

Effectiveness of Planned Preoperative Teaching on Self-Care Activities for Patients Undergoing Cardiac Surgery

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Abstract: Cardiac surgeries are high-risk procedures that require careful preoperative and postoperative management. Many perioperative complications can be anticipated allowing for early and aggressive management in an attempt to reduce morbidity and shorten convalescence. Preoperative teaching helps to decrease postoperative complications by introducing the tasks in which a patient will be required to participate after surgery.

Aim of the study: To evaluate the effectiveness of planned preoperative teaching on self-care activities for patients undergoing cardiac surgery.

Methods: Quasi-experimental research design was conducted in the cardiac center at Al-Thawra Modern General Hospital in Sana'a, Yemen. The study was conducted on 100 adult cardiac surgical patients of both sexes, were randomly assigned into two groups (50 study group and 50 control group). Study group were included in a planned preoperative teaching. Data were collected through two tools (Assessment questionnaire and observation checklist).

Results: The mean age of study group are 40.46 ± 14.13 years and 38.88 ± 12.47 years of control group. The pre-test result shows 52% of the study group and 82% of the control group possess inadequate knowledge. Whereas, in the post-test results 84% of the study group and 4% of the control groups had adequate knowledge. Significantly improved knowledge, performance level of self-care activities, early extubation, coping with pain, less amount of analgesic required, short postoperative period, short length of ICU stay and less complication than those non-receiving planned preoperative teaching.

Conclusion: Patients may benefit from this planned preoperative teaching intervention in terms of knowledge and performance of self-care activities, early extubation, coping with pain, length of stay and complication than those non-receiving planned preoperative teaching. The planned preoperative teaching could be incorporated as part of prepare patients for cardiac surgery.

Keywords: Cardiac surgery, planned preoperative teaching, self-care activities, and postoperative complication.

I. INTRODUCTION

Cardiovascular diseases (CVDs) are the number one cause of death globally: more people die annually from CVDs than from any other cause. An estimated 17.5 million people died from CVDs in 2012, representing 31% of all global deaths. Of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke. Over three quarters of CVDs deaths take place in low- and middle-income countries ⁽¹⁾. Countries in Africa and the Middle East bear a heavy burden from cardiovascular disease. The prevalence of coronary heart disease is promoted in turn by a high prevalence of cardiovascular risk factors ⁽²⁾. Cardiovascular diseases deaths in Yemen reached 21% of total deaths according to the latest World Health Organization (WHO) data published in 2014 ⁽³⁾. Rheumatic heart disease is the most

common cardiac disease in Yemen. It is associated with high morbidity and mortality⁽⁴⁾. Coronary artery disease (CAD) or coronary heart disease (CHD) is the most common type of heart disease and causes about two-thirds of all deaths resulting from cardiovascular disease⁽⁵⁾.

Each year approximately one million patients worldwide undergo cardiac surgery such as CABG, valve repair or replacement, aneurysm repairs, and arrhythmia surgery⁽⁶⁾. Cardiac surgery is required for a number of disorders that cannot be controlled or treated by conservative management. Coronary artery disease and valvular disease are the most common conditions requiring open cardiac surgery⁽⁷⁾. The primary goal of cardiac surgery is not just a minimally acceptable outcome where the patient survives without life-threatening complications or persistent clinically manifest organ dysfunctions or simply hospital survival; but a healthy, productive long-term survivor^(8,9).

Coronary artery bypass grafting and various valvular procedures can now be performed 'off-pump' via small incisions on the beating heart without bypass. However, most cardiac surgery is still carried out on bypass⁽¹⁰⁾.

Coronary artery bypass grafting or "CABG" is the most commonly performed "open heart" operation in the United States⁽¹¹⁾. In Yemen, Valve replacement is the most common open heart surgery procedure⁽⁴⁾. Cardiac surgery through either a sternotomy or thoracotomy has deleterious effects on the function of the muscle pump and the chest wall. Atelectasis is the most common pulmonary complication after cardiac surgery occurring in about 70% of cases⁽¹²⁾.

Postoperative pulmonary complications (POPC) occur after 25% to 50% of major surgical procedures. Postoperative pulmonary complications are as prevalent as cardiac complications and have a similar effect on morbidity, mortality and length of hospital stay⁽¹³⁾. Thromboembolism is the most common complication of prosthetic valves, and long-term anticoagulation with warfarin is initiated 48 hours after surgery⁽¹⁴⁾.

The major nursing activity to ensure that the client is prepared for surgery is preoperative teaching⁽¹⁵⁾. The surgery is a family crisis that may lead to a long recovery, patient dysfunction, and even death⁽¹⁶⁾. Preoperative teaching has proven beneficial in decreasing postoperative complications and length of stay as well as positively influencing recovery. Patients who are well prepared with detailed preoperative instruction deal more effectively with their surgery and are better prepared to manage their pain and engage in appropriate self-care activities⁽¹⁷⁾. It is important to minimize postoperative complications, increase patient compliance, and decrease patient anxiety⁽¹⁸⁾.

Patient education is the process of influencing the patient's behavior to effect changes in knowledge, attitudes, and skills needed to maintain and improve health⁽¹⁷⁾. Preoperative teaching is initiated as soon as possible, includes different modalities (verbal, written, electronic, return demonstration), and should be tailored to the needs of the patient. In addition, preoperative teaching includes instruction in the breathing and leg exercises used to prevent postoperative complications such as pneumonia and deep vein thrombosis (DVT). The goal of instruction is to have the client demonstrate the performance of exercises while verbalizing why the exercises are used during the postoperative phase^(14, 19).

The standard of care for all clients undergoing general anesthesia is to preoperatively teach techniques. In addition to teaching the patient and the family what they wish to know, several types of information are considered necessary in achieving optimal health explain coughing, deep breathing, and leg exercises. Teach the use of an incentive spirometer and splinting the incision to cough^(9,20). Informal teaching unplanned, spontaneous conveying of information, usually at the client's bedside or while caring for the client at home. Formal teaching planned, organized conveying of information. Without a plan, teaching becomes haphazard. Furthermore, without some organization of time and content, the potential for reaching goals, providing adequate information, and ensuring comprehension is jeopardized⁽⁹⁾.

