Evidence of pre and post-operative care for open heart surgery patient's on physiological and psychological Outcomes

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Abstract: **Physical and psychological stress are common after Open Heart Surgery .Critical care nurse has a vital role in pre and postoperative education and interventions which improve physiological and psychological outcomes. Aim : This study was carried out to investigate Effect evidence of pre and post-operative care for open heart surgery patients on physiological and psychological Outcomes . Design: A quasi-experimental research design. Setting: The study was carried out in Cardiothoracic Department and open heart Intensive Care Unit at Sohag University Hospital. Subjects: A purposive sample of 60 adult patients undergoing open heart surgery they were reviewed for potential enrollment in the study.(30 study group) received routine hospital care in addition to evidence of pre and post-operative care for open heart surgery patient's while the (30 control group) received routine hospital care only. Tools: three tools were utilized to collect data Tool I:-Patient assessment sheet. Tool II: physiological Assessment sheet. Tool III: psychological assessment sheet: Hospital Anxiety and Depression Scale. Methods: the researcher applying the evidence of pre and post-operative care for study group a day before operation to assess and equip the patient with theoretical and practical sessions according to patient need and implement practical sessions from 1st day in Intensive Care Unit until discharge , assessment of both group was done using previous tools .Results: a significant statistical differences were existed in study group compared to control group P<0.001 in relation to physiological and psychological outcomes . Conclusion and Recommendation: Applying the evidence of pre and post-operative care are effective in improving physiological and psychological Outcomes for open heart surgery patients, So The study recommended to incorporate Pre and post-operative care into routine nursing care practice to prepare patients for open heart surgery.**

Keywords: **Evidence of pre & post-operative care, open heart surgery, physiological & psychological outcomes.**

1. INTRODUCTION

Open Heart Surgery (OHS) become the *standard of care* for patients with multi vessel coronary artery disease. The most common kind of heart surgery is coronary artery bypass graft surgery (CABG) it is an effective modality for the management of a subset of CAD patient (**Manzurul, et al 2016).**

Open heart surgery is a major operation that requires close monitoring and immediate post-operative support. Patients awaiting cardiac surgery usually experience worries due to lack of knowledge over outcomes such as being away from family, becoming permanently disabled, loss of working ability, loss of sexual ability, inability to wake up from anesthesia, pain and fear of death which adversely affect their existing disease and surgery and result in prolonged recovery. (**Ertürk & Ünlü ,2018**) Effective preoperative teaching reduces anxiety and physiological responses to stress before and after surgery (**Malley, et al,2015**).

The preoperative period runs from the time the patient is admitted to the hospital to the time that the surgery begins. Preoperative Care given before surgery is made for the operation, according to the individual needs of the patient**.** Individualized education is important for preparing patients for the operation both physically and psychologically. **(Ertürk& Ünlü .2018).**

The time between contemplation of surgery and the procedure offers a window of opportunity to optimize patients' nutritional, functional and psychological state prior to surgery. Traditionally, preoperative care have focused on the underlying disease process and 'fitness for surgery' with physical pre-assessment and risk counselling late in the care when little time is available to intervene. With an increasingly elderly and co-morbid surgical population, early physiological assessment and multidisciplinary collaborative decision-making is increasingly important . Patient education improve surgical outcome, facilitating rapid recovery from surgery and limiting post-operative functional dependence. Patient education and engagement is important if compliance with behavioural change is to be achieved and maintained. To date, there has been evidence supporting preoperative exercise training, smoking cessation, reduction in alcohol intake, anaemia management and psychosocial support.(**Denny (2016**)

Evidence-based practice (EBP) is defined by the Institute of Medicine(IOM) is the integration of best research with clinical expertise and patient values for optimum care. EBP is considered a standard for safe and improve quality of patient care and helps control healthcare cost . Healthcare leaders recognize EBP as an integral part of achieving quality outcomes and attaining high reliability . **(Sandra,2015)**

Critical care nurse applying evidence of pre and postoperative nursing care of patient after open heart surgery   aimed to improvement of gas exchange and breathing, improvement airway clearance, Relief of pain and discomfort, increased arm and shoulder mobility, maintenance of adequate fluid volume and nutritional status, understanding of self-care procedures and absence of complications , assess the respiratory status by auscultation of both lungs every 2 hours to assess breath sounds. Assess color (e.g. discoloration of the fingernails or around the lips) to detect signs of hypoxia, observe signs and symptoms of cough, sputum expectorated (amount and color), hemoptysis, chest pain, dyspnea) , Nutritional assessment determination of blood urea nitrogen and serum creatinine, glucose tolerance or blood glucose, Assessment of serum electrolytes and protein levels, blood volume determinations, and complete blood cell count **,** decrease and prevention of complications **(Flynn, etal,2019 , Smeltzer& Bare 2015 , Morton G.P., et al ,2018))**

2. SUBJECTS AND METHODS

Aim of this study :- The aim of the study is to evaluate the evidence of pre and post-operative care for open heart surgery patient's on their physiological and psychological Outcomes Through the following:

1- Assess open heart surgery patient's physiological &psychological needs.

