 20).

Anxiety is common after AMI and may induce complications and poor outcome due to activation of the sympathetic nervous system and the hypothalamic pituitary adrenal axis. Little is known about critical care nurses' management of anxiety in the initial days after AMI (21). Alleviating anxiety and fears is an important nursing function, complementary and alternative medicine for anxiety management including reflexology interventions have widespread acceptance, largely with the clinical evidence for safety and efficacy (22).

Reflexology is a popular complementary therapy, which is based upon the application of pressure to specific reflex points of the hands and feet, corresponding with specific areas of the body. It has been reported that the specific massage to these points, increases the blood supply to the corresponding organs. Reflexology works as stress reducer in the nervous system producing beneficial affects overall body, also it easing pain and improving quality of life (23) .

It must be emphasized that safety lifestyle modification i.e, adhering to a heart healthy diet, regular exercise habits, avoidance of tobacco products and managing stress remains a critical component of health promotion and AMI risk reduction (24). Safe diet is a vital part of a healthy lifestyle, advice the patient with high lipid levels to follow diet that is low in saturated and trans fats that are found in some meats, dairy products, chocolate, baked goods, and deep fried and processed foods (25- 27). Teach patients that adding omega-3 fatty acids prevent blood clots formation and it has been effective in reducing lipid levels. The preferred source of omega-3 fatty acids is from fish three times a week or daily fish oil nutritional supplement 1-2 g/day ,also plant sources include flaxseed oil, walnuts, and canola oil (28).

Patients with acute MI can benefit from as little as 150 minutes moderate-intensity aerobic activity as waking per week to reduce hypertension, decrease smoking, eating and increase cardiac capillary blood flow (27). Warn the patient against intense exercise that may contribute to plaque rupture and increase the number of cardiac episodes (29). Tobacco use, especially cigarette smoking, account for one third of death from AMI, the nurse should advice tobacco user the important need for quitting smoking immediately. Also teaching the patient how to manage stress, and cope with problems can improve emotional and physical health (30).

The physician usually prescribes medication for AMI patient post discharge, such as statins, anti hypertension, beta-blocker and anti platelet (31). Safety statin therapy recommendation, include measuring of hepatic function before initial dose of treatment and if symptoms suggesting hepatotoxicity arise (32). Furthermore, it is important to warn the patient for signs of bleeding including bruising, nosebleeds, excessive menstrual flow, and coffee ground emesis (33)

Aim of the study was to evaluate the effect of implementing a safety nursing measures on clinical outcomes of patients with acute myocardial infarction. Research hypothesis: Patients with acute myocardial infarction who exposed to a safety nursing measures exhibit:-
1. No chest pain recurrence and no progression of AMI complications.
2. Reduction in complications of percutaneous coronary intervention.

3. Reduction in anxiety level and length of hospital stay
4. Improvment in quality of sleep.
5. Decrease in serum cholesterol and triglycerides than control patients who are not exposed to a safety nursing measures.

Materials and method
Materials
1. **Research design**: Quasi-experimental design was utilized.
2. **Setting:**   This study conducted in coronary care unit of Tanta University Hospital.

 3. **Subjects:** Convenience sample of 120 adult patients with AMI was selected based on Epi-info program and divided alternatively into two equal groups: Control group, had been received their routine nursing care by hospital nursing staff and study group, managed by safety nursing measures as developed and implemented by the researcher. The subjects of this study had been selected according to the following criteria: conscious adult patients, of both sexes, expected to stay not less than 4 day free from any other associated disorders as diabetes mellitus, liver disease, and chest diseases and psychiatric or anxiety disorders.

    4. **Tools:** Five tools had been used in this study: Tool (1) an assessment tool, was developed by the researcher and included patient's sociodemographic characteristics, medical and clinical data. **Tool (II)** nutritional assessment tool, this tool was developed by the researcher (34). It comprised of two parts: - Part (1) Daily dietary intake to estimate the caloric intake per day and Part (2) -Anthropometric measurements such as: mid arm muscle circumference, normal value was 18.5- 25.5 cm for adults, body weight and height. Body mass index, it was used to determine the degree of obesity as following; Under weight   (16-19), average weight (20-25), over weight (26-30), obese (31-40) very obese (41+). **Tool (III):–** Beck anxiety inventory (BAI), was developed by Beck (1988) (35). The BAI has internal consistency and a reliability coefficient (Cronbach's alpha) of .94. The BAI is a 21-item multiple-choice self report inventory that measures the severity of an anxiety in adults. Anxiety levels were defined as minimal (0 to 7), mild (8 to 15), moderate (16 to 25), and severe (26-63). **Tool (IV):-** The Groningen sleep quality scale (GSQS), was developed by Hajonides (1980) (36), the alpha reliability coefficient of this scale indicated an acceptable internal consistency 0.88. It consists of 15 statements and all items scored true/false. The scoring system of sleep quality: Good quality equal: 0-5, fair quality equal: 6-8 and poor quality equal: 9-14. **Tool (V):-** Myocardial infarction: clinical outcomes assessment tool. This tool was developed by researcher and consisted of four parts: Part (1): Chest pain assessment that included the following: 1. Severity:-by using the behavioral pain scale (BPS) (Campbell's 2000) (37). BPS has internal consistency and a reliability coefficient (Cronbach alpha) of 0.882. Ratings are converted into numerical values and summed for a total score, which classified into no pain (0), mild (1-3), moderate (4-5), severe (6-7) and worse pain (8-10). 2. onset , 3. location, 4. duration, 5. characteristics, 6. radiation, 7. associating factors, 8. relieving factors and 9. treatment. Part (2): Acute myocardial infarction complications assessment which included vascular, myocardial, electrical, embolism and pericardial complications, also complications from therapy, defibrillation, oxygen therapy and urinary catheterizations.   Part (3): percutaneous coronary intervention complications assessment as bleeding both external and internal and hematoma which defined as accumulation of blood at skin level with bruising or swelling in the area of the artery punctures. Hematoma classified either non-significant < 5cm2 or significant > 5cm2. Lower back pain measured by four-point verbal rating scale (38), this part of the scale has internal consistency and reliability of 0, 71 .Other assessment of nausea, vomiting and urinary retention. Part (4): Diagnostic studies as cardiac marker, lipid profile, coagulation profile and electrocardiography.
    Method
    Official permission to carry out the study was obtained from the responsible authorities at the study setting and data were collected over a period of 12 months. The Beck anxiety inventory (BAI) and the Groningen sleep quality scale (GSQS) were translated into Arabic and Alpha Cronbach's test was used to test tool reliability and reliability factor was =0.896. The developed tools were tested for content validity by nine experts in the field of Medical-Surgical, Critical Care Nursing, Cardiologists, Nutritionist and Medical Biostatistics.
     A pilot study was carried out on 12 patients to test the feasibility and applicability of the tools. The researcher was received training program on foot reflexology massage from Egyptian Academy for Complementary Therapy on (2014). Oral informed consent was obtained from the patients to participate in the study after explaining the purpose of the study. Confidentiality and privacy were assured using code number instead of name and withdrawal from the study was allowed at any time.   During assessment phase, both control and study groups were assessed to collect base line data by using all tools throughout the period of the study. During planning phase, safety-nursing measures were developed based on patient's goals, priorities and expected clinical outcomes. Dietary analysis of ingested food was assessed according to local food composition