Aim of the study:

The study was conducted to evaluate the effectiveness of planned preoperative teaching on self-care activities for patients undergoing cardiac surgery.

Research hypotheses:

The following research hypotheses were formulated in an attempt to achieve the aim of the study: subjects who receive planned preoperative teaching will reduce incidence of postoperative pulmonary, circulatory, and gastrointestinal complications, "better knowledge and level of performance" and will reduce the length of hospital stay for the cardiac surgical patient.

II. SUBJECTS AND METHOD

Research design:

The quasi-experimental research design was utilized to reach the aims of the study.

Setting:

This study was conducted at the cardiac surgical ward and intensive care unit in the cardiac center at Al-Thawra Modern General Hospital in Sana'a, Yemen.

Subjects:

Data collection on the cardiac center occurred between 1-June-2014 to 30- November- 2014. Both male and female adult patients were admitted to cardiac ward and scheduled for cardiac surgery. The subjects of the study comprised 100 adult patients who had undergone cardiac surgery during the period of the study (six months) and selected setting.

The study subjects were divided randomly into two equal groups. A study group which consisted of 50 adult patients received planned preoperative teaching and a control group which consisted of 50 adult patients received the routine hospital preoperative teaching only.

The following inclusion criteria were used to identify patients eligibility for this study: patients who underwent cardiac surgery, aged 18 to 60 years, willing to participate in this study, admitted for non-emergency condition, free from chronic diseases as diabetic mellitus and liver cirrhosis ...etc. Study exclusion criteria were as follows: patients who remained on endotracheal intubation /mechanical ventilation for more than three days and unconscious patients.

Tools:

The following tools were utilized to collect data pertinent to the study:

I. **The first tool** was an assessment questionnaire. It consisted of two parts.

Part I: A socio- demographic characteristics "to collect of age, sex, marital status, residence, educational level, occupation and personal habits" and health relevant data.

Part II: A structured questionnaire regarding knowledge of pre and postoperative self-care activities of patient's undergone cardiac surgeries.

II. **The second tool** was an observation checklist to evaluate the self-care activities which include: self-care activities related to breathing exercises (splinted cough, deep breathing and incentive spirometer), change positioning, extremities exercises, ambulation, dietary, elimination, wound care, personal hygiene, 'rest and sleep' and self-care measures for coping with pain.

Scoring system: *The scoring system of the patient knowledge questionnaire was done as follows:* Each correct answer scored one point and each incorrect answer scored a zero. For dietary, each healthy food like to eat answer scored two point, one point for decrease it answer and zero point for do not like. While each unhealthy food do not like to eat answered scored two, decrease it scored one and like to eat scored zero. *The scoring system of the postoperative observation was done as follows:* For self-care activity was done correctly scored two point, if need correction scored one point and if not done scored zero. *The knowledge score* were categorized as follows: Above 75% represented adequate knowledge, 51-75% represented moderately adequate knowledge and below 50% represented inadequate knowledge.

Methods:

- Once the necessary approvals were granted, the proposed study proceeded. The subjects who met sample criteria and agreed to participate in the study were interviewed by the researcher to collect the necessary data and implement the planned preoperative teaching after explaining the purposes of the study.
- The present study included 100 adult cardiac surgical patients of both sexes. The patients attending to the sittings of the study during a period of data collection were divided into two groups: a control group and a study group, both groups were taken at the same time and divided into equal groups (50 patients) to receive routine hospital preoperative

teaching (control group) and (50 patients) to receive planned preoperative teaching (Study group). Two days before surgery, the researcher visited all patients posted for cardiac surgery.

- Each patient in the two groups (Study group and control group) was interviewed individually before applying the planned preoperative teaching in order to collect the baseline patient's data using the study tools.
- Moreover, an instructional booklet was given to each patient in the study group to attract their attention, motivate them and help for reviewing at ward, home and support teaching and practice.
- Data collection covered a period of 6 months. It was stated from the first of June 2014 to the end of November 2014.

Evaluation:

- Each patient in both groups (Study group and control group) was observed postoperatively from the patient awareness in ICU to the time of discharge using *tool II*. Patient interviewed postoperative before discharge to assess knowledge using *tool I* with explanation of incorrect items.
- Comparison between the study group and control group was done to evaluate the effectiveness of the planned preoperative teaching on ability to recall knowledge explained preoperative, the length of hospital stay, development of postoperative complications and analgesics administered postoperatively.

Statistical analysis:

Data were collected, computed and statistically analyzed using the Statistical Package for Social Sciences (SPSS) version 22.0.0.0 for continuous variables (mean \pm SD) which was used for comparison and t test, paired t test, ANOVA t tests were used for the detection of significant differences for the independent group, same group (pre & post) and more than two groups respectively. For categorical variable comparison between groups a chi-square test was used.

III. RESULTS

Table 1: This table illustrated that the mean age of both groups were 40.46 ± 14.13 years and 38.88 ± 12.47 years for study and control group respectively. In relation to sex, more than half of the patients (62%) were males in study group. While the females were 52% more than males in control group. Majority of the participants in study and control groups (80% and 90% respectively) were married. The study and control groups were similar according to the area of residence (Rural 30% and urban 20%). With regard to educational level, reading and writing prevailed 32% among the Study group and 36% of the control group. Regarding occupation, about 54% of study group and 60% of control group were practical work. Concerning smoking habits, about one third of the study group 34% and 24% of the control group were smoking. Majority of the participants in study and control groups (70% and 60% respectively) were chewing khat. The study group and the control group are nearly matched as regarding to all socio-demographic characteristic. There were no significant differences between the two groups as regard to age, sex, marital status, residence, educational level, work and personal habits ($P > 0.05$).

Table 2: This table revealed that all of the participants in both groups had previous illness. Valve inflammation was the most common previous illness among the study group and the control group (56% and 70% respectively). Concerning family history, there was no family history in more than two third of the participants 74% in the study and 78% of the control groups. Regarding duration of disease, the majority 34% of the study group and 36% of the control group were ill from 1 to less than 5 years. Concerning current diagnosis, the most common diagnosis among the study group and control group was rheumatic heart disease (56% and 70% respectively). Valve replacement surgery was more prevalent 56% in the study group and 70% of the control group. Majority of the participants 78% in the study group and 76% of the control group had no previous admission for surgery. With reference to using analgesics, it was revealed that majority 74% of both groups used preoperative analgesics, while most common of analgesics used was paramol (paracetamol), it constituted 70% of the study group and 72% of the control group. Above three quarter of participants, 82% in the study and 92% of the control groups knew their medications and most of them knew the medications by the color (50% and 68% respectively). Medication and dietary modification were considered the second treatment disciplinary prescribed for the study and the control groups (22% and 40% respectively). The study group and the control group were nearly matched regarding all health relevant data. There were no significant differences between two groups ($P > 0.05$).