2- Implement prepared Evidence on open heart surgery patient's .

3- Evaluate the effect of implementing Evidence of pre & post-operative on patient's physiological &psychological outcomes.

Hypotheses: To fulfill the aim of the study the following research hypothesis were formulated:-

1-Patient who received evidence of pre& post-operative care excepted to have better physiological such as (arterial blood gases values, oxygen saturation, homodynamic parameters and pain compared to control group.

2-Patient who received evidence of pre& post-operative care excepted to have better psychological such as (decrease level of depression& anxiety compared to control group.

3-2-Patient who received evidence of pre& post-operative care excepted to shorter duration of period of mechanical ventilation   length of ICU stay

Research Design: A quasi-experimental research design was utilized in this study.

Setting: This study was conducted in Cardiothoracic Department & open heart intensive care unit at Sohag university hospital

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Subjects: A purpose sample of 60 adult patients undergoing open heart surgery they reviewed for potential enrollment in the study who randomly assigned into two equal groups.(30 study group) received routine hospital care in addition to evidence of pre &postoperative care for open heart surgery patient while the (30 control group) received routine hospital care only.

Inclusion criteria:

- All adult (18-60 yrs.) patients admitted in cardiothoracic for open heart surgery

- Hemodynamically stable

- The patient stays in ICU for at least 72 hours.

Exclusion criteria:-

The study was excluding those whom have a history of mental disorders.

Sample size: The sample size was calculated according to Epi Info 2000. A sample size was selected using a special formula based on prevalence of disease at a confidence interval of 95% and precision of (2%). The sample increased by 10% to overcome problems related to non-responses and missing date. The power of study was 80%.

Tools for Data Collection:

Three tools were used to collect the data according to the following:

Tool I: Patient assessment sheet :- An assessment sheet was developed by the investigator and used for collecting data for this study, these tools were tested by the researcher, and content of the tools were established by extensive literature review and pilot study. **(Smeltzer& Bare 2015 , Morton G.P., et al ,2018) .**It include the following main items:-

A-Patient socio- demographic data sheet which include: - Age, Sex, Marital status and level of education.

B- Medical &Clinical data: History of current disease, past medical diseases, date of admission, medical diagnosis, number of hours or days on mechanical ventilator, length of stay in ICU.

Tool II: Physiological Assessment sheet :-

This tool was developed by the investigator based on reviewing of the relevant literature **(Smeltzer& Bare 2015 , Morton G.P., et al ,2018) .**Which include :-

a) Hemodynamic assessment parameters as: Temperature, respiratory rate, cardiac parameter (heart rate, blood pressure & mean arterial pressure, CVP, spo_2)

b) Laboratory investigation:- Arterial blood gases ,Complete blood picture.

c) Respiratory assessment:- Respiratory assessment during post-operative period as pain with breathing, wheezing, dyspnea, coughing , sputum &hemoptysis.

d) Post-operative complications assessment : Complications occur postoperative period as wound infection, atelectasis, pneumonia, hemorrhage, dysrhythmia & gastrointestinal complications.

e) Assessment of pain level:- The NRS is most often presented as a horizontal 0 - to - 10 - point Scale, with word anchors of no pain "at one end of the scale, moderate pain" in the middle of the scale, and worst possible pain "at the end of the scale. **(Ismail, et al., 2015).**

Tool III: psychological assessment sheet :-

This tool of Hospital Anxiety and Depression Scale (HADS) was originally developed by**(Zigmond and Snaith (1983)** and used by investigator to determine the levels of anxiety and depression that patient is experiencing. The HADS is a fourteen item scale that generates ordinal data. Seven of the items relate to anxiety and seven relate to depression. HADS score For both scales, scores of less than 7 indicate non-cases 8–10 Mild 11–14 Moderate 15–21 Severe .

2- Operational design:-The operational design includes preparatory phase, content validity of the modified tool and reliability, pilot study and fieldwork.

A. Preparatory phase: It includes reviewing of related literature, and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

B. Validity: Content validity was conducted to determine whether or not the instrument measures what it is designed to measure. The tools were revised by a jury of 5 experts from faculty of nursing &medicine of Sohag & Halwan University, who reviewed the content of the tools for comprehensiveness, accuracy, clarity, relevance and applicability. Minor modifications were done.