tables to determine patients' nutritional needs (39). Calculating the caloric intake was done by the following method. Protein and carbohydrates both contain 4 calories per gram, while fat provides 9 calories per gram. Anthropometric measures were determined on patient admission as a baseline and are later for comparison in nutritional status. Mid arm circumference was measured by placing the tape gently around the left upper arm on its mid point without compression. The measurement was recorded to the nearest centimeter. The body mass index (BMI) was calculated as follows = Weight in Kg ÷ (height in meter) 2   Anxiety level was recorded for each patient by using the Beck anxiety inventory (BAI) and data about quality of sleep was obtained next day of reflexology session by using Groningen sleep quality scale (GSQS).

Assessments of percutaneous coronary intervention complications had been done post atient discharge from catheter lab. External bleeding means more than one 4 × 4 gauze. Hematoma size measured by identification of hematoma border by palpation then the diameter measured by a ruler. Lower back pain was rated by using a four-point verbal rating scale. Urinary retention is assessed by inspection and palpitation of suprapubic area and asking the patient about ability to void.

In implementation phase, control group participants received their routine hospital nursing care and Study group patients managed by safety nursing measures that were being implemented by the researcher, it included the following Safe practice during emergency nursing care: - It included bed rest, ECG monitoring, oxygen therapy by nasal cannula if Sao2 < 90%, performing 12 lead ECG, rapid assessment of circulation, breathing, providing emergency resuscitation or defibrillation if needed, insertion of intravenous line and collection of blood sample.

Safety practice during medication administration: - It included general safety guideline during administration of emergency medication as infection control precautions, checking of ten rights, correct dose calculation, stay beside the patient. Specific safety guidelines for medication as thrombolytic, anti coagulant and others by observation of side effects and immediate interventions. Safety nursing practice for percutanous coronary intervention. Which included safety monitoring, manual compression for 20-30 min for arterial closure post sheath removal, sterile dressing and bandage on the insertion site, changing position from supine in the 2 first hour to semi- fowler with head of bed 45 in the second 2 hours and to lateral right and left for the third 2 hours. Simplelumbosacral stroke massage was performed twice for 5 minutes for reducing back pain Safety measures to reduce anxiety and promote sleep. The study group patients had been received also 15 minutes of general foot reflexology massage and the stimulation of three reflex points including solar plexus, pituitary gland, and heart after they become stable, once daily for three consecutive days.

Health teaching was being applied to study group patients in 4 sessions; each session took duration of 30 minutes. Session1 include information about disease causes, manifestations, treatment and complications, session 2 include safe diet, session 3 include life style modification and medication regimen post MI and session 4 for revision. Explanation, discussion and colored booklet for more clarification were being used.

During evaluation phase, comparison had been done for both control and study groups immediately on admission, discharge and one- month post discharge by using the four tools (II-V).

II. Results:

Table (1) revealed that most of the patients in both control and study groups 76.7% and 75.0% were between 51-60 years old. Nearly two third of the patients in control and study groups were male 71.7 % and 65.0 %. The majority of the patients in control and study groups were married 80.0% and 83.3% respectively. Regarding educational level and occupation, nearly one third of the patients in control and study groups had primary education 33.3% and 38.3% and nearly half of the patients in control and study groups were manual worker 53.3% and 46.7% respectively. Concerning family income, the most of the patients in control group 80% while nearly half in study group 46.7% had not enough family income. From this table there was significant difference between both control and study groups 21.7% in relation to duration of stay in CCU.

Figure (1) showed that nearly one third of patients in both control and study groups 30% and 36.7% had anterior MI while the minority of patients in both control ad study groups had right ventricle MI 10% and 5% respectively.

Table (2) found that nearly half of the patients in both control and study groups 56.7% and 50% were smoker respectively, also 50% of the patients in control group and 53.6% in study group were smoking for more than 20 years. Regarding number of cigarette, nearly one quadrant and study groups 25% of the patients in control and 21.7% in study group were smoked two pockets per day. Concerning tries to quit smoking, it was found that nearly half of the patients in both control and study group 60% and 61.7% had tries to quit smoking and nearly half of the patients in control and study groups had once tries to quit smoking 44.4% and 54% respectively.

Figure (2) showed that higher proportion of the patients in control and study groups on admission 31.7% and 46.7% were obese while the higher proportion of the patients in control and study groups one month of discharge 30% and 35% were overweight respectively.

Figure (3) shows that 63.3% of the study patients had severe anxiety before reflexology session that decreased to 26.7% post session in the first day. While the highest proportion 66.7% had moderate anxiety pre-session that lowered to mild anxiety 61.7% post session in the second day, and at the third day 65 % of the study patient had mild anxiety pre-session that decreased to minimal anxiety 53.3% post session.