Table 3: This table indicated that all items and scores of dietary regarding to dairy product, meat and eggs yolk, starches and carbohydrate, and beverage and others of the study group differed significantly after applying planned preoperative

teaching. Moreover, the total scores and some dietary items of the control group were slightly increased but the differences were not statistically significant. In addition, there were no statistically significant differences in all dietary items between the study group and the control group before applying planned preoperative teaching (P= 0.299). On the other hand, after applying planned preoperative teaching the differences between total score and all items of dietary of the study group and the control group were statistically significant (P=0.000), except in starches and carbohydrate score there were no significant differences (P > 0.05).

Table 4: This table showed that the total scores and all items regarding knowledge of the cardiac surgery, preoperative self-care activity, postoperative care, sternal percussion, coping with pain, breathing with incentive spirometer, ‘leg and foot exercise’, ‘getting in and out of a chair’, deep breathing exercise, ‘splinting and coughing’, and hand washing of the study group differed significantly after applying planned preoperative teaching. Moreover, the total scores and some items of knowledge of the control were increased with statistically significant differences except in leg & foot exercise score, getting in and out of a chair score, deep breathing exercise score, splinting and coughing score and getting out of bed (P >0.05). In addition, there were no statistically significant differences detected between the two groups before applying sessions regarding the total knowledge scores and all items of knowledge. On the other hand, after applying planned preoperative teaching, the differences between total scores and all items of knowledge of the study and control groups were statistically significant where P values were (P 0.000) except in hand washing.

Table 5: This table revealed that total scores and all items scores regarding practice (level of performance) breathing with incentive spirometer, deep breathing, splinting and coughing, mobility exercise, getting out of bed, sternal percussion, leg and foot exercise, hand washing and personal hygiene scores between the study group and the control group differed significantly after applying planned preoperative teaching where P values were (P 0.000).

Table 6: This table clarified that the degree of pain 5-6 degree was 44% in study group and 46% in the control group. While 9-10 degree was 4% in study group compared to 24% in control group indicating that there were significant difference were detected between the two groups.

Table 7: This table indicated that the study group had a less complication after surgery 6% compare with 32% of the control group. Pneumonia occurred only (1%) on the study group, while it occurred (22%) on the control group with significant differences there detected between two groups as regarded to postoperative complication except that for mediastinitis and plural effusion were no statistically significant differences between the two groups.

Table (8): This table revealed that the length of ICU stay, preoperative days, postoperative days and weaning from ventilator differed significantly between the study group and control group where P values were (P <0.05). While length of hospital stay was nearly matched for the study group and the control group, no statistically significant differences between the two groups.

Figure (1): This figure revealed that the pre-test result showed that 52% and 82% of the participants possessed inadequate knowledge of the study and control groups respectively. Whereas, in the post-test results, 84% of the study group and 4% of the control groups had adequate knowledge.

Table (1): Comparison of the socio-demographic characteristic between study group and control group.

Items	Study Group		Control Group		Significant Test
	No=50	%	No=50	%	
Age Group					X ² = 3.204 P 0.361
18-30	15	30	18	36	
31-40	11	22	14	28	
41-50	6	12	8	16	
51-60	18	36	10	20	
	Mean & SD = 40.46 ± 14.13		Mean & SD = 38.88 ± 12.47		
Sex					X ² = 1.980 P 0.159
Male	31	62	24	48	
Female	19	38	26	52	
Marital Status					X ² = 3.866 P 0.145
Single	10	20	4	8	
Married	40	80	45	90	

Divorced	0	0	1	2	
Residence					
Rural	30	60	30	60	
Urban	20	40	20	40	
Educational Level					
Illiterate	15	30	18	36	X ² = 1.209 P 0.751
Read & write	16	32	18	36	
Secondary School	13	26	9	18	
University	6	12	5	10	
Occupation					
Work	27	54	30	60	X ² = 0.367 P 0.545
Not Work	23	46	20	40	
Smoking Habits					
Yes	17	34	12	24	X ² = 1.214 P 0.271
No	33	66	38	76	
Chewing Khat					
Yes	35	70	30	60	X ² = 1.099 P 0.295
No	15	30	20	40	

Table (2): Relationship between the study group and control group regarding to health relevant data.

Items	Study Group		Control Group		Significant Test
	No=50	%	No=50	%	
Previous illness					
Yes	50	100	50	100	
No	0	0	0	0	
Hypertension					X ² = 2.291 P 0.130
Yes	19	38	12	24	
No	31	62	38	76	
Myocardial Infraction					X ² = 1.714 P 0.190
Yes	18	36	12	24	
No	32	64	38	76	
Valve inflammation					X ² = 2.102 P 0.147
Yes	28	56	35	70	
No	22	44	15	30	
Stroke					
Yes	1	2	1	2	
No	44	98	49	98	
Arterial Septic Defect					X ² = 0.709 P 0.400
Yes	4	8	1	2	
No	46	92	49	98	
Family History					X ² = 0.214 P 0.640
Yes	13	26	11	22	
No	37	74	39	78	
Duration of disease					X ² = 3.461 P 0.326
<1 years	11	22	10	20	
1- < 5years	17	34	18	36	
5-< 10years	12	24	6	12	
>10years	10	20	16	32	
Current Diagnosis					X ² = 4.178 P 0.382
Ischemic Heart Disease	18	36	12	24	
Rheumatic heart Disease	28	56	35	70	
ASD	3	6	2	4	
Aortic Aneurysm	1	2	0	0	
Atrial Myxoma	0	0	1	2	
Type of Surgery					X ² = 4.178 P 0.382
CABG	18	36	12	24	
Valve Replacement	28	56	35	70	
ASD Repair	3	6	2	4	
Aortic Repair	1	2	0	0	
Myxoma Exertion	0	0	1	2	
Previous Admission					X ² = 0.056 P 0.812
Yes	11	22	12	24	
No	39	78	38	76	

Table (2): Continue.