C. Reliability:

Reliability of the tool was tested to determine the consistency of the measurement instrument. The degree to which an instrument measures the same way each time if used under the same condition with the same subjects. The Cronbach's alpha model, which is a model of internal consistency, was used to test tool reliability. Reliability factor of the second tool was 0.843 and third tool was 0.793 Statistical equation of Cronbach's alpha reliability coefficient normally ranges between 0 and 1; higher values more than 0.7 denote acceptable reliability.

D. Pilot study:

A Pilot study was carried out with 10% (6 patients) of the sample under study to test the applicability, clarity and efficiency of the tools, then the tools modified according to the results of the pilot study, patients who shared in pilot study were not included in the sample and replaced by other patients.

E. Field Work:

• An approval was obtained from a scientific ethical committee of the faculty of nursing at Helwan University.

• An official permission was obtained from the director of the Sohag University Hospital in which the study was conducted by condition the researcher devotes himself to collecting cases from May 2018 to march 2019 because of the rate of attrition.

• The purpose of the study was simply explained to the patients or to their families who agree to participate in the study prior to any data collection.

• An oral informed consent was obtained from each participant and from his family prior to data collection after explaining the aim of the study.

• Sampling was started and completed within nine months

• To assure equity of groups at the beginning of the study, an attempt was made to match subjects based on inclusion and exclusion and after that assign them to either a study group or a control group randomly .This process meant that if a patient was eligible for participation, but could not be matched on these factors, they were not included in the study. Once it was determined that a multiple of two (i.e., two, four, six) similar patients qualified for inclusion criteria, each patient was assigned a number.

• These numbers were put in a hat, and a number was drawn randomly from the hat. The first number drawn was assigned to the study group, the second number drawn was assigned to the control group, the third number drawn to the study group, the forth to the control group until all similar patients were assigned to either study or control group.

• The initial determination that the first draw would be assigned to the study group was decided by a flip of a coin with heads being the study and tails being the control condition. Thus, the assignment to the study or control condition was established prior to approaching the family for informed consent.

• Patients' medical records were used to obtain the past and present medical history.

• Initial assessment was done by the investigator for all study subjects including control and study group to explain the aim of the study and take their approval to participate in the study prior to any data collection.

• They were reassured that the information collected will be treated confidentially, and that it will be used only for the purpose of research.

- Both of two groups were received the routine hospital management and been assessed utilizing the three study tools as a baseline assessment

- both groups was monitored 2 times/day. The control group subjects were evaluated in the same way as the study group subjects

Assessment Phase for the control group:

- During this phase the researcher assess patient's profile data, respiratory system, hemodynamic parameters, mechanical ventilated parameters, psychological condition

- The researcher introduced herself for the patients, patient's family and explained the purpose of the study

*Field work (for study group) includes Pre &postoperative Sessions:- the preoperative sessions divided into two theoretical sessions & two practical sessions then the practical sessions implemented post operative by the researcher based on patient assessment needs .

Theoretical sessions (First &Second sessions)

During these sessions the investigator empower patients with knowledge's regarding anatomy of the heart and its function , heart disease ,open heart surgery ,the importance of surgery (indications) &Complications that occur after open heart surgery.

The teaching method was through explanation &pictures. Each patient was teaches individually for 1 hours in each theoretical sessions.

Practical sessions (Third &Fourth sessions)

During these sessions the investigator empower patients with knowledge and practice regarding post-operative nursing care **based on evidence based as following:**

visiting ICU unit , know the nursing staff , show the devices as monitor , mechanical ventilation , time of Extubation and length of stay, measuring vital signs, teach patient to perform Merits of exercise therapy before and after surgery, Postoperative exercise as breathing & coughing exercises , incentive spirometer , care of drains , nutrion , rang of motion , medication , Glycemic Control ,how to support the wound , early movement , how to assess and control pain , chest tube care and when it removed , listening to music have a beneficial effect on systolic blood pressure, heart rate, respiratory rate, quality of sleep and pain , individualized education and massage therapy to reduce anxiety and pain and tension after cardiac surgery , specific discharge instructions as wound care after discharge ,The teaching method was through explanation &pictures. Each patient was teaches individually for 4 hours in each practical sessions.

3- Administrative design:

 An official permission was obtained from the director of Sohag University Hospital and head of cardio thoracic ICU unit, in which the study was conducted. A letter was issued to them from the faculty of nursing; Helwan University explains the aim of the study for obtaining the permission for data collection.