Figure (4), statically significant difference between both groups was noted. A higher proportion of the patient in control group 65% and 71.7 % of the patients in study group had sever anxiety on admission that decreased to moderate anxiety in 53.3% of the patient in control group and minimal anxiety in 51.7% of the study patients. On one-month post discharge, it is found that most of the patients in control and study groups 58.3% and 75% had minimal anxiety respectively.

Figure (5), there was statistical significant difference between both groups. On admission, the majority of the study sample in both control and study groups had poor sleeping pattern 81.7 and 93.3% respectively. On discharge, a higher proportion of the patient in control group 65% and 48.3% in study group had fair sleeping pattern, that improved to good sleep in 51.7% of the patients in control group and 76.7% in study group after one-month post discharge.

Figure (6) observed that half of the patients on control and study groups had worse chest pain on admission. While 5% of the patients on control and study group had moderate pain on one month post discharge.

able (3) revealed that one quadrant of the patient in control group had infarction extension compared to 10% in study group. Concerning recurrent ischemia, minority of the patients 16.7% of the control group and 5% of the study group had recurrent ischemia during CCU hospitalization. Regarding myocardial complications during CCU hospitalization, the minority of the patients in both control and study groups 15% and 10% suffer from heart failure respectively. In relation to electrical complications during CCU hospitalization, the minority of the patients in both control and study groups had atrial fibrillation 8.3% and 6.7%, also nearly one quadrant of the patient in control and study groups had ventricle fibrillation 28.3% and 25% respectively.

Regarding pericardial complications, only 5% of the patients in study group complain from pericarditis compared with 10% of their control, also 16.7% of the patients in study group and 5% in control group suffer from pericardial effusion during CCU hospitalization. Finally 33.3% of the patient in control group and 13.3 % in study group suffer from bleeding from the therapy during hospitalization.

Table (4) showed that 30% of the patients in control group and the minority of in study group 15% had bleeding. Regarding hematoma size range from 0-15cm in control groups compared with 0-10cm in study group. Concerning lower back pain, there is a statistical significant difference between both groups as a higher proportion of the patients in control group 65% had a moderate lower back pain compared with 46.7% of the patients in study group. Regarding other complications, nearly half of the patients in control group 53.3% and 38.3%of the patients in study group had hypotension post PCI; also, the minority of the patients in both groups had neural numbness 15% and 18.3% respectively. In relation to nausea and vomiting, 31.7% of the patients in control group and 25% of the patients in study group had nausea and vomiting. As for urinary retention, the minority of the patient in control group 5% compared with no patient in study group had urinary retention post PCI.

Figure (7) showed lipid profile, the majority of the patients in both control and study groups had high triglycerides and cholesterol levels on admission 78.3% and 90.0% for control patients' and 83.3% and 96.7% for study patients' respectively. After one-month post discharge, there is a difference but it is not a significant, 20 % decline in high triglycerides level in study group compared with 18.3% in the control and 30% decline in high cholesterol level in study group compared with% in the control group.

Table (1) Percentage distribution of sociodemographic and clinical characteristics of the studied patient with acute myocardial infarction.

Sociodemographic Characteristics	The studied patients (n=120)				χ^2 P
	Control group (n=60)		Study group (n=60)		
	N	%	N	%	
Age in years:					
▪ 31years	6	10.0	3	5.0	1.811
▪ 41 years	8	13.3	12	20.0	0.404
▪ 51years	46	76.7	45	75.0	
Range **Mean±SD**	**(37-60)** **53.40±6.282**		**(38-60)** **54.58±5.432**		
Sex					
▪ Male	43	71.7	39	65.0	0.616
▪ Female	17	28.3	21	35.0	0.432

| Marital status					
▪ Single	1	1.7	1	1.7	
▪ Married	48	80.0	50	83.3	0.291
▪ Divorced	2	3.3	2	3.3	0.962
▪ Widow	9	15.0	7	11.7	
Educational level					
▪ Illiterate	7	11.7	3	5.0	
▪ Read and write	18	30.0	18	30.0	3.762
▪ Primary education	20	33.3	23	38.3	0.439
▪ Secondary education	10	16.7	14	23.3	
▪ University /higher	5	8.3	2	3.3	
Occupation					
▪ Manual work	32	53.3	29	48.4	
▪ Employee	19	31.7	20	33.3	4.351
▪ House wife	9	15.0	8	13.3	0.361
▪ Not work (retirement)	0	0.0	3	5.0	
Residence					
▪ Rural	41	68.3	45	75.0	0.657
▪ Urban	19	31.7	15	25.0	0.418
Family income					
▪ Not enough	48	80.0	28	46.7	**15.58**
▪ Enough	5	8.3	20	33.3	**0.00***
▪ Enough and more	7	11.7	12	20.0	
Duration of stay (in days)					
▪ 4	21	35.0	34	56.7	
▪ 5	17	28.3	13	21.7	
▪ 6	7	11.7	11	18.3	**15.095**
▪ 7	8	13.3	2	3.3	**0.01***
▪ 8	6	10.0	0	0.0	
▪ 9	1	1.7	0	0.0	
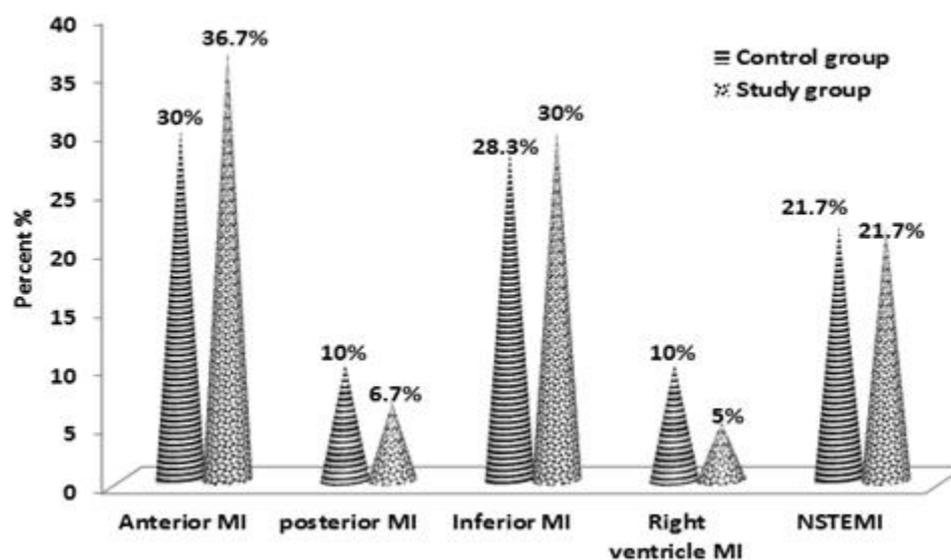
Figure (1) Diagnosis of the studied patient with acute myocardial infarction.