Items	Study Group		Control Group		Significant Test
	No=50	%	No=50	%	
Using Analgesics	Yes	37	74	37	
	No	13	26	13	
Types of Analgesics					
Paramol	35	70	36	72	X ² =0.049 P 0.826
Voltaren	9	18	8	16	X ² =0.071 P 0.790
Tramadol	3	6	1	2	X ² =0.211 P 0.646
Ibuprofen	1	2	1	2	
Do you know your Medications					
Yes	41	82	46	92	X ² = 2.210 P 0.137
No	9	18	4	8	
How you know your medications(by)					
Color	25	50	34	68	X ² = 5.879 P 0.118
Name	11	22	5	10	
Shape	5	10	7	14	
Do not know	9	18	4	8	
Treatment Disciplinary prescribed					
Medication	36	72	27	54	X ² = 5.099 P 0.165
Medication + Diet	11	22	20	40	
Medication, Diet and avoid risk factors	3	6	2	4	
Medication, Diet, avoid risk factors and exercise	0	0	1	2	

Table (3): Comparison between study group and control group according to the dietary before and after intervention.

Items	Before Intervention		After Intervention		t ₁	t ₂
	Study group	Control group	Study group	Control group		
Diary Product score	5.7	5.3	6.82	5.22	t= 3.908 P 0.000*	t= 0.409 P 0.684
	± 1.92	± 1.82	± 1.98	± 1.80		
	t= 1.069	P 0.288	t= 4.221	P 0.000*		
Meat and Eggs Yolk Score	7.86	7.36	9.12	7.26	t= 4.392 P 0.000*	t= 0.348 P 0.729
	± 3.57	± 3.00	± 3.66	± 2.99		
	t= 0.757	P 0.451	t= 2.780	P 0.007*		
Starches and Carbohydrate Score	3.84	3.84	4.08	3.96	t= 2.005 P 0.050*	t= 1.630 P 0.110
	± 0.65	± 0.65	± 0.83	± 0.53		
	t= 0.000	P 1.000	t= 0.861	P 0.391		
Beverage and Others Score	10.36	9.6	12.02	9.7	t= 5.269 P 0.000*	t= 0.341 P 0.734
	± 3.38	± 2.79	± 3.24	± 2.82		
	t= 1.224	P 0.224	t= 3.820	P 0.000*		
Total dietary Score	28.7	27.16	33.04	27.18	t= 5.861 P 0.000*	t= 0.033 P 0.974
	± 7.99	± 6.68	± 8.45	± 6.85		
	t= 1.044	P 0.299	t= 3.808	P 0.000*		

Table (4): Relationship between the study group and control group as regarding knowledge of self-care activity before and after intervention.

Items	Before Intervention		After Intervention		t ₁	t ₂
	Study group	Control group	Study group	Control group		
Cardiac Surgery Score	3.68	3.5	5.74	4	t= 8.142 P 0.000*	t= 2.948 P 0.005*
	± 1.73	± 1.83	± 1.04	± 1.39		
	t= 0.505	P 0.615	t= 7.041	P 0.000*		
Preoperative Self-care activity Score	8.62	8.56	11.08	9.06	t=7.220 P 0.000*	t= 2.045 P 0.046*
	± 2.63	± 2.64	± 1.30	± 1.38		
	t= 0.114	P 0.910	t= 6.958	P 0.000*		
Postoperative care Score	9.66	9.06	15.22	10.38	t= 8.844 P 0.000*	t= 3.348 P 0.002*
	± 5.32	± 4.00	± 2.54	± 2.96		
	t= 0.637	P 0.526	t= 8.769	P 0.000*		
Sternal Percussion Score	4.42	4.45	6.74	6.06	t= 6.184 P 0.000*	t= 4.243 P 0.000*
	± 2.66	± 2.59	± 0.56	± 1.42		
	t= 0.229	P 0.820	t= 3.146	P 0.002*		
Coping With Pain Score	2.14	2.4	4.82	3.96	t=7.915 P 0.000*	t= 4.981 P 0.000*
	± 2.20	± 1.94	± 1.24	± 1.38		
	t= 0.625	P 0.533	t= 3.272	P 0.001*		
Breathing with incentive Spirometer Score	1.48	0.82	4.82	2.28	t=11.269 P 0.000*	t= 5.105 P 0.000*
	± 2.06	± 1.51	± 0.39	± 1.71		
	t= 1.827	P 0.071	t= 10.216	P 0.000*		
Leg & foot exercise Score	1.98	1.22	7.74	1.38	t=14.604 P 0.000*	t= 0.984 P 0.330
	± 2.54	± 2.46	± 2.10	± 2.88		
	t= 1.516	P 0.133	t= 12.588	P 0.000*		
Getting in and out of a Chair Score	0.64	0.38	2.42	0.28	t=9.939 P 0.000*	t= 1.300 P 0.200
	± 1.03	± 0.73	± 1.05	± 0.83		
	t= 1.464	P 0.146	t= 11.275	P 0.000*		
Deep Breathing Exercise Score	0.92	0.62	3.68	0.42	t=15.168 P 0.000*	t= 1.237 P 0.222
	± 1.14	± 1.23	± 0.84	± 1.18		
	t= 1.267	P 0.208	t= 15.895	P 0.000*		
Splinting and Coughing Score	0.96	0.48	5.16	0.44	t=15.582 P 0.000*	t= 0.629 P 0.533
	± 1.64	± 1.33	± 1.31	± 1.43		
	t= 1.608	P 0.111	t= 17.175	P 0.000*		
Hand Washing Score	4.28	4.46	5.9	5.74	t=5.510 P 0.000*	t= 4.232 P 0.000*
	± 2.16	± 2.07	± 0.36	± 0.63		
	t= 0.425	P 0.671	t= 1.550	P 0.124		

t₁= Comparison between study group before and after intervention.

t₂= Comparison between control group before and after intervention.

*= Significant differences P ≤ 0.05.

Table (5): Comparison of postoperative practice between study group and control group.

