Effect of phase one cardiac rehabilitation on occurrence of early complications Among acute myocardial infarction patients with st segment-elevation

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Abstract

Phase one cardiac rehabilitation is important for patients with acute myocardial infarction .Critical care nurses play an important role on relieving pain, improving respiratory distress , maintaining adequate tissue perfusion by decreasing the heart work load, and early recognition of complications. **Aim**: to evaluate the effect of phase one cardiac rehabilitation on occurrence of early complications among acute myocardial infarction patients with ST segment- elevation**. Patient and methods. Design:** a quasi-experimental research design is used in this study. **Setting**: this study is conducted in the coronary care unit, Assiut University Hospital. **Sample**: a convenience sample of 60 patients (control and study) 30 each .**Tools**: Three tools are used for data collection. I –Acute myocardial infarction patient assessment, II- modified Borg's rating perceived exertion Scale , III -Hospital anxiety and depression scale . **Methods:** training the patient up to a heart rate of 120 beats / minute or peak heart rate, guided by symptoms of chest pain and dyspnea (Borg's rating of perceived exertion < 10) for the study group were performed for 5-days during phase one cardiac rehabilitation, Hospital anxiety and depression scale was applied tool for both groups. **Results**: findings of the present study show significant difference recurrence of chest pain was between both groups in 4th day .Also the duration of chest pain per hr in the 2 nd day & 3 rd day between both groups indicates highly statistical significant difference ($p<0.05$) ,and improve Heart rate, respiratory rate & decrease anxiety from 3 rd to 5 th day in the study group than control group, also shows Borg's (RPE) scale shows highly significant increased in study group during exercise from admission to 5th day. **Conclusion**: phase one cardiac rehabilitation is associated with significant improvement of the study group versus control group regarding for dyspnea, heart rate, chest pain, anxiety and depression.

Key words: phase one cardiac rehabilitation, early complication ,acute myocardial infarction , Borg's rating perceived Scale & anxiety & depression.

Introduction

St segment elevation acute myocardial infarction (STEMI) commonly known as heart attack, result from the interruption of blood supply of the heart. Complication of acute myocardial infarction includes ,failure of reperfusion presented with: angina, infarct extension and chest pain is the most common symptom of acute myocardial infarction and shortness of breath occurs when the damage to the heart limits the cardiac output of the left ventricle, causing left ventricular failure and Other symptoms include dysrhythmias ,tachycardia or bradycardia, diaphoresis, weakness, light-headedness, nausea, vomiting, and palpitations**,** stress and anxiety **(Piepoli et al., 2010).**

Phase one cardiac rehabilitation **(CR)** begins on patients phase admission to the hospital and ends on discharge. The goal of exercise in phase one is to avoid the deleterious effects of bed rest by making a gradual transition from passive range of motion exercise to active range of motion exercises during staying at hospital, including (ankle foot movements and finger and wrist movement) .Performing exercises five repetitions ,twice daily ,breathing exercises, active range of motion exercises to hip and knee , Elbow circulars (five repetitions twice daily) ,upper and lower limb flexion (five repetitions twice daily) ,walk for at least 2 minutes within room and least 5 minutes outside the room twice daily The patient receives detailed exercise instruction stressing on the need for continuing exercise during fifth day. **(Mitchel et al., 2006).**

Relaxation techniques may counteract the effects of long-term stress, which may contribute to or worsen a range of health problems including depression, digestive disorders, headaches, high blood pressure, and insomnia. Deep breathing exercises help to expand the lungs and improve the chest muscles. Regular breathing exercises or inspiratory muscle training can increase lung capacity, improve breathing strength, and the ultimately result in a better quality of life. **(Benson et al., 2008).**

The modified Borg's rating of perceived exertion (RPE) is a way of measuring physical activity intensity level .perceived exertion is measuring how

hard the person feels when the body is working.it is based on the physical sensations a person experiencing during the physical activity ,including increased heart rate ,increased respiration or breathing rate ,increased sweating ,and muscle fatigue .although this is a subjective measure ,a person's exertion rating may provide a fairly good estimate of the actual heart rate during the physical activity **.(Perez –landaluce et al., 2002).**

The "Rating of Perceived Dyspnea (RPD) Scale measures the presence of dyspnea. Dyspnea is an uncomfortable awareness of one's breathing effort. It is a normal symptom of heavy exertion but becomes pathological if it occurs in unexpected situations**.** A number of scales may be used to quantify the degree of shortness of breath. It may be subjectively rated on a scale from 1 to 10 with descriptors associated with the number The Modified Borg Scale **(Saracino, 2007).**

Effects of phase one CR exercise have potential impact on psychosocial outcomes. Habitual exercise has potential for the following benefits: reduction in depression and anxiety, enhanced mood status, enhanced self-efficacy, restoration of self-confidence, decreased illness behavior, increased social interaction, exercise may have antidepressant effects. exercise can correct major depression **(Mustelin et al., 2009).**

The Critical care nurse should perform the initial assessment .It should be carried out before, during and after rehabilitation., and then evaluates the patient's physical status, including heart rate, blood pressure, ischemic signs and symptoms such as chest pain or discomfort , St segment change ,headache ,vomiting ,irritability , difficulty breathing, palpitations, unusual fatigue, faintness, or sweating. The patient understand limitations and effects of medications on exercise. Promoting rest is essential: that the patient should have both physical and emotional rest. Oxygen may be administered during the acute stage to diminish the work of breathing and to increase the comfort of the patient. **(Thomas et al., 2007).**

Aim of the study

The aim of the study was to evaluate the effects of phase one cardiac rehabilitation on occurrence of early complication among patients with S T segment-elevation acute myocardial infarction (STEMI).

Hypothesis

Acute Myocardial Infarction Patients with ST Segment –Elevation who are subjected to phase one cardiac rehabilitation exhibit no complications.

Operational definition

Phase one cardiac rehabilitation post –acute MI patients, the sum of activities as well as the best possible physical, psychological health and emotional distress patients include, training the patient up to a heart rate of 120 beats / minute, guided by symptoms of chest pain and dyspnea by using (Borg's rating of perceived exertion < 10) and interval training with bouts of exercises lasting from three to five minutes or as tolerated, interspersed with adequate rest periods in order to achieve an exercise / rest ratio of 2 : 1. Following an acute coronary event, reassurance, and education, correction of cardiac misconceptions, risk factor assessment, and mobilization.