Table (2): Percentage distribution of smoking history of studied patients with acute myocardial infarction

Smoking habits	The studied patients(n=120)				χ^2 P
	Control group (n=60)		Study group (n=60)		
	N	%	N	%	
1.Smoking habits					
▪ Smoker	34	56.7	30	50.0	1.158
▪ Ex smoking	5	8.3	8	13.3	0.763
▪ Passive smoking	6	10.0	5	8.3	
2.Number of years you have smoked					
▪ 6-10 years	0	0.0	1	1.7	2.286
▪ 11-20 years	15	25.0	10	16.7	0.515

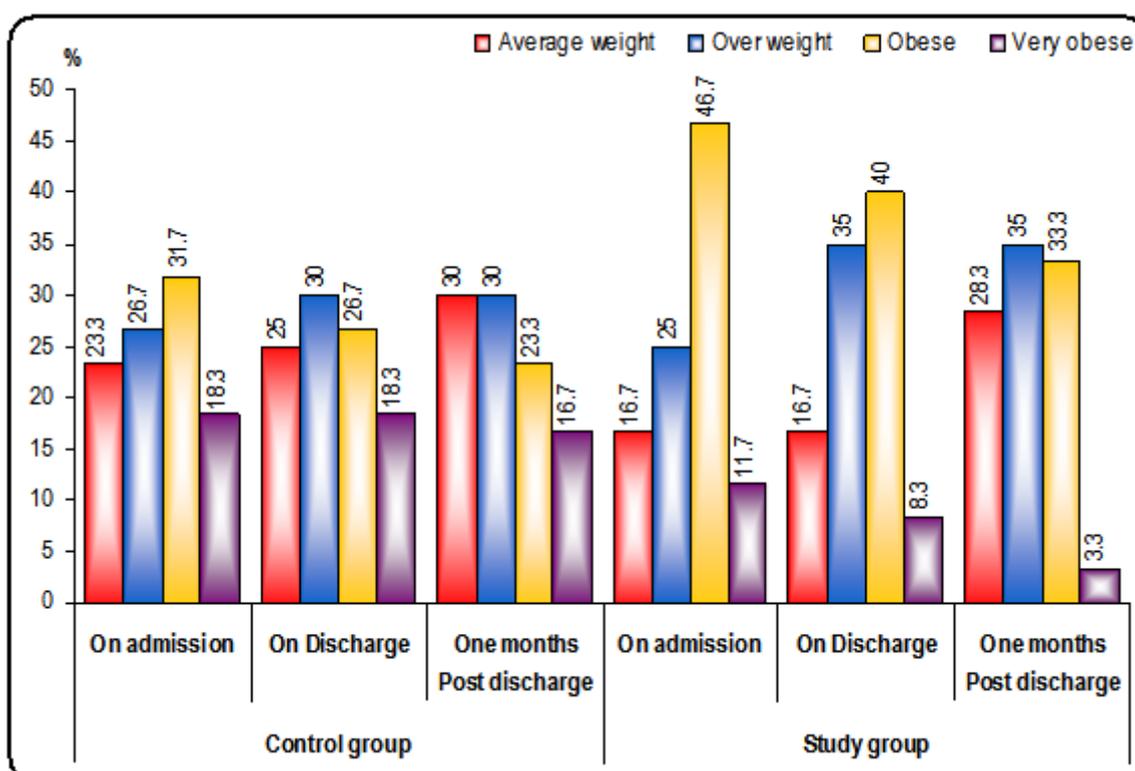|					
▪ > 20 years	30	50	32	53.6	
3.Cigarettes smoked per a day ▪ One pocket ▪ One and half pocket ▪ Two pocket ▪ More than two pocket	10 13 15 1	16.7 21.7 25 1.7	9 14 13 2	15.0 23.3 21.7 3.3	2.375 0.667
4.Trials to quit smoking	36	60	37	61.7	0.906 0.636
5.Times of tries to quit smoking ▪ Once ▪ Twice ▪ Three times ▪ More	16 10 0 10	44.4 27.7 0 27.7	20 9 2 6	54.0 24.3 5.4 16.3	3.705 0.447