Items	Study group	Control group	Significant Test
Breathing with incentive Spirometer Score	8.84	5.04	t= 11.881 P 0.000*
	±2.17	± 0.64	
Deep Breathing Score	6.36	1.54	t= 12.540 P 0.000*
	±2.00	± 1.83	
Splinting and Coughing Score	6.96	0.24	t= 15.984 P 0.000*
	±2.73	± 1.19	
Mobility Exercise Score	17.9	8.46	t= 10.273 P 0.000*
	± 6.00	± 2.48	
Getting out of Bed	4.08	0.14	t= 12.812 P 0.000*
	±2.08	± 0.64	
Sternal Percussion Score	7.46	5.54	t= 9.759 P 0.000*
	± 0.71	± 1.19	
Leg and Foot Exercise Score	14.84	1.32	t= 16.242 P 0.000*
	± 5.69	± 1.50	
Hand Washing Score	9.32	5.3	t= 8.976 P 0.000*
	±2.42	± 2.04	
Personal Hygiene Score	7.5	6.02	t= 5.594 P 0.000*
	± 0.93	± 1.62	
Total Score	83.26	33.6	t= 17.171 P 0.000*
	± 19.32	± 6.69	

Table (6): The relationship between study and control groups on degree of postoperative pain.

Items	Study Group	Control Group	Significant Test
Degree of Pain			X ² = 10.188 P 0.037*
1-2 No	3	2	
	6	4	
3-4 No	15	8	
	30	16	
5-6 No	22	23	
	44	46	
7-8 No	8	5	
	16	10	
9-10 No	2	12	
	4	24	

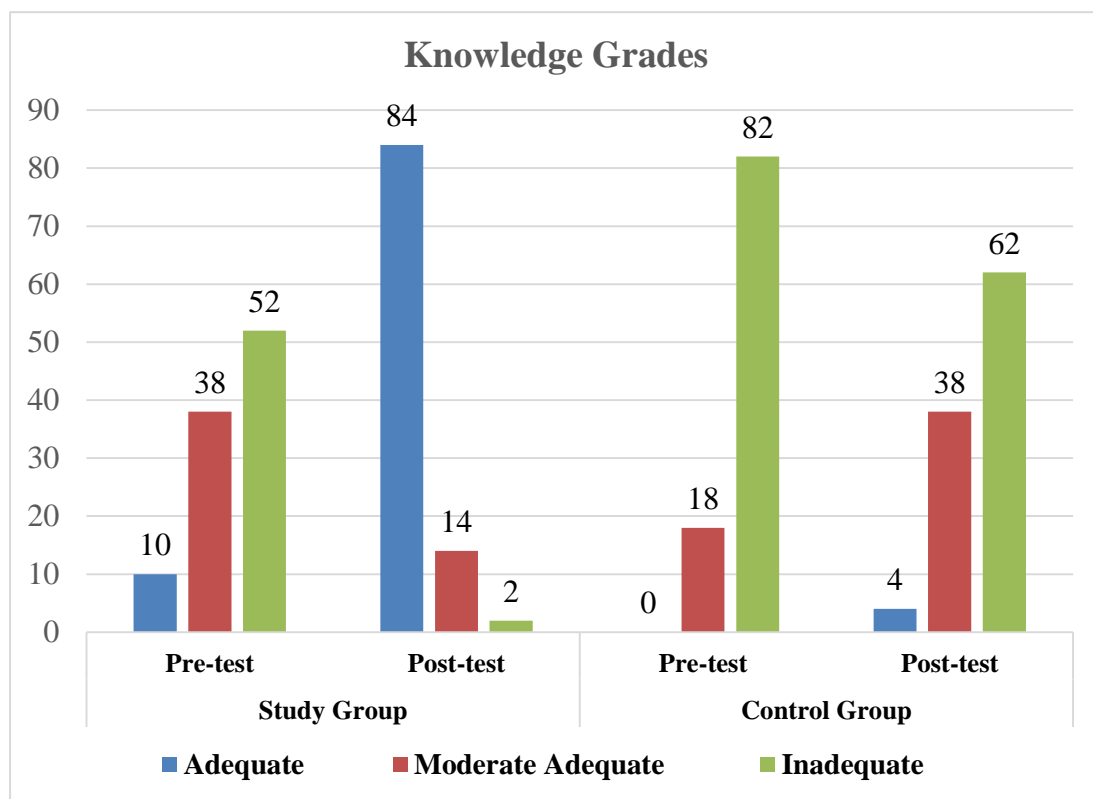
Table (7): Effect of planned preoperative teaching on postoperative complication.

Items	Study Group		Control Group		Significant Test	
	Yes	No	Yes	No		
Postoperative Complication	No	3	47	16	34	X ² = 10.981 P 0.001*
	%	6.0	94.0	32.0	68.0	
Pneumonia	No	1	49	11	39	X ² = 9.470 P 0.002*
	%	2.0	98.0	22.0	78.0	
Mediastinitis	No	2	48	3	47	X ² = 0.211 P 0.646
	%	4.0	96.0	6.0	94.0	
Plural Effusion	No	0	50	1	49	X ² = 0.010 P 0.315
	%	0.0	100.0	2.0	98.0	

Table (8): Effect of planned preoperative teaching on the hospital stay and weaning from ventilator.

Items	Study group	Control group	Significant Test
Preoperative Days	11.42	8.56	t= 2.668
	± 5.44	± 5.28	P 0.009*
ICU Days	3.1	3.92	t= 4.096
	± 0.97	± 1.03	P 0.000*
Postoperative Days	7.9	11.66	t= 4.363
	± 1.33	± 5.95	P 0.000*
Length of Hospitalization	19.84	20.28	t= 0.297
	± 5.73	± 8.77	P 0.767
Weaning from Ventilator	9.46	13.54	t= 2.637
	± 3.68	± 10.30	P 0.010*

Figure (1): Relation between knowledge grades before and after intervention for study group and control group.



IV. DISCUSSION

Ischemic heart disease is the most common cause of death (12.2% of all deaths). Worldwide, valvular heart disease remains a major cause of morbidity and mortality ⁽²¹⁾.