Hospital Anxiety and Depression Scale (HADS) **(Bjelland et al., 2002):** is used to assessment patients' needs. Psychological support is also necessary to decrease psychological distress, which is common following MI. At the same time the patient undergoing training of exercise (breathing exercise & range of motion exercise) abilities to cope with the physiological symptoms of stress, express emotions and needs in interpersonal relations, reduce the level of hostility, the feeling of identity in the illness (self-picture of a patient)**.(Hanssen et al., 2009).**

Early complication of acute myocardial infarction relieved after application of phase one cardiac rehabilitation found the following: reduced of chest pain, reduce dyspnea, improved of heart rate, decrease occurrence of arrhythmia (Tachycardia, breadycardia , Ectopic). Exercise reduces systolic and diastolic blood pressure after the exercise period, decrease anxiety and depression, Exercise in particular will increase the contractibility of the heart muscle following the stress of a heart attack, help to lower your risk of repeated infarct, reduce your risk of death from heart disease. **(Franklin, 2009)**

Patients and Method

Research design

A Quasi experimental research design was utilized in this study .

Setting of the study

The study was conducted in coronary care unit at Assiut University Hospital .consists of three rooms each room it contains six beds for patients.

Sample

A convenience sample of 60 uncomplicated adult patients male and female with ST segment-elevation acute myocardial infarction who are admitted to coronary care unit ,this sample was assigned randomly into two groups (study and control) 30 each.

Inclusion criteria

- Uncomplicated ST segment-elevation myocardial infarction

- Both sexes male and female.
- Age 18 -60 years.
- Unstable angina.
- Free respiratory system from infection

Study Tools

Three tools were utilized in this study:

Tool one: "Acute Myocardial Infarction Patient Assessment Tool"

This tool was developed by the researcher after extensive literature of review **(Abraham et al ,.2010 & Thow et al ., 2006 & Mitchell et al ., 2006)** This tool consists of 3 parts:

Part 1: Socio- demographic data and clinical data assessment: This part was used to assess and record patients profile data such as age, sex, medical diagnosis, past history, and myocardial infarction risk factors.

Part II: Hemodynamic parameters Assessment : this part was used to assess the hemodynamic status such as temperature, resting heart rate as base line data on admission ,blood pressure, mean blood pressure, respiratory rate and measure peak heart rate during exercise measure two time daily for 5 days,.

Part III: Cardiovascular disorder assessment: this part was used to assess and record cardiovascular manifestations as chest pain (onset, severity, duration, and recurrence), types dysrhythmias and monitoring ECG change. This part was used immediately on admission to measure baseline data before exercise, compared to this data after exercise two time daily for 5 days to assess cardiovascular status.

Tool II : Modified Borg's rating perceived exertion rating Scale:

This tool consists of three parts:

Part I: Modified Borg's Rating perceived exertion scales (RPE) it was adopted from **(Borg, 1998)** according to The American College of sport medicine **(ACSM ,2006**) **,(RPE),** it was used to measure exercise intensity during cardiac rehabilitation. The scale allows the individuals to subjectively rate their level of exertion during exercise. Rating of perceived exertion scales consists of 10 categories . The feeling the individual has at rest was 0, Very light exertion was 1. Light was 2 when patient no fatigue. Moderate exertion was 3 when patient slowly walking across the ward. Somewhat hard was 4 when patient comfortable walking. Hard was 5 when patient beginning to breathe deeper. Harder was 6 when patient walk Fast, breathing deep but able to maintain. Very hard was 7 when patient making Vigorous exercise, and feeling fatigued .Very, very hard was 9 when patient unable to maintain for very long, Maximal was 10 when patient complete exhaustion .When using the RPE scale, select a number based on your overall effort needed to do the activity.

Part II: Rating of Perceived of Dyspnea Scale (RPD) : it was adopted from **(Mahler and Horowitz, 1994)** and was used to measure the patients sensation of dyspnea by rating on the scale . The Scale was used to assess degree of dyspnea during exercise twice daily .The scale ranged from 0 to 10. 0 indicates "no shortness of breath. " A 10 represents "so much shortness of breath that patient has to stop his activity, in addition to respiratory assessment which includes rate and rhythm.

The Borg scale is a psychophysical measure in which a subject reports symptoms associated with a current physical activity, e.g., exercise. The Borg scale rates dyspnea on a scale of 0-10 to quantify the intensity of dyspnea during activity. The 0-10 scale is the "modified" Borg scale; the original perceived exertion scale. The modified Borg scale as a perceived symptom scale can be used to rate various symptoms associated with exercise (e.g., breathlessness, muscle fatigue).

Part III: phase one cardiac rehabilitation complication record : This part it used to was used to assess patients early complications developed by the researcher such as chest pain, , dizziness, high blood pressure, ,fatigue, palpitation ,tachycardia ,bradycardia dysrhythmia, palpitations, dyspnea, ECG changes,

Tools III: Hospital anxiety and depression scale (HADS) adopted from (Zigmond et al .,1983) & (Bjelland et al ., 2002): It used to measure states of depression, anxiety and emotional distress amongst patients. Originally the scale consisted of seven questions interrelated items per subscale to assess symptoms of anxiety (**HADS- A) &** depression (**HADS- D).** Thus the final scale has a total of 14 items; each item is answered using a four point likert –type scale ranging from 0 (not at all) to 3 (very often)**..** An analysis Score for each subscale (anxiety and depression) can range from 0-21 with scores differentiation of each mood state into four ranges: normal (0-7), mild (8-10), moderate (11-14), severe (15-21). Scores for the entire scale (emotional distress) range from 0-42, with higher scores indicating more distress.

-The items on the questionnaire that relate to anxiety are: (I feel tense or wound up, I get a sort of frightened feeling as if something bad is about to happen, Worrying thoughts go through my mind, I can sit at ease and feel relaxed, I get a sort of frightened feeling like butterflies in the stomach, I feel restless and have to be on the move, I get sudden feelings of panic).

-The items that relate to depression are (I still enjoy the things I used to enjoy, I can laugh and see the funny side of things, I feel cheerful, I feel as if I am slowed down, I have lost interest in my appearance, I look forward with enjoyment to things, I can enjoy a

good book or radio or TV program. **(Bjelland et al., 2002) .**

Method

The study was conducted on three phases:

1-Preparatory phase

-Approval to conduct the study was obtained from the CCU director and ethical committee in the CCU of Assuite University.

The sample consists of 60 adult admitted patients selected conveniently meeting the inclusion criteria was enrolled in the study, and was assigned randomly into two groups (control & study) groups.

Ethical considerations: informed consent was obtained by the researcher from the patient's responsible person. Explanation about the study was done to the patients responsible person include the aim and nature of the study, potential benefits, risks and discomforts during participation.