4- Statistical Analysis:

- Data were collected and coded to facilitate data manipulation and double entered into Microsoft Access and data analysis was performed using Statistical Package of Social Science (SPSS) software version 18 in windows 7.

- Simple descriptive analysis in the form of numbers and percentages for qualitative data, and arithmetic means as central tendency measurement, standard deviations as measure of dispersion for quantitative parametric data.

- Quantitative data included in the study was first tested for normality by One-Sample Kolmogorov-Smirnov test in each study group then inferential statistic tests were selected.

- **For quantitative parametric data:**

  ▪ In-depended student t-Test used to compare measures of two independent groups of quantitative data

  ▪ Paired t-test in comparing two dependent quantitative data.

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- **For qualitative data**

- Chi square test to compare two or more than two qualitative groups.

- The P-value ≤ 0.05 was considered the cut-off value for significance.

Ethical consideration:

An approval was obtained from a scientific research ethics committee of the faculty of nursing at Helwan University and oral informed consent was obtained from the study subjects individually before starting the study. The aim and objectives of the study was clarified to the patients included in the study by the investigator. Participants were assured that anonymity and confidentiality would guarantee. Patients were informed that they are allowed to choose to participate or withdraw from the study at any time. Ethics, culture, values were respected.

3. RESULT

Table (1): Socio demographic characteristic for both study and control groups (n=60).

Socio demographic characteristic	Study (n= 30)		Control (n= 30)		P-value
	No.	%	No.	%	
Age (years)					0.766
Mean ± SD	36.67 ± 13.64		35.57 ± 14.85		
Sex:					1.000
Male	18	60.0	18	60.0	
Female	12	40.0	12	40.0	
Marital status:					0.542
Single	6	20.0	8	26.7	
Married	24	80.0	22	73.3	
Education:					0.689
Illiterate	18	60.0	15	50.0	
Basic education	4	13.3	4	13.3	
Secondary	8	26.7	11	36.7	

Chi-square test & Independent samples t-test   *P<0.05 significant

Table (1): Shows that, there was no statistically significant difference between the study and control groups regarding to **Socio-demographic** characteristics as age, sex, marital status and educational level(0.766 ,1.000, 0.542, 0.689) receptively .

Table (2): Medical and clinical assessment data for study & control groups (no= 60)

Chronic disease	Study (n= 30)		Control (n= 30)		P-value
	No.	%	No.	%	
Past history:					0.681
Ischemic heart disease	4	13.3	2	6.7	
Rheumatic heart disease	20	66.7	21	70.0	
No past history of disease	6	20.0	7	23.3	
Type of surgery:					0.920
Aortic valve replacement	2	6.7	3	10.0	
Coronary artery bypass	6	20.0	7	23.3	
Mitral valve replacement	22	73.3	20	66.7	

Chi-square test & Independent samples t-test   *P<0.05 significant

Table (2): Shows that, there was no statistically significant difference between the study and control groups regarding to past history and type of surgery at (0.681 , 0.920) receptively .

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Table (3) Comparison between study &control group regarding Vital signs and hemodynamic parameters during pre-operative period (n=60).

Hemodynamic parameters	study group (n= 30)	control group (n= 30)	P value
Temperature	37.1 ± 0.2	37.5± .7	0.118
Heart rate (beat/min)	83.43±11.55	85.53±15.38	0.552
Systolic BP (mm .Hg)	112.33±1.51	113.67±13.51	0.751
Diastolic BP (mm. Hg)	70.67±8.68	70.33±10.33	0.893

Chi-square test & Independent samples t-test   P >0.05 non-significant *P<0.05 significant   **P<0.01 moderate significant   ***P<0.001 highly significant

Table (3): Shows that, there was no statistical significant difference between study and control groups regarding to all hemodynamic on preoperative day at (0.118 ,0.552 , 0.751 , 0.893) receptively.

Table (4) Comparison between study &control groups regarding Vital signs and hemodynamic parameters of three days post-operative (no= 60)