Discussion of the study results will be presented within the following: The socio-demographic background of the present study showed that the mean age of the study group was 40.46 ±14.13years, while the mean age of the control group was 38.88 ±12.47years. Males were more than females in study group. While the females were more than male in control group. Majority of the participants in study and control groups were married. The study and control groups were similar according to the area of residence. Reading and writing prevailed 32% among the study group and 36% of the control group. About 54% of study group and 60% of control group were practical work. About one third of the study group 34% and 24% of the control group were smoking. While the majority of them chewed Khat.

In relation to age group, the present study findings revealed that patients aged 51-60years formatted 36% of study group. While 18-30years patients were 36% in the control group. This in agreement with Azer et al. (2011) who reported that the

most age groups seen in cardiac surgery ages ranged from 18 - 29 years⁽²²⁾, and Kaur et al. (2007) reported ages 16-35 was seen in cardiac surgery⁽²³⁾. Another study showed that, the mean of age of patients in study and control group were 53.5 and 52.8 years, respectively⁽²⁴⁾.

The present study revealed that cardiac surgery was seen in males more than females in the study group. While females more than males in the control group. Findings were found in the study of Guo et al. (2012), Kruzik (2009) and Hulzebos, (2006) reported that more than half of cardiac surgery were male⁽²⁵⁻²⁷⁾. Mamta (2014) and Kaur et al. (2007) pointed out that equal number of males and females^(23, 28). In addition, a study carried out in Assiut University by Azer et al. (2011) reported that more than half of the patients in study group 53.3 % was females. While the majority of the patients in the control group 63.3 % were male⁽²²⁾.

In relation to marital status, the present study revealed that more than three-quarter of the participants were married. This agreed with Azer et al. (2011), El-shenawie (2008) and Deyirmenjian et al. (2006) who reported that most of studies patients were married^(22, 29, 30).

Regarding the area of residence the present study indicated that most of the patients belonged to rural areas (Rural 30% and urban 20%) in both groups. That is related to there is only one governmental cardiac center in whole Yemen country. Sam finding reported that the most coronary artery bypass graft patients in Australia lived in rural areas⁽³¹⁾.

Level of education in the present study revealed that the most of the subjects could read and write and illiterate with no significant differences. This may be related to the socioeconomical state of the patients. Yemen is one of the poorest countries in the Arab region⁽³³⁾. This is a harmony with Azer et al. (2011) who found that 33.3 % of the patients in study group were illiterate. While the patients' in control group 26.7 % who read & writ, with no statistical significant difference between study and control groups⁽²²⁾. Furthermore, the difference between patients on the base of their education level was not significant⁽³²⁾.

Regarding occupation, the present study revealed that more than half of the patients were practical work. The same findings were reported in a study carried out in University of Balamand by Deyirmenjian et al. (2006) who found that more than half of the patients were employed⁽³⁰⁾. In this respect, El-shenawie (2008) clarified that most of the study patients were skilled occupation⁽²⁹⁾.

Concerning chewing khat the present study showed that the majority of participants were chewing khat. This was supported by Al-Mugahed (2008) and World Health Organization (2008) who estimated that up to 90% of adult males chew Khat in Yemen and for a females may be as high as 50% or even higher as young women take up the habit. A latest study for the World Bank expected that 73% of women in Yemen chew khat more or less frequently. Meanwhile, a staggering 15–20% of children below 12years are also daily consumers. In fact the World Health Organization (WHO) do not consider Khat to be a seriously addictive drug, that does not mean its consumption is without physiological repercussions^(34, 35). In addition, a study by Al-Mugahed (2008) reported that proposed links between chewing Khat and the incidence of myocardial infarction, vascular disease, and dilated cardiomyopathy⁽³⁶⁾.

Regarding smoking habits, the present study revealed that about two third of both groups was not smoking. The same finding were reported that the high percentage 80% of the study group and 73.3% of the control group were non-smokers⁽²²⁾. A study carried in Mansoura university by Ahmed et al. (2006) pointed that 75% of early activity group and 85% of control group were non-smoking⁽³⁷⁾. On the other hand, a study by more than half of the participants in the control group (58.3 %) and in the intervention group (55.6 %) had a history of smoking and/or have been smoking⁽³⁸⁾.

Moreover, in the present study, it was found that, there was no significant difference in socio-demographic data between study and control groups. This findings was in the same line with Kehler (2012), Azer et al. (2011), Fredericks (2009) and El-shenawie (2008) who indicated that there was no statistical significant difference between study and control groups regarding sociodemographic variables^(22, 29, 39, 40). A study was, carried out in Iran by Babaee et al. (2007) they reported that, there was no significant difference in mean of age, level of education and job status⁽²⁴⁾. Another study was carried out in the United Kingdom by Isher (2010) reported that, the results have shown no significant difference between two groups in terms of age, status of the job and level of education⁽⁴¹⁾.

Most of the participants in the study and the control groups had previous illness; valve inflammation was the most common previous illness among both groups. The same findings were reported that most of patient had previous illness, and streptococcal infections found was 86.7% in the study group and 96.7% in the control group⁽²²⁾.

Regarding duration of disease, the present study revealed that the majority of both groups had duration of disease from 1 to less than 5 years. The same finding was reported in a study carried in Mansoura University (2014) which indicated that that majority of subjects were had 1 to less than 5years disease duration ⁽⁴²⁾.

Regarding type of surgery, the present study showed that the valve replacement surgery was more prevalent in the study and control groups. This may be related to the fact that the majority of valve inflammation was the current diagnosis. This was an agreement with Raboi et al. (2010) who stated that the most common cardiac disease in Yemen is rheumatic heart disease. It is associated with high morbidity and mortality. The most common open-heart surgery is valve replacement in cardiac center in Thawra general hospital ⁽⁴⁾. The same finding reported that valve replacement was 85% most common operation type ⁽³⁷⁾.

On the other hand, Meyer (2009) who found that the Coronary artery bypass surgery 67% was the most common operation type ⁽⁴⁴⁾. Another study was conducted by Thoralf (2014) who reported that, the most common open-heart surgery performed is the coronary artery bypass grafting in the United States ⁽⁴⁵⁾.

In relation to previous admission for surgery, the present study revealed that the majority of the participants in the study group and the control group had no previous surgery. A study by Guo et al. (2012) who explained that the majority of patients had no previous operations and no difference in previous hospitalization, operation history or physical assessment between the two groups ⁽²⁵⁾.