Confidentiality of the data, privacy, voluntary participation and the right to refuse to participate in the study was emphasized to the subjects.

Content validity by a jury of (7) experts in the field of the study. 3 from coronary care unit medicine & 4 from critical care nursing Assuite University and the necessary modifications were done.

-A pilot study was done to test the feasibility of the study, and applicability of the tool and the necessary modification were done the pilot study was done on 6 patients who were included in the study if no major modification was necessary.

The reliability analysis test using Alpha Cranach's (values 0.84) indicated the applicability of the tools.

Data collection

Started from (April 2013 to March 2014) on three phases: preparatory phase, implementation phase and evaluation phase.

The data were collected from the first day of admission until 5 days.

Before initiating phase one cardiac rehabilitation, the researcher review the patient medical and social history which is followed by an assessment of patient for understanding for disease ,capacity and motivation for learning new information to decrease anxiety ,stress , and emotional status and apply questionnaire sheet in about 15 minutes for both group .

2-Implementation phase

The studied sample fulfilling the reach criteria was assigned randomly into two groups (study group and control group).

For the control group

Patient received the routine hospital care were assessed by the researcher using first tool and second tool Part III.

Hospital anxiety and depression questionnaire scale to determine level anxiety and depression was used from the first day of admission and consequently daily during the five days to apply the scale in both groups (control and study group) .

Applied for reduce stress composed of reduction of acute emotional states , stress through training in relaxation techniques , breathing exercise and cardiac rehabilitation exercise ,Provide information, advice, knowledge of the disease and its possibilities , Identification and a regulating activation of behavior

The effective psychological intervention is achieved in the study group by application of phase one CR through identifying patients' needs, worries.

For the study group

Phase one cardiac rehabilitation it was administered patients in CCU as soon as relieve chest pain under supervision by researcher according to the recommendation of the American College of Sports Medicine (ACSM) include , training the patient up to a heart rate of 120 beats / minute , peak heart rate, guided by symptoms of chest pain and dyspnea (Borg's rating of perceived exertion < 10)**,** blood pressure , were measured before and after the CR exercise and interval training with bouts exercises lasting from 3 to 5 minutes or as tolerated with adequate rest periods in order to achieve an exercise/rest 2:1 following an acute coronary event**. (Mitchell et al ., 2006).**

1st day:

The study group, the researcher assessed the patients with acute MI according to the designed assessment tool using tool I, from first day of admission as a base line data (chest pain, heart rate, respiratory rate, blood pressure and the ECG).

Patient complete bed rest at the first day of admission was done, and relaxation technique (breathing exercise) was performed, and active range of motion exercises were performed (ankle foot and finger movements and then rest) five times, twice daily.

2nd day

The researcher initiated physical exercise according the American Collage of Sport Medicine that included (relaxation, breathing exercise, active range of motion exercise to hip and knee, sitting, arm bending, stretching up (five repetitions, twice daily).

Partial sitting (1-2 hour and self-feeding).

Before application of the physical exercise the researcher explained the procedure to the patient & assessment of the patient condition was done, measured the resting heart rate, peak heart rate, blood pressure, ECG changes, dysrhythmia, chest pain, dyspnea, before, during and after exercise for five days.

Exercise session lasted approximately 20 min. The session composed of intermittent series of exercises, each lasted between 3 and 5 min, with rest time intervals between the series according to the patient condition, or lasted between 1 and 2 min, exercise/rest 2:1 **(Kirkeby et al., 2005) .**

3rd to 4th day:

It is necessary that the patient is in a stable condition, from a clinical, hemodynamic and electro-cardio-graphic point of view.

Performed progressive exercises (ten repetition), each exercise 2 times per day; including breathing exercises, active range of motion exercises for upper and lower extremities in sitting. The patient should walk within the room at first, and then in the corridors for about 2-5 minutes, three to four times a day starting with 25 and 50 meters, increase 10 to 15 meters per day, and walk one way to the toilet.

5th day:

It is necessary that the patient be in a stable condition, repetitions of each exercise 2 times per day. The patients were allowed to walk in the coronary unit from 15 minutes, 2 or 3 times a day, and it is necessary that the patient can make at least 150 to 200 meters before discharge, climbing one flight of steps. All of these use repetition of large muscle group activity**,** the researcher explained to the patient the time for stop exercise.

Physical exercise program should be terminated when the patient begins to experience the following condition:

Heart rate becomes more than 20 beats\ min over his usual rate (tachycardia).

- **Chest pain**: during exercise observed by the researcher, or reported by the patient.
- **Blood pressure:** Systolic blood pressure if falling or increased 10 to 40 mmHg with respect to the measurement obtained while bed rest.
- **Borg rating perceived exertion Scale**: (0-10) Method of rating perceived exertion: the RPE was monitored regularly during the test. The end points of the RPE were taken to be between 7 and 8.the patient could do the exercises .This method is safe and effective in controlling the intensity of the effort, and it is useful in patients with arrhythmias.
- **Dyspnea**: the researcher monitoring level of dyspnea, and asked the patient to find out the level of exercise intensity that is most appropriate for you. Usually, the patient can keep the dyspnea level during exercise lower than level 3 & and can stop when experience: any abnormal shortness of breath; signs of poor perfusion (cyanosis or pallor); Increasing chest pain; and sustained ventricular tachycardia, bradycardia.

Statistical design

for qualitative variables, and means and standard deviations for quantitative variables. Quantitative continuous data were compared using analysis of variance test in case of comparisons between two independent groups. Using chi-square test for non-parametric data to determine significant. Statistical significant differences were considered when P-value used as follows: - P >0.05 non-significant, *P<0.05 significant Statistical, ** (p< 0.01)**,** ## (p< 0.01) used to compare between pre and post CR exercise, $ Significant difference p=0.001).

All data were recorded in a

Results

Table (1): Comparison between the control and study group in relation to the Socio- demographic data, risk factors, and diagnosis.

Socio- demographic	Control group (N =30)		Study group (N =30)		Significance test
Age	**No.**	**%**	**No.**	**%**	
Range	29 – 65		37 – 65		**0.523**^{Ns}
Mean ± SD	55.4±10.5		57.1±10.0		
Sex					
Male	23	76.7	21	70.0	**0.543**^{Ns}
Female	7	23.3	9	30.0	**0.241**^{Ns}
Previous risk factor					
MI	4	13.3	2	6.7	**0.667**^{Ns}
Hypertension	12	40.0	10	33.3	**0.125** ^{Ns}
Angina	8	26.7	7	23.3	**0.985**^{Ns}
Diabetes	14	46.7	12	40.0	**0.794** ^{Ns}
Smoking	14	46.7	14	46.7	**0.795** ^{Ns}
Diagnoses					
Recent anterior MI	22	73.3	27	90.0	**0.029***
Recent Extensive Anterior MI	5	16.7	2	6.7	**0.182** ^{Ns}
Recent inferior lateral MI	3	10.00	1	3.3	**0.999** ^{Ns}
Chi-square test - Independent samples T- test Ns There is no significant difference (P > 0.05)					

Table (2) Comparison between the control and study group in relation to the pre and post cardiac rehabilitation (CR) exercise as regards respiratory & heart rate (by mean ± SD) through the study days.