Hemodynamic parameters		study group (n= 30)	control group (n= 30)	P value
Temperature	1st day 2nd day 3rd day	36.3± 0.9 37.5± .7 37.3 ± .5	36.5± .9 38.5± .8 39.8± 1.3	0.253 **0.05*** **034***
Heart rate (beat/min)	1st day 2nd day 3rd day	103.3± 23.7 96.71±11.39 93.16±12.79	105.8± 12.84 110.64±11.14 91.07±7.0	0.313 **0.001**** **0.01***
Systolic BP (mm .Hg)	1st day 2nd day 3rd day	120.30±12.76 100.44±10.22 123.87±15.8	122.47±20.55 127.15±9.87 127.75±12.97	0.14 **0.05*** 0.037
Diastolic BP (mm. Hg)	1st day 2nd day 3rd day	68.54±7.24 65.96±17.15 77.45±5.64	66.03±7.19 71.86±23.40 76.04±11.05	0.951 **0.01*** 0.84
C.V.P	1st day 2nd day 3rd day	3.56±2.45 7.06±1.9 10.45±1.8	4.21±3.19 7.94±2.9 7.10±2.5	0.52 0.029 **0.01***
SPO$_2$	1st day 2nd day 3rd day	97.58±1.7 97.65±2.09 98.79±2.10	98.35±1.19 96.47±1.8 95.31±3.6	0.065 **0.001*** **0.003****

Chi-square test & Independent samples t-test   *P<0.05 significant

Table (4): Shows that, there was highly statistically significant difference between the study and control groups regarding to temperature, heart rate and SpO$_2$ in second day and third day at (0.05, 0.001 , 0.001)(.034 , 0.01 , 0.003) receptively . Moreover, there was statistically significant difference between the study and control groups regarding to blood pressure in second day at(0.05, 0.01) , While, there was no statistically significant difference in first and second day at(0.14, 0.037) (0.951, 0.84) .More ever , there was statistically significant difference between the study and control group regarding to central venous pressure in the third day (0.01) . While, there was no statistically significant difference in first and second day at(0.52, 0.029) receptively.

Table (5): Comparison between study &control groups regarding Arterial blood gases in first, second & third day post- operative (no= 60)

ABG	DAYS	Study (n= 30) Mean ± SD	Control (n= 30) Mean ± SD	P-value
PH	1st day 2nd day 3rd day	7.35 ± 0.10 7.37 ± 0.08 7.39 ± 0.07	7.34 ± 0.09 7.42 ± 0.06 7.45 ± 0.06	0.593 **0.02*** **0.018***
$PaCO_2$	1st day 2nd day 3rd day	35.85 ± 9.47 36.12 ± 6.29 37.31 ± 4.08	36.72 ± 10.86 42.93 ± 4.23 41.74 ± 4.98	0.740 **0.001**** **0.023***
PaO_2	1st day 2nd day 3rd day	140.87 ± 37.20 161.87 ± 30.19 166.99 ± 15.41	133.20 ± 38.80 126.97 ± 32.98 135.58 ± 17.99	0.566 **0.001**** **0.041***
HCO_3	1st day 2nd day 3rd day	20.27 ± 4.98 20.00 ± 2.97 23.20 ± 5.03	19.50 ± 4.75 19.57 ± 3.01 22.33 ± 4.20	0.544 0.577 0.472
SaO_2	1st day 2nd day 3^{-rd} day	96.93 ± 2.36 97.80 ± 0.92 97.87 ± 0.97	96.87 ± 2.50 95.77 ± 0.94 94.87 ± 0.94	0.916 **0.011*** **0.001****
BE	1st day 2nd day 3rd day	-5.01 ± 5.36 -3.71 ± 4.79 -2.25 ± 4.37	-5.81 ± 4.53 -4.63 ± 4.30 3.09 ± 3.63	0.531 0.437 0.424

Chi-square test & Independent samples t-test   *P<0.05 significant

Table (5): Shows that, there was no statistically significant difference between the study and control groups regarding to arterial blood gases in first day at (0.593 , 0.740 , 0.566 , 0.544 , 0.916 , 0.531).As well as the table shows that, there was statistically significant difference between the study and control groups regarding to PH, PaCO2, PaO2 and SaO_2 in second and third day (0.02 , 0.001 , 0.001 , 0.011) (0.018 , 0.023 , 0.041 , 0.001) , While, there was no statistically significant difference regarding to HCO3and BE at (0.577 , 0.437) (0.472 ,0.424) receptively.

Table (6): Comparison between study &control groups regarding Assessment of pain level during post- operative period (n=60).

Assessment of pain level	Study (n= 30)		Control (n= 30)		P-value
	No.	%	No.	%	
First day:					0.064
Moderate	18	60.0	20	66.7	
Severe	12	40.0	10	33.3	
Second day:					**0.033***
Moderate	23	76.6	17	56.7	
Severe	7	23.4	13	43.3	
Third day:					**0. 001****
Mild	18	60.0	8	26.6	
Moderate	7	23.4	10	33.0	
Sever	5	1.6	12	40.0	

Chi-square test & Independent samples t-test   *P<0.05 significant

Table (6): Shows that, there was no statistically significant difference between the study and control groups regarding to pain level in the first day at(0.064). while, there was statistically significant difference between the study and control groups regarding to pain level in second and third day at (0.033, 0. 001) respectively .