Concerning using analgesics, the present study revealed that majority 74% of both groups use analgesics, while the most common of analgesics used was Paramol (paracetamol), it constituted 70% of the study group and 72% of the control group. These findings congruent with Sattari et al. (2013) who pointed that 42% of the patients reported used analgesic to relieve the pain of their concurrent disease which included 57.8% acetaminophen codeine, 19.1% acetaminophen, 11.9% ibuprofen and 2.4% opium ⁽⁴³⁾.

Above three quarter of participants in the study and the control groups of the present study (82% and 92% respectively) knew their medications and most of them knew it by color (50% and 68%) respectively. No significant differences were detected between both groups. On the other hand, a study by Lenahan et al. (2013) who reported that about 60% of the patients were able to identify their hypertension medications by name. Those patients were less probable to have limited literacy 37.7% than those who identified medications by appearance 67.3% and those who were unable to identify any of their medications 50.0% ($p=0.001$) ⁽⁴⁶⁾. Furthermore, 31.7% of the patients knew of their medications by name and 25.3% knew something about their prescribed course ⁽⁴⁷⁾.

In the present study the medication was the main component of treatment disciplinary prescribed for both groups. While medication and dietary modification were considered the second treatment disciplinary prescribed. This may be related to the fact that the majority of illiterate and “read and write” of educational level. This finding may be attributed to the fact that the patients of the present study were equally had low locus of control and were not aware that therapeutic regimen should follow after cardiac surgery. This result was in agreement with El-shenawie (2008) who referred that patients knowledge about therapeutic regimen was most of the patients in both study and control groups had poor knowledge about modifiable lifestyle changes related to the diet, exercises, smoking, medication and stress modification after surgery. There were no significant differences between study and control groups regarding following therapeutic regimen in all of its items ⁽²⁹⁾.

On the other hand, a study by El-Mawla (2014) showed that medication and dietary modification were the main components of treatment regimens of coronary heart disease. While medication, diet, avoid risk factor were second treatment regimens ⁽⁴²⁾.

After applying planned preoperative teaching, the differences between total score and all items of dietary of the study group and the control group were statistically significant, except in starches and carbohydrate score was not difference significant. This results affirmed that the diet was important in treating and preventing cardiac disease. This was supported by a study carried out in Alexandria University by El-shenawie (2008) who found that after implementation of the nursing intervention during follow up period, a modification in the study group patients lifestyle were improved than the control group patients in relation to medication adherence, diet control, activity tolerance, stress reduction and smoking cessation ⁽²⁹⁾.

Regarding knowledge of the study group and the control group the finding of the present study showed that there was a significant improvement in total scores and all items of knowledge for the study group after applying planned

preoperative teaching in comparison with control group (table 4). On the other hand, there were significant improvements in some items of knowledge for the control group. This may be related to the questionnaire, which was instructed for the patients and to the instructions they received from hospital team.

The present study revealed that the total practice score and all practice (level of performance) items of the study group and the control group differed significantly after applying planned preoperative teaching. This was in accordance with Chevillon (2015) who pointed that the study group had significantly fewer days of mechanical ventilation ($P = 0.04$) and more knowledge about postoperative care ($P < .001$) than the control group⁽⁴⁸⁾. Towell and Nel (2010) reported that the patient's knowledge was improved though the educational programme⁽⁴⁹⁾. Another study carried out in Canada by Fredericks (2009) reported that the knowledge level and performance of self-care behaviors increased after educational intervention⁽⁴⁰⁾. The same finding showed that knowledge and attitude had significant differences between two groups one month after educational intervention, and stated that health education improved the quality of life in terms of knowledge and attitude of the patient after coronary artery bypass graft⁽²⁴⁾.

Another related study revealed that the use of pamphlets appeared to be beneficial in terms of knowledge of condition and surgical procedure, skills or exercise performance and time taken to learn skills or exercises. When pamphlets are given prior to patient admission and when they are specifically designed for the intended surgical procedure, they are more effective. Pre-admission patients teaching is more effective than post-admission teaching in terms of patient's knowledge. In addition, Patients in all groups video were found to have repeated breathing exercises with the spirometer per-session at a higher level significantly than the no video control⁽⁵⁰⁾.

Yeh et al. (2005) reported that there were statistically different between study group and control group on the self-efficacy ($P < 0.001$) functional activities⁽⁵¹⁾. Fedorowicz (2006) who showed that both groups increased their actual and perceived knowledge significantly⁽³⁸⁾. Another study carried out in Mangalore by D'Souza (2013) reported that there were significant difference between the mean pre-test and posttest knowledge score⁽⁵²⁾. Also in this respect, a study which was carried out in Punjab in (2007), showed that study group had strongly significant difference which increased in performance level of total scores as well as each variable of self-care activities⁽²³⁾.

The result is in agreement with Azer et al. (2011) who found that there were significant differences for improvements throughout the phases of educational program among study group regarding total knowledge and practice score about open-heart surgery⁽²²⁾. Pre-habilitation exercise and education intervention were to improve the functional walking ability and healthy physical activity lifestyle choices of patients who were waiting for elective coronary artery bypass surgery⁽³⁹⁾. Furthermore, the objective knowledge was the only positive outcome influenced by patient education⁽⁵³⁾.

Cheung et al. (2007) pointed out that patients in the study group significantly scored higher on the knowledge assessment questionnaire than patients in the control group. Both education and country of origin influenced the scores of patients in the control group, but not in the study group⁽⁵⁵⁾. Preoperative digital video disc enhanced thoracic surgical patients knowledge of engagement in and understanding of their postoperative care activities⁽⁵⁴⁾.

On the other hand, a study by West et al. (2014) who indicated that there was no difference reported in improvement of knowledge scores between the two groups ($P = 0.908$). The results indicated no difference in coronary artery bypass graft patient's knowledge of self-care behaviors⁽⁵⁶⁾.