Vital signs	Heart rate (b\m)			Respiratory rate		
Group	Control N =30	Study N =30	P. value	Control N =30	Study N =30	P. value
	Mean ± SD			Mean ± SD		
1st Day	88.5±23	95.5±30.9	**0.304** ^{Ns}	30.8±7.8	36.8±2.8	**0.002****
2nd Day **Pre exercise** **Post exercise**	86±15.8 -	89.7±17.1 89.3±12.9	**0.387** ^{Ns}	25.4±6.1	26.4±3.9 26.6±3.5	**0.452** ^{Ns}
P. value		**0.911** ^{Ns}			**0.872** ^{Ns}	
3rd Day **Pre exercise** **Post exercise**	80.9± 8.0 -	77.8 ± 5.7 65.34 ± 3.0	**0.034 ***	25.9±7.4	26.2±4 26.2±4	**0.796** ^{Ns}
P. value		**0.001** $^{\#\#}$			**0.834** ^{Ns}	
4th Day **Pre exercise** **Post exercise**	86 ± 11.5 -	79.1 ± 9.33 70. ± 3.47	**0.013***	25.7±5.5	20.5±2.1 22.3±2.7	**0.001****
P. value		**0.001**$^{\#\#}$			**0.005**$^{\#\#}$	
5th Day **Pre exercise** **Post exercise**	89.5 ± 5.4 -	78.1 ± 9.67 69.34 ± 3.399	**0.001****	25.7±7.2	19.7±4.7 22.2±4.7	**0.001****
P. value		**0.001**$^{\#\#}$			**0.043**$^{\#}$	

*Independent samples T- test * Statistical significant difference between two group (P< 0.05). ** (p< 0.01)*
Ns There is no significant difference (P > 0.05) - Paired T-test (#) used to compare between pre and post CR exercise for study group with (p < 0.05)

Table (3): Comparison between the control and study group as regard pre and post cardiac rehabilitation (CR) in relation to recurrence, and duration of chest pain.

phase one CR	Recurrence chest pain					Duration of chest pain per (hr. , min)		
	Control N =30		Study N =30		Significance test	Control N =30	Study N =30	Significance test
	No.	%	No.	%		Mean ± SD	Mean ± SD	
1st Day Pre Exercise	30	(100.0%)	30	(100%)	**1.000 Ns**	11.8±20.1hr.	3.3±2.2 hr.	**0.024***
2nd Day Pre Exercise Post Exercise	7 -	(23.3%)	4 5	(13.3%) (16.7%)	**0.504 Ns**	15.7±6.7min -	15±0.0 min 13±2.7 min	**0.569 Ns**
P. value			**0.672 Ns**				**0.001 ##**	
3rd Day Pre Exercise Post Exercise	9 -	(30.0%)	2 4	(6.7%) (13.3%)	**0.045***	13.5±3.4 min -	22.5±10.min 11.3±2.5 min	**0.001****
P. value			**0.667 Ns**				**0.001 ##**	
4rd Day Pre Exercise Post Exercise	3 -	(10%)	0 0	(0.0%) (0.0%)	**0.007****	0 0	0 0	0 0
P. value			**NA**					

*Independent samples T- test * Statistical significant difference between two group (P< 0.05). ** (p< 0.01) Ns There is no significant difference (P > 0.05) -Paired T-test (#) used to compare between pre and post CR exercise for study group with (p < 0.05).*

Table (4): Modified Borg's Rating perceived exertion (RPE) scale during phase one cardiac rehabilitation (CR) exercise for the study group.

Rating perceived exertion scale (RPE)	Study group (N =30)				
	Mean + SD	P1	P2	P3	P4
(RPE) scale 1st Day	0.1±0.2				
(RPE) scale 2nd Day	2.2±0.8	0.001**			
(RPE) scale 3rd Day	4.3±1.1	0.001**	0.001##		
(RPE) scale 4th Day	7.1±1.7	0.001**	0.001##	0.001xx	
(RPE) scale 5thDay	8.9±1.3	0.001**	0.001##	0.001xx	0.001$$
(RPE) scale P1,5	0.001#				

*Independent samples T- test Statistical significant difference * (P< 0.05).*
*Statistical significant difference ** (p< 0.01) Ns There is no significant difference (P > 0.05)*
Paired T-test (#) used to compare between 1 day and 5 day for study group with (p < 0.05). P1 (**) Comparison between Day1 & day2, day3, day4, day5 - P3 (xx) Comparison between Day 3 & , day5 P2(##) Comparison between Day2 and day3, day4, day5 - P4($$)Comparison between Day4 and day5

Table (5): Rating perceived dyspnea (RPD) scale measured during exercise for the study group.

Rating perceived of Dyspnea scale (RPD)	Study group. (N =30)				
	Mean + SD	P1	P2	P3	P4
RPD scale 1st Day	5.9±1.6				
RPD scale 2nd Day	2.9±1.1	0.001**			
RPD scale 3rd Day	1.6±0.8	0.001**	0.001##		
RPD scale 4th Day	1.4±0.8	0.001**	0.001##		
RPD scale 5th Day	1.2±0.7	0.001**	0.001##	0.044x	0.307 Ns
RPD scale P1,5	0.001#				

*Independent samples T- test Statistical significant difference * (P< 0.05).*
*Statistical significant difference ** (p< 0.01) Ns There is no significant difference (P > 0.05)*
Paired T-test (#) used to compare between 1 day and 5 day for study group with (p < 0.05). P1 (**) Comparison between Day1 & day2, day3, day4, day5 - P3 (xx) Comparison between Day 3 & , day5 P2(##) Comparison between Day2 and day3, day4, day5 - P4($$)Comparison between Day4 and day5

Table (6): Comparison between the control and study group in relation to the Hospital Anxiety and Depression Scale. (HADS) .