Table (7): Comparison between study &control groups regarding psychological outcomes (Hospital Anxiety and Depression Scale (HADS) in the third day following operation (n=60).

	Study (n= 30)		Control (n= 30)		P-value
	No.	%	No.	%	
Anxiety:					
Normal	14	46.7	5	16.7	**0.034***
Borderline	7	23.3	8	26.7	
Abnormal	9	30.0	17	56.7	
Depression:					
Normal	15	50.0	6	20.0	**0.015***
Borderline	9	30.0	8	26.7	
Abnormal	6	20.0	16	53.3	

Chi-square test & Independent samples t-test   *P<0.05 significant

Table (7): Shows that, there was statistically significant difference between the study and control groups regarding to Hospital Anxiety and Depression Scale (HADS) in the third day at (0.034, 0.015) respectively .

Table (8): Relation between Socio demographic characteristics of study group related to anxiety level (n=30).

Socio demographic characteristic	Normal (N=14)		Borderline (N=7)		Abnormal (N=9)		Chi-square P-value
	No.	%	No.	%	No.	%	
Age (years)							6.512 **.02***
Mean ± SD	34.01 ± 9.62		39.26 ± 12.77		37.02 ± 11.16		
Sex:							9.164 **.007****
Male	10	71.4	5	71.4	3	33.3	
Female	4	28.6	2	28.6	6	66.7	
Marital status:							5.006 **.01***
Single	4	28.6	1	14.3	1	11.1	
Married	10	71.4	6	85.7	8	88.9	
Education:							8.677 **.009****
Illiterate	5	35.7	5	71.4	8	88.9	
Basic education	2	14.3	1	14.3	1	11.1	
Secondary	7	50	1	14.3	0	0	

Chi-square test *P<0.05 significant   **P<0.01 highly significant

Table (8): Shows that, there were statistically significant relation between socio demographic characteristics of study group related to anxiety level regarding age, sex , marital status & education at (.02 , .007 , .01 , .009) respectively.

Table (9): Relation between characteristics of study group related to depression level (n=30).

Socio demographic characteristic	Normal (N=15)		Borderline (N=9)		Abnormal (N=6)		Chi-square P-value
	No.	%	No.	%	No.	%	
Age (years)							4.688 .032*
Mean ± SD	36.11 ± 12.26		35.92 ±12.85		38.11±10.55		
Sex:							2.187 **.001****
Male	9	60	6	66.7	3	50	
Female	6	40	3	33.3	3	50	
Marital status:							7.113 **.009****
Single	1	6.7	1	11.1	4	66.7	
Married	14	93.3	8	88.9	2	33.3	

Education:							
Illiterate	6	40	7	77.8	5	83.3	8.555
Basic education	2	13.3	1	11.1	1	16.7	**.006****
Secondary	7	46.7	1	11.1	0	0	

Chi-square test *P<0.05 significant   **P<0.01 highly significant

Table (9): Shows that, there were statistically significant relation between socio demographic characteristics of study group related to depression level regarding age, sex , marital status & education at (.032 , .009 , .001 , .006) respectively.

Table (10): Comparison between study &control groups regarding respiratory system assessment during first ,second &third day (n=60).

Assessment of respiratory system	DAYS	Study (n= 30)		Control (n= 30)		P-value
		No.	%	No.	%	
Pain with breathing	1st day	30	100.0	30	100.0	1.000
	2nd day	25	90.3	28	93.3	1.000
	3rd day	12	40.0	18	60.0	**0.01***
Wheezing	1st day	8	26.7	8	26.7	1.000
	2nd day	4	13.3	4	13.3	1.000
	3rd day	__	_	__	_	__
Dyspnea	1st day	12	40.0	14	46.7	0.602
	2nd day	4	13.3	12	40.0	**0.001****
	3rd day	4	13.3	10	30.0	**0.001****
Coughing	1st day	4	13.3	4	13.3	1.000
	2nd day	12	40.0	18	60.0	**0.01***
	3rd day	4	13.3	12	40.0	**0.001****
Sputum	1st day	2	6.7	2	6.7	1.000
	2nd day	8	26.7	1	3.3	0.426
	3rd day	2	6.7	13	43.3	**0.001****
Hemoptysis	1st day	4	13.3	5	16.7	1.00
	2nd day	2	6.7	4	13.3	0.426
	3rd day	0	0	3	10.0	1.000

Chi-square test & Independent samples t-test   P >0.05 non-significant *P<0.05 significant   **P<0.01 moderate significant   ***P<0.001 highly significant

Table (10): Shows that, there were no statistically significant difference between the study and control group regarding to pain with breathing, wheezing, dyspnea, sputum, hemoptysis and crackle in first, second &third day at (1.000, 573 , 0.602 , 1.000, 1.00) (1.000 , 1.000, 1.000 , 0.488 , 0.602,0.426) (0.602 ,0.448,0.781,1.000) respectively.