Figure (2) Effect of nutritional management on body mass index among with acute myocardial infarction in both control and study groups.
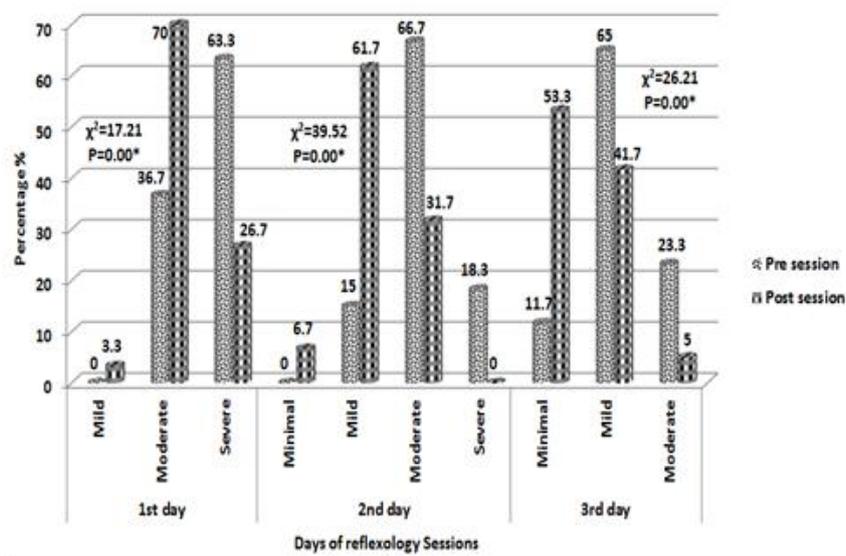
Figure (3): Percentage distribution of patients in study group according to their total anxiety level under reflexology session for 3 consecutive days
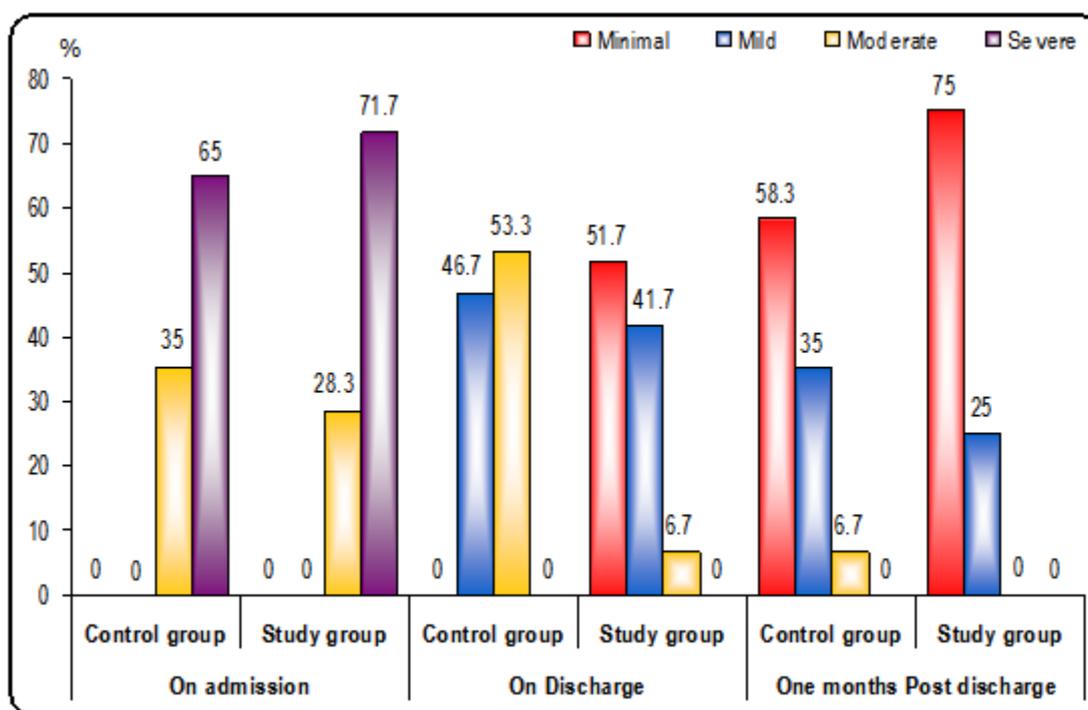

Figure (4): Percentage distribution of the studied patients with acute myocardial infarction according to their anxiety level.
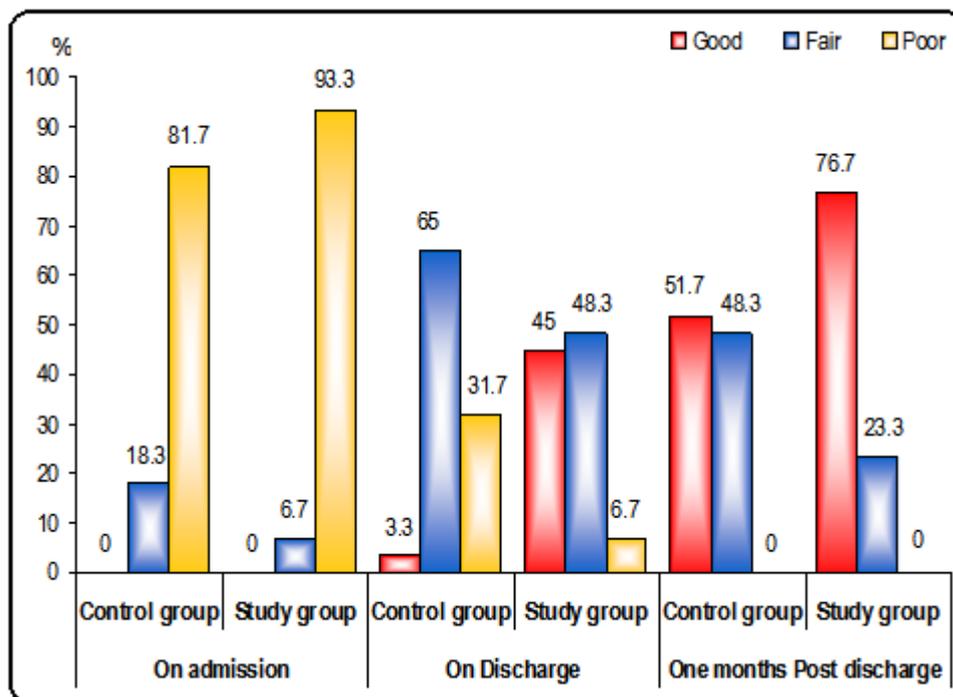
Figure (5): Percentage distribution of the studied patients with acute myocardial infarction according to their sleeping pattern
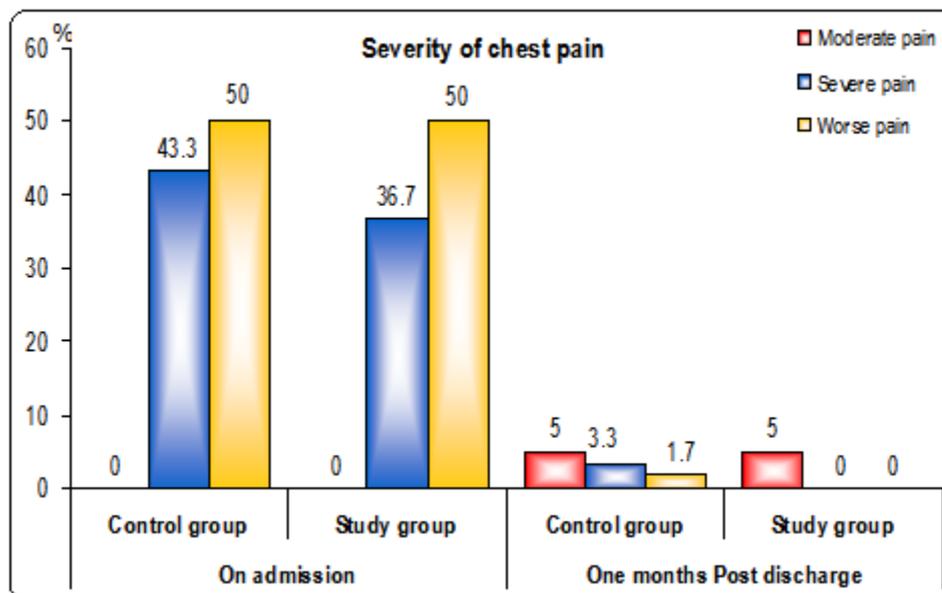