The degree of postoperative pain, the present study showed that that the study group had a less degree of pain than control group with a significant difference were detected between two groups. This is in harmony with a study of Babae et al.(2007) demonstrated the benefit that pre-operative education in quality of life between two groups, were seen in energy, emotional reaction, pain, sleep, physical mobility, and total average quality of life⁽⁵⁷⁾. Furthermore, who found that the use of guided imagery can significantly less pain in the ambulatory surgery setting⁽²⁴⁾. Sayin and Aksoy (2012) reported that the average level of pain postoperatively in the study group was less than that in the control group. The total score of pain reduction for the study group after surgery was greater than for the control group⁽⁵⁸⁾. Level of pain and adverse reactions were significantly lower in the study group than in the control group⁽⁵⁹⁾. Moreover, Kol (2014) indicate that the rate of pain was higher in the control group than in the study group, and the difference between the two groups was statistically significant ($p < 0.05$)⁽⁶⁰⁾.

These findings contrast with Guo et al. (2012) that there was no difference between groups in the average level of pain, current pain, and interference in general activity, mood and walking ability. Patients in the preoperative education group reported less pain interference in sleeping⁽²⁵⁾.

Regarding postoperative complication and length of hospital stay, the present study indicated that there was a significant difference detected between both groups regarding postoperative complication except mediastinitis and plural effusion. The average length of ICU stay, preoperative days, postoperative days and time of extubation were less in study group than control group and differed significantly between both groups. Nevertheless, length of hospital stay was nearly matched for the study group and the control group showing no statistically significant differences between the two groups. This is due to the closed of cardiac surgical ward for maintenance reasons when the study group was taken. This is in agreement with Valkenet et al. (2011) reported that an exercise therapy preoperatively could be effective for decreasing rates of post-operative complication and length of hospital stay after cardiac or abdominal surgery ⁽⁶¹⁾.

A study carried in Yemen by Al-Qubati (2013) revealed that the cumulative incidence of pulmonary complication after open heart surgery was 15.08%, with an overall mortality 18.5% (5 of 27) and mortality among all patients was 2.79% (5 of 179). Mediastinitis occurred in 1.6% with mortality 33.3%, pneumonia occurred in 2.79% atelectasis occurred in 1.11%, pleural effusion occurred in 2.22% and pneumothorax occurred in 0.55% ⁽¹²⁾.

This finding, was also supported by Hulzebos et al. (2012) who indicated that a preoperative physical therapy (mixed intervention including either breathing exercises or aerobic exercises and inspiratory muscle training) decreased postoperative pulmonary complications (pneumonia and atelectasis) and length of hospital stay in patients underwent elective cardiac surgery ⁽⁶²⁾. The same finding was shown in a study carried out in Bangkok in 2010 that study reported that the incidence of total pulmonary complications in both groups was 5.58% and the most frequent pulmonary complication was pneumonia. The most frequent pulmonary complication in group one was pleural effusion while the most complication in group two was pneumonia ⁽⁶³⁾.

In addition, a study conducted in china by Guo et al. (2012) reported that there was a reduction of the number of hours spent in the intensive care unit (ICU) for preoperative education patients ($P=0.05$) but no significant difference in length of postoperative hospital stay ⁽²⁵⁾. Furthermore, a study showed that the extubation time for the study group was significantly lower, which indicated that this particular physiological measure may have been affected by education ⁽³⁰⁾. Significant differences existed in improvements throughout educational program among study group regarding hospital stay, intensive care unit stay and incidence of wound healing delayed among study group ⁽²²⁾.

Same finding was reported by Hulzebos et al. (2006) that the postoperative pulmonary complications duration of postoperative hospitalization and mechanical ventilation statistically significant differed ⁽⁶⁴⁾. Snowden et al. (2014) found that preoperative intervention significantly reduced the extubation time and the relative risk of developing postoperative pulmonary complications ⁽⁶⁵⁾.

Moreover, The use of guided imagery can significantly reduce preoperative anxiety in the ambulatory surgery setting, which can result in less postoperative pain and earlier discharge times from postoperative anaesthesia care unit ⁽⁵⁷⁾.

These findings were not congruent with Hulzebos et al. (2006) who found that preoperative physical therapy (including inspiratory muscle training, training and education of breathing and coughing techniques) does not statistically significant decrease the PPC incidence (atelectasis and pneumonia) in four studies of adult patients undergoing cardiac surgery ⁽²⁷⁾. In the same line Sawatzky et al. (2014) illustrated that ICU length of stay, operative complications, and length of hospital stay did not differ between both groups ⁽⁶⁶⁾.

Regarding knowledge grade, the current study reveal that, the pre-test result showed the most of the participants possessed inadequate knowledge 52% of the study group and 92% of the control group. Whereas, in the post-test results 82% and 4% of the participants had adequate knowledge of the study group and the control groups respectively.

In the same line to this finding Goossens et al. (2014) who stated that, patients who previously received education displayed 24% adequate knowledge, 32% moderate and 44% poor knowledge. Patients who did not receive prior education (comparison group) displayed 15% adequate knowledge, 20% moderate knowledge and 65% poor knowledge ⁽⁶⁷⁾.

V. CONCLUSION

The study concluded that cardiac surgical patients who received the planned preoperative teaching regarding self-care activities gained significantly improved knowledge and level of performance of postoperative self-care activities not only in the total score, but also in each component of self-care activities, early extubation, coping with pain, less amount of

analgesic required, short postoperative period, short length of ICU stay and less complication than those non receiving planned preoperative teaching.

VI. RECOMMENDATIONS

Based on the findings of this study, the following recommendations are suggested;

- Regular training on pre-operative teaching for cardiac surgery patients should be provided using T.V, video, tapes and brochures to enhance adherence to health behavior.
- Members of the multidisciplinary team should partake in training sessions to ensure effective patient care.
- Establishing an educational section in the cardiac center is essential to provide cardiac patients and family members with required information.
- In service training to all nurses in cardiac center and outpatient's clinics is needed to update their knowledge and increase their ability to care patient with cardiac disease.
- Family members and other significant persons should actively participate in planning care of cardiac surgical patients, so they can support and encourage them manage their condition.

For further research

- Further studies with a larger number of patients are needed to confirm these findings.
- Hospitals of public and/ or private sectors could be involved in a study about the preoperative teaching for patients who undergo cardiac surgery.
- Further studies to explore benefits and barriers to performance self-controlled preoperative teaching, could be carried out.
- More studies are needed to evaluate effectiveness of long-term follow up of preoperative teaching on health outcome.

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