(HADS) scale	Control group (N =30)	Study group (N =30)	Significance test
Anxiety	**Mean ± SD**	**Mean ± SD**	
1st day	20.4±0.9	20.2±1	**0.418Ns**
2nd day	19.8±1.1	15.4±2.4	**0.001****
3rd day	18±1.4	10.3±2.3	**0.001****
4th day	17.1±3.3	7.2±1.91	**0.001****
5th day	17.5±1.3	5.9±1.8	**0.001****
P1,5	**0.357Ns**	**0.001##**	
P3,5	**0.157Ns**	**0.001 ##**	
Depression	**Mean ± SD**	**Mean ± SD**	
1st day	18.6±1.2	17±1.7	**0.621Ns**
2nd day	18.1±1.5	13.5±2.5	**0.001****
3rd day	17.1±1.7	9.9±2.3	**0.001****
4th day	16.8±1.5	7.3±1.9	**0.001****
5th day	16.7±1.5	6.2±1.4	**0.001****
P1, 5. value	**0.512Ns**	**0.001##**	
P3, 5	**0.337Ns**	**0.001 ##**	

Independent samples T- test Ns There is no significant difference (P > 0.05)
*$ Significant difference (p=0.001) # # , **There is a significant difference at p<0. 01 . P. value: Comparison between 5 days P1, 5 comparisons between day 1 and day 5 P3, 5 comparisons between day 3 and day*

Table (7): Comparison between the control and study group in the pre & post cardiac rehabilitation exercise as regard the complications (Sever fatigue, Hypotension, Hypertension).

complication Group	Sever fatigue or discomfort					Hypotension					Hypertension				
	Control (N =30)		Study (N =30)		P. value	Control (N =30)		Study (N =30)		P. value	Control (N =30)		Study (N =30)		P. value
	N	%	N	%		N	%	N	%		N	%	N	%	
1st Day	30	100.0	29	96.7	**1.000 Ns**	4	13.3	10	3.3	**0.126 Ns**	**7**	23.3	10	33.3	**0.566 Ns**
2nd Day Pre Exer	8	26.7	3	10	**0.182 Ns**	6	20	2	6.7	**0.254 Ns**	1	3.3	1	3.3	**1.000 Ns**
Post Exer			6	20				1	3.3				0	0	
P. value			**0.469 Ns**					**0.989 Ns**					**0.989 Ns**		
3rd Day Pre Exer	3	10.0	0	0	**0.236 Ns**	6	20	3	10	**0.469 Ns**	1	3.3	0	0	**1.000 Ns**
Post Exer			1	3.3				1	3.3						
P. value			**0.989 Ns**					**0.604 Ns**					NA		
4th Day Pre Exer	0	0.0	2	6.7	**0.472 Ns**	8	26.7	1	3.3	**0.030***	1	3.3	0	0	**1.000 Ns**
Post Exer			6	20				1	3.3						
P. value			**0.254 Ns**					**1 Ns**					NA		
5th Day Pre Exer	0	0.0	0	0	**NA**	8	26.7	1	3.3	**0.030***	4	13.3	0	0	**1.000 Ns**
Post Exer			2	6.7				0	0						
P. value			**0.476 Ns**					**0.989 Ns**					NA		

Chi-square test used to improve p. value
** There is a significant difference at p<0.05*
*** There is a significant difference at p<0.01*
Ns There is no significant difference
Exer: exercise
NA Not applicable -Paired T-test (≠) used to compare between pre and post CR exercise for study group with (p < 0.05) .

Table (8): Comparison between the control and study group in the pre & post cardiac rehabilitation exercise as regard complications (Dizziness & Palpitation).

complication / Group	Dizziness					Palpitation				
	Control (N =30)		Study (N =30)		P. value	Control (N =30)		Study (N =30)		P. value
	N	%	N	%		N	%	N	%	
1st Day	27	90	26	86.7	**1.000 Ns**	29	96.7	27	90	**0.604 Ns**
2nd Day										
Pre Exer	3	10	3	10	**0.667 Ns**	10	33.3	3	10	**0.060 Ns**
Post Exer	-	-	0	0		-	-	3	10	
P. value			**0.236 Ns**					**1 Ns**		
3rd Day										
Pre Exer	11	36,7	0	0	**0.008****	14	46.7	2	6.7	**0.001****
Post Exer	-	-	6	20		-	-	2	6.7	
P. value			**0.031 #**					**1 Ns**		
4thDay										
Pre Exer	12	40	0	0	**0.006****	17	56.7	0	0	**0.001****
Post Exer	-	-	3	10		-	-	0	0	
P. value			**0.236 Ns**					-		
5th Day										
Pre Exer	3	10	3	10	**0.667 Ns**	5	16.7	0	0	**0.062 Ns**
Post Exer	-	-	0	0		-	-	0	0	
P. value	-	-	**0.236 Ns**			-		-		

Chi-square test used to improve p. value *** There is a significant difference between both group at p< 0.01*

** There is a significant difference at p< 0.05* *Ns There is no significant difference*

Exer: exercise

NA Not applicable- Paired T-test (#) used to compare between pre and post CR exercise for study group with (p < 0.05

Table (9): Comparison between the control and study group in the pre and post cardiac rehabilitation as regard the arrhythmia changes.

Arrhythmia / Group	Tachycardia			Bradycardia			Frequency Ectopic		
	Control (N =30)	Study (N =30)	P. value	Control (N =30)	Study (N =30)	P. value	Control (N =30)	Study (N =30)	P. value
	N %	N %		N %	N %		N %	N %	
1st Day	4(13.3%)	6(20.0%)	**0.729 Ns**	1(3.33%)	4(13.3%)	**0.350 Ns**	2(6.67%)	1(3.3%)	**0.978 Ns**
2nd Day									
Pre Exer	1(3.33%)	2(6.7%)	**0.978 Ns**	0(0%)	0(0%)	**NA**	(23.3%)	1(3.3%)	**0.057 Ns**
Post Exer		1(3.3%)						2(6.7%)	
P. value		**0.999 Ns**						**0.999 Ns**	
3rd Day									
Pre Exer	1(3.33%)	0 (0%)	**NA**	0(0%)	0(0%)	**NA**	2(6.67%)	1(3.3%)	**0.978 Ns**
Post Exer								1(3.3%)	
P. value								**1.000Ns**	
4th Day									
Pre Exer	0 (0%)	0 (0%)	**NA**	1(3.33%)	0(0%)	**NA**	2(6.67%)	2(6.7%)	**1.000 Ns**
Post Exer								0(0.0%)	
P. value								**0.472 Ns**	