Figure (6): Percentage distribution of studied patients with acute myocardial infarction according to chest pain

Table (3): Percentage distribution of the patients according to acute myocardial infarction complications during CCU hospitalization and one month post discharge.

Acute myocardial Infarction Complications	The studied patients (n=120)									
	Control group (n=60)				χ^2 P	Study group (n=60)				χ^2 P
	During hospitalization		one month post discharge			During hospitalization		one month post discharge		
	N	%	N	%		N	%	N	%	

a. Vascular complications **1.Infarction extension**	15	25.0	0	0.0	**17.14** **0.00***	5	10.0	0	0.0	**14.58** **0.00***
Group 1 Vs Group 2 χ^2 , P	**7.870** **0.02***		0.00 1.00							
2.Recurent ischemia	10	16.7	6	10.0	1.15 0.283	3	5	3	5	0.00 1.00
Group 1 Vs Group 2 χ^2 , P	**9.73** **0.002***		**6.85** **0.032***							
b. Myocardial complications **1.heart failure**	9	15.0	0	0	**9.73** **0.002***	6	10	0	0	**6.316** **0.012***
Group 1 Vs Group 2 χ^2 , P	**9.73** **0.002***		0.00 1.00							
c. Electrical complications **1.Atrial arrhythmia**	5	8.3	0	0.0	**5.28** **0.022***	4	6.7	0	0.0	**4.14** **0.042***
Group 1 Vs Group 2 χ^2 , P	0.10 0.752		0.00 1.00							
2.Ventricular arrhythmia	17	28.3	3	5.0	**19.81** **0.00***	15	25.0	3	5.0	**17.14** **0.00***
Group 1 Vs Group 2 χ^2 , P	2.034 0.496		0.00 1.00							
d. Pericardial complication **1.Pericarditis**	6	10.0	2	3.3	2.14 0.143	3	5.0	0	0.0	3.08 0.079
Group 1 Vs Group 2 χ^2 , P	3.08 0.079		2.034 0.496							
2.Pericardial effusion	8	13.3	2	3.3	**3.93** **0.048***	3	5.0	0	0.0	3.08 0.079
Group 1 Vs Group 2 χ^2 , P	**3.43** **0.032***		2.034 0.496							
e-Bleeding from therapy	20	33.3	2	3.3	**24.00** **0.00***	8	13.3	2	3.3	**3.93** **0.048***
Group 1 Vs Group 2 χ^2 , P	**6.93** **0.048***		0.00 1.00							
f-Minor burn after defibrillation shock	8	13.3	0	0	**3.93** **0.048***	3	5.0	0	0.0	3.08 0.079
Group 1 Vs Group 2 χ^2 , P	**3.73** **0.042***		0.00 1.00							
g-Dysuria from urinary catheter	7	11.7	0	0	**24.00** **0.00***	2	3.3	0	0	2.98 0.132
Group 1 Vs Group 2 χ^2 , P	**5.75** **0.028***		0.00 1.00							

Table (4): Percentage distribution of patients according to complications of percutaneous coronary intervention during CCU hospitalization.

Complications	The studied patients (n=120)				χ^2 P
	Control group (n=60)		Study group (n=60)		
	N	%	N	%	
1.Bleeding ▪ Internal ▪ External	14 4	23.3 6.7	9 0	15.0 0.0	5.958 0.051
2 Hematoma ▪ Non-significant < 5cm² ▪ Significant > 5cm²	12 2	20 3.3	8 1	13.3 1.7	0.34 0.56
2.Hematoma size Range Mean±SD	(0-15) 2.67±5.004		(0-10) 1.22±2.952		t=3.737 P=0.056