Table (11): Comparison between study group &control group regarding (**ICU Stay**, **Duration of MV**) (n=60).

ICU stay (days)	Study Group n= 30)		Control Group (n= 30)		P- value
Mean ± SD	4.07 ± 1.01		5.30 ± 1.29		**0.000****
Range	3.0 – 5.0		4.0 – 8.0		
Duration of MV:					
3 hrs.	24	80.0	11	36.7	**0.001****
6 hrs.	6	20.0	19	63.3	

Chi-square test & Independent samples t-test   *P<0.05 significant

Table (11): Shows that, there was statistically significant difference between the study and control groups regarding to ICU (days) and Duration of MV(hours) Stay at (0.000,0.001) respectively .
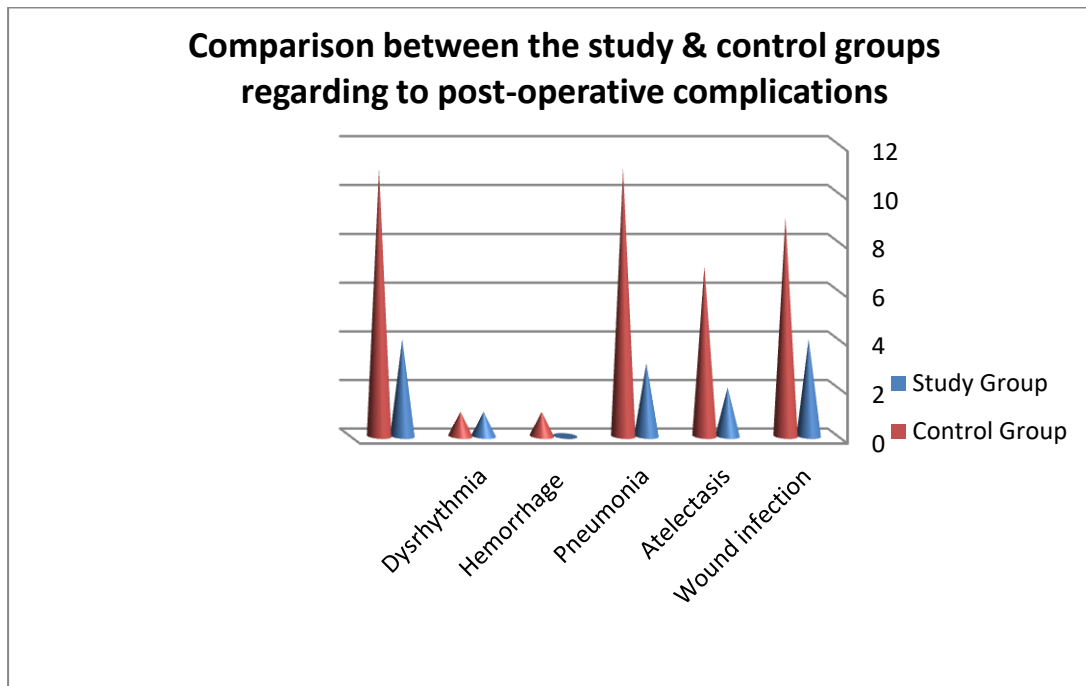
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Figure (1):- Comparison between the study & control groups regarding to post-operative complications

Figure (1) :Shows that, there were statistically significant difference between the study and control groups regarding to wound infection, atelectasis pneumonia and Gastrointestinal complication at(0.035, 0.022, 0.006, 0.024). while, there were no statistically significant difference between the study and control groups regarding to hemorrhage &dysrhythmia at (0.635 , 0.765) respectively

4. DISCUSSION

In spite of advances in surgical techniques and improvements in preoperative and postoperative cares, the heart surgeries are responsible for high rates of morbidity and mortality. Patients undergoing CABG surgery often develop pulmonary dysfunction, such as atelectasis, restrictive ventilator disorder and hypoxemia. **(Yazdannik, etal. 2016).** Coronary artery disease (CAD) is one of the leading causes of morbidity and mortality in both the developing and the developed countries, Patients unresponsive to medical treatment are often required to consider cardiac surgery. (**Kandaswamy, & Zuo.2018**) . Patients awaiting cardiac surgery typically experience significant physical and psychological stress, including high levels of anxiety and depression due to fears, worries, and uncertainties about surgery. These can exacerbate symptoms of the existing disease, adversely affect physiological parameters before and during anesthesia, and also can result in prolonged recovery.(**Yüksel ,et al 2016).**

Regarding socio demographic characteristic The present study showed that the mean age of studied patients in study and control groups were at (36.67 ± 13.64 - 35.57 ± 14.85). The majorities of them were male, married and completed secondary education. The result of the study indicated that there was no significant difference between study and control group regarding socio demographic characteristic which indicated randomly selection of the study group.