Arrhythmia Group	Tachycardia			Bradycardia			Frequency Ectopic		
	Control (N =30)	Study (N =30)	P. value	Control (N =30)	Study (N =30)	P. value	Control (N =30)	Study (N =30)	P. value
	N %	N %		N %	N %		N %	N %	
5th Day Pre Exer Post Exer	0 (0%)	0 (0%)	NA	0(0%)	0(0%)	NA	2(6.67%)	0 1(3.3%)	0.472Ns
P. value	-	-	-	-	-	-		1.000Ns	

Chi-square test used to improve p. value *Exer: Exercise*
Ns There is no significant difference
NA Not applicable

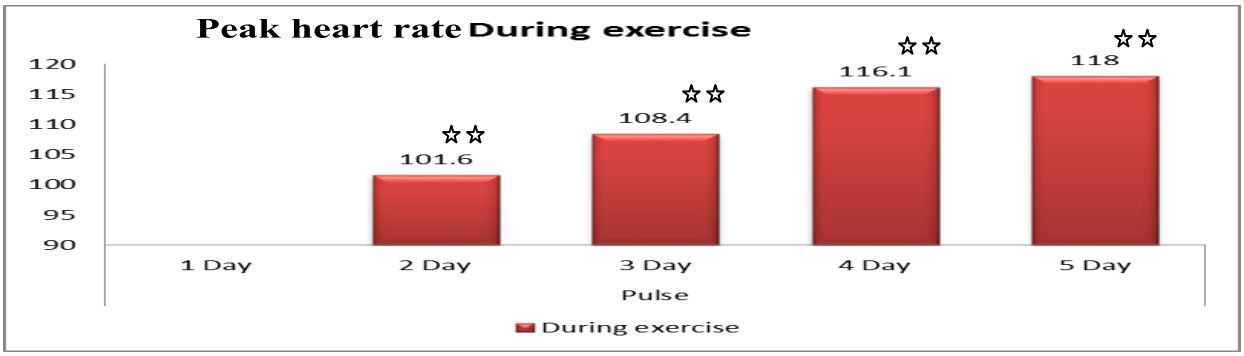

Figure (1) : Peak heart rate during exercise in study group.

*** There is a significant difference at p<0.01*

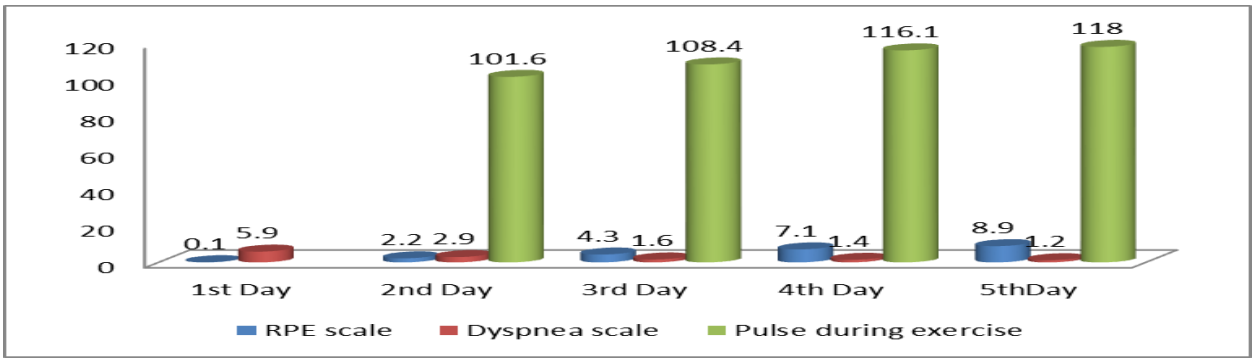

Figure (2) : Mean values in the perceived exertion rating scale, perceived dyspnea rating scale, & peak heart rate measurements, for the study group during exercises in the different 5 days.

Table (1) :shows comparison between control and study group in relation to the Socio- demographic data, risk factors, and diagnosis**.** The mean age of the control and study group was found to be (55.4 +10.5 and 57.1+10.0) respectively, there was no significant difference (P > 0.05). Concerning sex of the studied patients, the highest percentage of the two groups was found to be 76. % and 70.0 % in the control and study group respectively were males, while 30.0 % and 23.3% in control and study were females**.**

Regarding the cardiovascular risk factors, it was found that13.3% of the patients among control group had history of MI, and 6**.7**% among the study group with no significant differences between the two groups (P > 0.05). As regard presence of the other cardiovascular risk factors as hypertension, angina, and diabetes, it was found that 26.7%, 46.7%, and 46.7% respectively among the control group versus 33.3%, 23.3%, and 40.0% respectively among study group with no significant differences between the two groups (P > 0.05). Also the same table shows that 46.7 % of patients were smoking in the both groups with no significant differences (P > 0.05)**. Regarding clinical data** it was noticed that the diagnoses with

Recent anterior MI in control and study groups was found to be in 73.3% and 90.0% of the patents respectively with statistical significant difference between the two groups ($p<0.01$).

Table (2) : demonstrates the comparison between the control and study group in the pre and post cardiac rehabilitation (CR) exercise as regards respiratory & heart rate. Comparison between the control and study group in relation to the **respiratory rate**, shows a highly statistical significant differences. Moreover, a statistical significant deference was found in the pre and post exercise period in the study group in the 4th day, 5th day of assessment ($P= p< 0.01$**)**. As regard the **heart rate** it was found a statistical significant difference between the both groups during the 3rd day, 4th day of assessment (0.034, 0.013) .respectively and a highly statistical significant difference was found in the 5th day between the both groups with $p< 0.01$.

Table (3) : comparison between the control and study group as regard pre and post cardiac rehabilitation (CR) in relation to recurrence, and duration of chest pain. As regard the recurrence of chest pain a highly statistical significant difference was found between both groups during 3rd day, 4th day of assessment (p=0.045, 0.007) respectively. In relation to the duration of chest pain a highly statistical significant difference was found during 3rd day in the both groups. In the study group comparison between pre and post CR exercise regarding recurrence of chest pain in the 2 nd day and 3 rd day showed no significant difference ($P >0.05$), while the duration of chest pain per hr in the 2 nd day and 3 rd day indicates highly statistical significant difference ($p<0.05$) .

Table (4) : presents the value of the Modified Borg's Rating Perceived Exertion (RPE) scale during phase one cardiac rehabilitation (CR) exercise for the study group, it shows highly statistical significant increase in the study group during exercise between 1st day versus 5th day ($p< 0.01$).

Table (5) : depicts the value of the rating perceived dyspnea (RPD) scale during phase one cardiac rehabilitation (CR) exercise for the study group. Rating perceived dyspnea (RPD) scale shows highly significant increased in the study group during exercise between 1st day versus 5th ($p< 0.01$).