4.Lower back pain ▪ No pain (0) ▪ Mild pain (1-3) ▪ Moderate pain (4-5) ▪ Severe pain (6-7)	7 3 39 11	11.7 5.0 65.0 18.3	8 23 28 1	13.3 38.3 46.7 1.7	**25.657** **0.00***
5.Others complications a. Hypotension	32	53.3	23	38.3	2.719 0.142
b. Neural defect numbness	9	15.0	11	18.3	0.624 0.807
c. Nausea and vomiting	19	31.7	15	25.0	0.657 0.418
d. Urinary retention	3	5	0	0	0.36 0.542
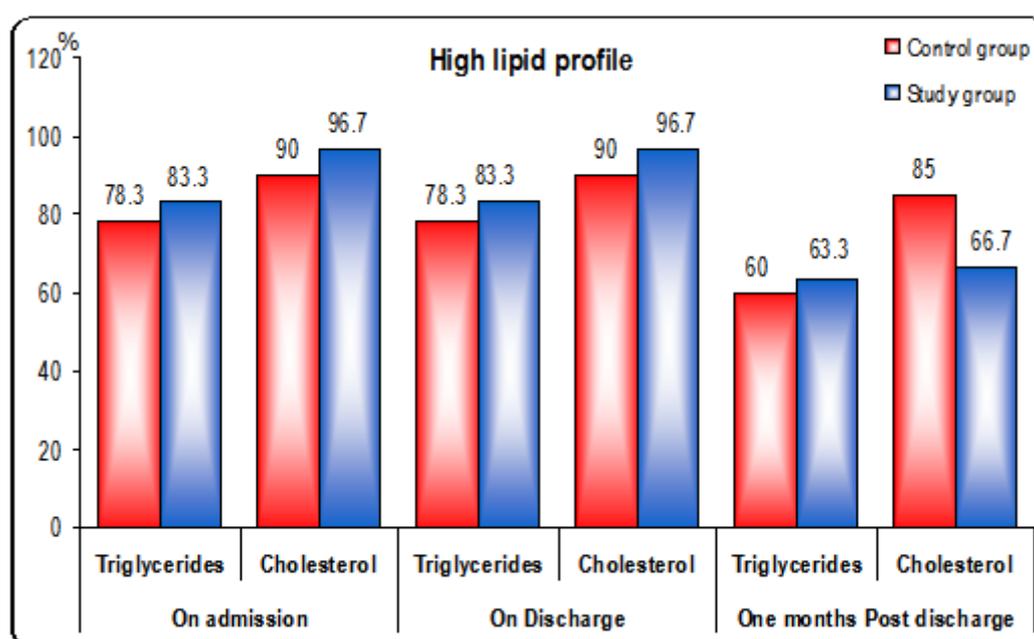
Figure (7): Percentage distribution of studied patients according to high lipid profile levels

III. Discussion

Concerning sociodemographic characteristics of the AMI patients, the finding of the present study revealed that most of the study sample was between 51-60 years old, this finding is justified by effect of aging on heart and blood vessels with increasing the incidence of all types of atherosclerotic diseases with aging. This finding was in line also with **Aliyu (2016)** [40] who found that more than three quarter of the studied patients undergoing cardiac catheterization were within the age group of 50 years and above and **Michelle (2011)** [41] also mentioned that advance age is an independent risk factor for coronary heart diseases.

Regarding sex, nearly two third of the patients in control and study groups were male, because male are at risk more than female as a result of smoking habit and stress, also due to cardio-protective effect of estrogen for female before menopause. This finding was in line also with **Canto (2012)** [42] who stated that women were more likely than men to present without chest pain and a higher mortality than men within the same age group. Similarly, **Adhikari (2018)** [43] concluded that most of the AMI patients in the study sample were male. This finding was in contrast with **Aliyu (2016)** [40] who mentioned that women have a greater risk for development of coronary artery disease than men.

Concerning to occupation, nearly half of the patients in both groups were manual worker, this may due to most of the patient had low income and in rural areas. This result with online with **Alexander (2015)** [44] who

stated that vigorous exercise can cause coronary plaque rupture or myocardial ischemia that leads to cardiac arrest. While this result was in contrast with **Behdin (2017)** [45] in study examine the associations between cardiovascular disease and occupational risk factors , stated that brief episodes of physical exertion increase the risk of cardiovascular events.

In relation to educational level, residence and family income in this study, nearly one third of the study sample had primary education, most of them in both groups' lives in rural areas and most of the study sample had low income. These results was in agreement with another study conducted by **Mohammed (2017)** [46] who found that nearly one third with the low education level at primary level and nearly half were low-income per month.

In relation to duration of hospital stay, nearly one third of patients in control group and more than half of patients in study groups stayed for 4 days in the CCU with a significant difference between both groups. This due to immediate management by PCI and thrombolytic medications and effect of safety nursing practice. This result was inline with another study for Jane (2010) [47] who stated that the average length of stay declined over the 10-year study period from 7.2 days in 1995 to 5.0 days in 2005. Regarding to present diagnosis, the highest percentage nearly one third of patients in both groups had anterior MI. This result was in line with Kazazi (2010) [48] who mentioned that anterior wall MIs is the most common type of acute myocardial infarction is and in same time, it is the most serious and have the worst prognosis type of MI. This result agreed with the hypothesis, which stated that patients who will expose to safety nursing measures will exhibit reduction in length of hospital stay.

Concerning to past medical / surgical history, it was found that nearly two third of the patients in both groups had cardiac catheterization or stent , this result was in agreement with **Ko DT (2010)** [49] who stated that cardiac catheterization is substantially underused among higher risk patients with acute myocardial infarction (AMI) with appropriate indications. Also this study revealed that most of the patients in both groups received non steroidal anti inflammatory drugs (NSAIDs), this result was in agreement with **Thöne (2017)** [50] who concluded that the most frequently used NSAIDs, were associated with a 40-50% increased relative risk of AMI.

Additionally, more than half and one third of the patients in both groups received anti hypertensive and hypercholesterolemia medications respectively. This due to the effect of hypertension and hypercholesterolemia in exacerbation of atherosclerotic process and increase vessels wall permeability. These results were similar to the result of **Rodriguez (2014)** [51] who found in large observational studies that increasing blood pressure is related to AMI in both men and women. Also **Osipov (2009)** [52] mentioned that hypercholesterolemia may adversely influence the evolution of AMI even after patency of an occluded coronary artery is successfully reestablished and another study conducted by **Zeller (2016)** [53] also stated that familial hypercholesterolemia (FH) is at very high risk of early myocardial infarction.

In relation to smoking history, nearly half of the patients in both groups were smoker for more than 20 years and nearly one quadrant of the patients in both groups were smoked two pockets per day, this may be explained as nicotine release catecholamine that increase heart rate and blood pressure also increase the possibility of platelet -thrombus formation. These results were agreed with **Delemoes (2018)** [54] **and Elkhader (2016)** [55] they identified smoking as the second most important risk factor for AMI world-wide and explain the negative effects of smoking and nicotine on the cardiovascular system especially with long period of smoking and heavy smoking of more than 40of cigarette per day.   .

Concerning body mass index, the current study showed an increase in percentage of patients with average weight noted in the study group from admission to one month post discharge compared with patients in control group during the same period, this due to adherence of study patients to health teaching program about the healthy and safe diet, exercise and medication. This is in line with **Hooper (2015)** [56] who explained that difference due to initiation of a well planned meal according to patients need to replace the breakdown of fat and improve health status.