Table (6) : shows comparison between the control and study group as regard the value of the Hospital Anxiety and depression scale (HADS), a highly statistical significant difference was found between the two groups from 1st day to 5th day ($p<0. 01$).

Table (7) : comparison between control and study group regarding the presence of sever fatigue or discomfort, there was no statistical significant difference ($P >0.05$) between the both groups from the 2nd day to the 5th day. Moreover, there was no statistical significant difference ($P >0.05$) in the pre and post exercise period in the study group. Regarding Hypotension there was a statistical significant difference between the control and study group with $p<0.05$ in the 4th day, and 5th day. While the study group shows no statistical significant difference ($P >0.05$) in the pre exercise and post exercise from 2nd day to 5th day. **Regarding Hypertension** there was no statistical significant difference ($P >0.05$) between the control and study group from the 1st day to 5th day. While the study group shows no statistical significant difference ($P >0.05$) pre exercise and post exercise in 2nd day, and it was absent during pre-exercise and post exercise during other days.

Table (8) : comparison between control and study group regarding presence of dizziness and palpitation, here was statistical significant difference with $p< 0.01$ in the 3rd day, 4th day, and absent of palpitation in study group for pre and post exercise in the 4th day and 5th day.

Table (9) : shows comparison between the control and study group regarding presence of arrhythmia. As regard tachycardia there was no statistical significant difference ($P >0.05$) in 1st days and 2nd day between the both groups, and no tachycardia experienced during other days in the both groups. In the study group tachycardia was experienced in the pre and post exercise, with no statistical significant difference ($P >0.05$) in 2st day, while no experienced tachycardia during the other days. Regarding **the bradycardia** no statistical significant difference was found between the two groups with $P >0.05$ in 1st days and no experienced tachycardia during other days in the both groups**.** In the study group no bradycardia experienced in the pre and post exercise period from the 2st day to 5th day. Regarding frequency of Ectopic shows no statistical significant difference between the two groups with $P >0.05$ in 1st day versus 5th day. While the study group shows no statistical significant difference in the pre and post exercise with $P >0.05$ from 1st days versus 5th day.

Figure (1): indicates the peak heart rate during exercise in study group, show statistical significant difference with ($p< 0.01$) from 2nd day to 5th day **.**

Figure (2) : indicates the Borg's Rating Perceived Exertion Scale, it was strongly positive correlated with peak heart rate ($r = 0.643$, $P = 0.001$**). While the Rating perceived of dyspnea was moderately negative correlated with heart rate ($r = -0.425$, $P = 0.021$*)

Discussion

Phase one cardiac rehabilitation exercise decrease complication post- MI found the following: improvement in functional capacity, reduced of chest pain, reduce dyspnea, improved of heart rate, decrease occurrence of arrhythmia, Exercise reduces systolic and diastolic blood pressure after the exercise period. Improved cardiovascular efficiency, improve pulmonary capacities and muscular strength. **(Gaziano et al., 2007)**

Phase one CR to increase and enhance the patient's physical ability while decreasing anxiety, antidepressant effects and increasing self-care and sufficiency. During their hospital stay, patients will progress in their functional ability (from sitting to standing and walking) and learn how to perform cardiac rehabilitative exercises , assist the patient in becoming ambulatory; to prepare the patient to cope with the psychological and emotional stress that accompanies a coronary event; and to educate the patient about coronary risk factor modification. The guidelines for patient mobilization for inpatient cardiac rehabilitation. **(American Heart Association, 2010).**

Critical care nurse take exercise during phase one CR to improvement capacity, anxiety reduction and mental support, patient education and lastly, clinical status verification. Assessed patient twice daily during exercise and educational needs. Exercise goals will be established and communicated to the patient. **(Piotrowicz et al., 2008).**

The critical care nurse under supervision, the patients during exercise keeping in mind heart rate, blood pressure, Rating of Perceived Exertion (RPE), Modified Borg's Rating of Perceived Exertion dyspnea (RPD) and cardiac symptoms. developed for a five-day hospitalization period, following STEMI, is given in the principles followed were low intensity, short duration, early mobilization, and progression of intensity as tolerated. **(Thomas, 2007).**

The critical care nurse assessment the patients with acute MI psychosocial status. There is a well-established relationship between anxiety and depression and patients with AMI. This can affect heart rhythm, blood pressure with highly anxious patients at 3-6 times greater risk of MI and sudden death **(Serber et al., 2009).**

Effects phase one Cardiac rehabilitation exercise

Finding of the present study indicated that improvement heart rate (HR) in the study group than control group and return to normal after CR exercise. Also peak heart rate it was observed that exercise intensity in study group was 120 beats per minute during exercise. This may be due to CR exercise improvement in coronary blood flow; increasing for oxygen to the heart this result is in line with result of **(Ribeiro et al., 2012)** that reoprted immediately after exercise, HR decreases rapidly, mainly due to rapid reactivation of the parasympathetic nervous system. The exercise-training program induced a significant increase improvement of the HR .

The present study revealed that improvement respiration was found in the post phase one CR exercise in the study group than control group & regarding rating perceived dyspnea (RPD) scale observation during exercise shows improvement in study group. This may be due to the exercise efficiency of your muscles to use oxygen, Ability of your lungs to provide oxygen to your blood stream & Ability of your body to transport oxygen to the working muscles and organs. This result is in line with result of **(Gregory Thompson et al., 2010)** who reported Exercise has specific benefits for your body's functions, including increased: strength of your muscles. efficiency of your muscles to use oxygen, Ability of your lungs to provide oxygen to your blood. Also agree **(Hulzebos et al., 2006)** who reported types of breathing exercises that can help develop new patterns of breathing and increase breathing efficiency and strengthens the chest wall and abdominal muscles and when practiced regularly, can relieve shortness of breath and decreased breathlessness, and breathing exercises less fatigue, greater confidence, more independence, and enhanced quality of life**.**

The present study revealed the recurrence of chest pain is reduced duration of chest pain was found in study group than control group. It was observed that the a combination of exercise and psychological interventions through phase one CR can improvements functional capacity to decrease cardiac effort, Blood flow increases during and after active exercise and reduction in cardiac symptoms. This result is in line with result of **(Kohzuki et al., 2008**) reported that the benefit CR involved the physical, emotional, and psychosocial aspects of the patient's life previous of chest pain with persistence; patients achieve improvements in exercise tolerance and functional capacity to decrease cardiac effort.