In relation to anxiety level for patients in study group undergone foot reflexology massage, there is a statically significant difference between the studied patients pre and post the session, also between first, second and third day. More than one third reduction in percentage of patients suffer from severe anxiety was noted in the first session, this may be due to the relaxation effect of foot reflexology massage on nerves affecting the anxiety centers on the brain. This result is online with **Laila (2012)** [57] who recommended with using foot massage to reduce anxiety and improve sleep for critically ill patients in intensive care units including CCU .

Moreover, there is statically significant difference between control and study group was noted regarding anxiety level on admission , discharge and post one month post discharge. A significant increase more than half in the percentage of patients suffer from minimal anxiety noted in the study group from admission to discharge when compared with patients in control group during the same period, this may be due to the effect of foot reflexology massage and stability of physical condition. This result is agreed with **Molavi (2013)** [58] and **Bidgoli (2017)** [59] they stated that reflexology can decrease anxiety level for cardiac patients especially before

coronary angiography. Another study conducted by **Shahsavaria (2017)** [60] concluded that foot reflexology alleviates anxiety and improves physiological parameters among the candidates for bronchoscopy. On contrast, systematic review of randomized controlled trials by **Ernst (2009)** [61] concluded that the evidence available to date does not demonstrate convincingly that reflexology is effective for any medical condition. This results agreed with the hypothesis which stated that patients who will expose to foot reflexology sessions as a part of a safety nursing measures will exhibit reduction in anxiety level.

In relation to pattern of sleep, there is statistical significant difference between both groups. High reduction in the percentage of the patients suffering from poor sleep noted in the study group from admission to discharge compared with the patients in the control group in the same period, this usually due to the effect of reflexology massage on reducing anxiety level. Also **Elbanna (2017)** [62] found that foot reflexology massage is useful in reducing pain and improving of sleep pattern among patients complain from solid tumor. Another study conducted by **Rahmani (2016)** [63] concluded that the intervention of footbath and foot reflexology massage are effective in reducing sleep disorders and there was a synergistic effect when used in combination. This results agreed with the hypothesis which stated that patients with acute who will expose to foot reflexology sessions as a part of a safety nursing measures would exhibit improvement in sleep pattern.

In relation to chest pain assessment, the present study reported that a significant decline in chest pain was shown on discharge, after one month of discharge as compared to chest pain on admission among both the study and control groups, with no statically significant difference between the characteristics of chest pain between both control and study groups. This result agreed with the hypothesis, which stated that patients who will expose to safety nursing measures would exhibit no recurrence of chest pain.

Concerning complications of acute myocardial infarction, the present study revealed that nearly one quadrant of the patient in both groups had infarction extension, one third of control patients had bleeding from therapy lastly small percentage of the patients in both groups had other vascular, myocardial, electrical, pericardial complications, this may be due to the widespread availability of revascularization therapy, limiting the size of infarction in congruent with safe nursing practice. These results were agreed by **Amato (2017)** [64] who found that the incidence of sustained VT and VF occurring within 48 hours of the onset of an ACS seems to have decreased over the past decade. These results were partially agreed with the hypothesis, which stated that patients who will expose to safety nursing measures would exhibit no progression of AMI complications.

In relation to complications post percutaneous coronary intervention (PCI), the results revealed that nearly one third of the patients in control group and the minority of in study group had bleeding with a statistical significant difference between both groups due to apply of manual compression for 20 minutes and bandage for 24 hours. This result was in line with **Mohammed (2013)** [65] who concluded that manual compression is the safest method for prevention of vascular complications. Also, there was statistical significant difference between both groups regarding back pain as nearly two third of the patients in control group had a moderate lower back pain compared with less than half of the patients in study group, this may be due to the effect of safe change of position for patients in study group and applying of simple lumbosacral back massage. These results was similar to **Cha (2016)** [66] and **Abdollahi (2015)** [67] they examine the effect of changing position on the bleeding ,hematoma size , lower back pain for patients post cardiac catheterization. These results were y agreed with the hypothesis, which stated that patients who will expose to safety nursing measures would exhibit reduction in PCI complications.

Moreover, A significant decreases in the percentage of patients with high serum cholesterol level is noted in the study group from admission to one month post discharge with a significant difference compared with patients in control group in the same period, this due to effect of healthy teaching program. This result was agreed by **Bowen (2016)** [68] and **Stone (2014)** [69] they concluded that the addition of cardio protective diet rich in omega 3 in addition to cholesterol lowering supplements for cardiac patients are helpful in reducing the risk of coronary attacks recurrence. This result was agreed with hypothesis, which stated that health teaching about safe diet is effective on reducing cholesterol level.

IV. Conclusions

Based on the results of this study, it could be concluded that safety nursing measures for the patients with acute myocardial has positive effect on clinical outcomes as chest pain recurrence, duration of stay on CCU, complications of AMI and PCI. Also, the present study concluded that nutritional counseling and safe life style helpful on decreasing body mass index and serum cholesterol, triglycerides, also the finding concluded that foot reflexology massage is useful on reducing anxiety and improving sleeping pattern of acute myocardial infarction critically-ill patients.

Recommendations Based on the finding of the current study, the following recommendations are derived:
Recommendation for clinical practice

Safety nursing interventions should be carried out as a routine care for critically –ill patients with acute myocardial infarction. Application of foot reflexology massages as a part of routine care.

Recommendation for administration

Give the nurses the responsibility to remove the sheath post PCI Necessary equipment and supplies in cardiac catheterization units should be available

Recommendations for education and training.

Development of in service training program for CCU nurses for foot reflexology massage for AMI patients to reduce anxiety and improving sleep pattern. Planned pre discharge education about safe life style should be prepared and given to patients as well as systemic education during the period of follow up.

Recommendations for further research studies:

The study should be replicated on large sample, different hospitals setting and for long time in order to generalize the results. Assessment of problems facing coronary care nurse regarding safe practice and their effect on nurses' performance and satisfaction.

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