The present study revealed the Modified Borg's Rating Perceived Exertion (RPE) scale during phase one CR exercise for the study group shows improvement during exercise. It was observed in the present study all the exercises for study group were designed at a comfortable rate of perceived exertion. This may be related to the exercising or working at moderate levels will help you to increase your exercise endurance and improve your lung function**.** This result is in line with result of **(Abraham et al., 2010)** who reported The RPE increase was significantly lower in the group where phase-1 CR

was provided. This shows that there are short-term benefits of exercises during phase-1. This along with the decreased time for the vitals to return to baseline post phase-1 , all point to the importance of exercises during phase-1, for helping the body's response to physical activity immediately after a coronary event. Even though there was no change in the length of stay in the hospital, physical and functional benefits were seen among these patients. Such a protocol-guided program would also facilitate better activity levels during phase-2, with no complications.

Hospital anxiety and depression scale (HADS).

The effectiveness of phase one cardiac rehabilitation exercise to reduce Anxiety and depression .The present study show during measure of anxiety and depression (HADS). It was observed that after intervention of phase one CR exercise, anxiety and depression scale reduced in study group than control group. This may be due to appropriate physical exercises was effective in the study group include of relaxation, breathing exercises & the education for reducing anxiety and depression. Exercises decrease overall levels of tension, elevate and stabilize mood, improve sleep, and improve self-esteem. Exercising regularly helps you take charge of anxiety and reduce stress, anger, and frustration. Exercise can also serve as a distraction to your worries, allowing you to find some quiet time and break out of the cycle of negative thoughts that feed anxiety, depression, and other mental and emotional problems improve your memory, help you sleep better, and boost your overall mood.

It was observed improving sleeps in study group after application of phase one CR than control group through exercise in the morning or afternoon can help regulate your sleep patterns. If you prefer to exercise at night, relaxing exercises help promote sleep **.**The critical care nurse facilitates the patient's adaptation to life; understand the discomfort and stressful factors from the symptoms, in order to reduce anxiety through the nurse's integrated views. The main focus of psychological interventions is to assist the patient to adapt to change, become self-empowered and regain control of their life. exercise effective at reducing fatigue, improving alertness and concentration, and at enhancing overall cognitive function. This can be especially helpful when stress has depleted your energy or ability to concentrate.

This result in the line with **(Day et al., 2005)** who reported the effective of exercise during phase one CR is an antidepressant,E:\New folder\The relationship between depression, anxiety, and cardiovascular outcomes in patients with acute coronary syndromes.htm - b134-ndt-6-123 is associated with reduced anxiety,E:\New folder\The relationship between depression, anxiety, and cardiovascular outcomes in patients with acute coronary syndromes.htm - b135-ndt-6-123 and has substantial cardiovascular benefit. a pair of trials of exercise (30 minutes of continuous walking to reach a target heart rate, in depressed patients found that regular exercise was as effective as sertraline in the treatment of depression. cardiac rehabilitation programs can provide many services that are helpful to cardiac patients with depression, from ongoing depression evaluation, to social support, to specific interventions for cardiovascular health. Therefore, both of these interventions can be tremendously helpful for cardiac patients with psychological distress. Exercise is thought to help ease stress, boost your energy levels and improve your general well-being and self-esteem. It can also help to reduce anger. As well as this, Exercise can make you sleep better**..**

Also agreed with **(Dehdari et al., 2007) & (Hazavehei, 2008**) whom reported reduce level of anxiety after implementation of the program. Another point of view **(Farkhondeh et al., 2012)** Who reported the effect of cardiac rehabilitation on depression and anxiety among 60 patients . They found that rehabilitation reduce depression. There was a statistically significant difference in depression scores between groups.

The present study revealed that Complication during phase one CR exercise (Sever fatigue or discomfort, hypotension, hypertension, dizziness, palpitation) with improvement gradually in study group. It was observed the safe application CR exercise with minimal of symptoms appear pre and post CR exercise. This result in the line with **(Garyfallia Pepera, 2013|)** who reported no complication reported post-exercise. a small number of minor cardiovascular events were recorded during the exercise . Also agreed with **(Abraham et al., 2010)** who reported no complications or mortality from the use of the phase one cardiac rehabilitation was observed during hospitalization.

The present study revealed that Arrhythmias (tachycardia, bradycardia, Freqency ectopic) .It was observed in the study group during application of CR exercise absence of arrhythmias (pre, during and post CR exercise) at the end of the study. It was observed no complication from application phase one CR exercise .This may be related to the CR exercise benefits for your body's functions, Ability of your body to transport oxygen to the working muscles and organs, blood flow increases during and after active exercise and reduction in cardiac symptoms. also psychological interventions is to assist the patient reducing fatigue, improving alertness and concentration, This result in the line with **(Garyfallia Pepera, 2013)** that application of CR exercise

decrease occurrence of arrhythmia who reported The relative safety of the exercise training experienced by the present study group is possibly the result of a well-supervised exercise program , which was risk stratified and gave special consideration to American collage of sport medicine recommendation .

Relationship between Rating of perceived exertion and heart rate in the study group

The present study show during phase one CR exercise rating of perceived exertion was strongly positive correlated with heart rate without any complication & Exercise training reduces the perceived sense of dyspnea & significant positive change that improvement respiration rate after the implementation exercise. & dyspnea was negative correlated with heart rate .it was observed during study breathing exercise decreased breathlessness and help patient to reduces stress. This result is in line with **(Hulzebos et al., 2006)** who reported breathing exercises less fatigue, greater confidence, more independence, and enhanced quality of life**.** also (**Johannes Scherr et al., 2012)** who reported Rating of perceived exertion was strongly correlated with heart rate. also **(Jolly et al., 2006)** reported with Exercise training is an effective therapeutic approach to reducing the dyspnea, promoting their sense of independence and psychosocial health. Another point of view **(Laoutaris et al., 2006)** reported with Exercise training reduces the perceived sense of dyspnea both at rest and during exercise. Inspiratory training increases the inspiratory muscles' strength.

Conclusions

Based on the findings of the present study, it can be concluded that the study groups who receive phase one cardiac rehabilitation with St segment elevation acute myocardial infarction improvement than control group regarding for dyspnea, ,heart rate, decreased recurrence chest pain , Statistical significant decrease level of anxiety and depression .

Recommendations

Based on the study findings, the following recommendations are suggested:

1- Establishing a standardized protocol for application cardiac rehabilitation.
2- Provide training program for the care nurses about application of cardiac rehabilitation to prevent complications of acute MI.
3- Critical care nurses should performed cardiac rehabilitation exercise as part of the management of myocardial infarction patients.
4- Repeat this research on large sample size and in multi centers for generalization.

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