These findings were supported **by Patra , et al. (2017)** who conducted "Assessment of Coronary Artery Bypass Grafts Status in Symptomatic Patients: An Observational Study" in India confirmed that, Almost half of the studied patients belonged to age group of 65 years or less with a male predominant population. Also **Ahmed, Mohammed and Ghanem (2015)** who conducted "Coronary artery bypass grafting, Effect of developing and implementing nursing care standards on patient's outcomes" in Egypt reported that:- In relation to educational level, more than half of the patients were illiterate.

The present study illustrated that, both study and control groups have past history of rheumatic heart disease & have mitral valve replacement surgery. These findings agreed with **Ahmed, et al. (2015)** who conducted "Comparison the

effect of conservative therapy and blow bottle among open heart surgery patients for the prevention of postoperative pulmonary complications" in Egypt, As regards medical history the majority of patients were having rheumatic fever. That indicated, the main cause of open heart surgery was rheumatic fever .Also This was an agreement with **Raboi et al. (2010)** who conducted" Mechanical valve dysfunction in yemen". stated that the most common cardiac disease in Yemen is rheumatic heart disease & associated with high morbidity and mortality.

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 **Saad, Salam& Hassanein (2015)** who conducted " Effectiveness of Planned Preoperative Teaching on Self-Care Activities for Patients Undergoing Cardiac Surgery" reported that The most common open-heart surgery is valve replacement in cardiac center & the valve replacement surgery was more prevalent in the study and control groups.

The present study showed , there were no significant statistical difference found between the study and control groups on preoperative day regarding Temperature , heart rate (HR), systolic and diastolic blood pressure (BP), which indicated stable condition of all patients as a result of providing routine nursing care . On the same line **Stephanie, et al. (2012)** who conducted "efficacy of breathing and coughing exercises in the prevention of pulmonary complications after coronary artery surgery" reported that no significant differences between 3 groups using (routine chest physiotherapy and prophylactic chest physiotherapy) as regard temperature at any stage of treatment during fourth postoperative day.

As well as results of **Heidari ,et al. (2015)** who conducted "The Effect of Music on Anxiety and Cardiovascular Indices in Patients Undergoing Coronary Artery Bypass Graft: A Randomized Controlled Trial" show that similarity of present study as it illustrated that relaxation has significant effects on patients' vital sign after extubation, their vital sign was not significantly different because of relaxation but with more training, it became significant after 48 and 72 hours from extubation. Assessment of vital signs before surgery for both study & control groups, there is no statistically significant difference between study and control groups but after practice pre & post-operative teaching most of vital signs were statistically decreased but within normal rage among study group.

According to arterial blood gases values in post-operative period there was significant improvement in PH, PaO_2, $PaCO_2$ and SaO_2 in study group than control group. Which indicated the effectiveness of the provided nursing interventions .This finding is supported by **Shagufa et al(2018).** who conducted " Immediate effect of incentive spirometry on arterial blood gases analysis after coronary bypass graft surgery patients". there were no significant differences in the mean arterial blood gas parameters between the two groups on the second postoperative day, but there was a significant difference in the mean arterial blood gas parameters between the groups on the third post-operative day. Also, **Shakouri et al 2015** who conduct the " Effect of respiratory rehabilitation before open cardiac surgery on respiratory function" reported that the were significant difference in ABG between study and control group on days after cardiac surgery.

As well as Yazdannik et al (2016),has done study on "The effect of incentive spirometry on arterial blood gases after coronary artery bypass surgery (CABG)" Result shows difference between the intervention and control groups in the mean amount of arterial blood oxygen, arterial blood carbon dioxide and oxygen saturation .

Current study found no statistically significant difference between study and control groups as regards degree of pain severity in the 1st day. On the other hand there was statistically significant difference between study groups as regards degree of pain severity in the 2nd &3rd days. Which could be a result of providing nursing intervention.

This finding was in accordance with **Mello et al. (2014)** who conducted "Assessment of pain during rest and during activities in the postoperative period of cardiac surgery" in Brazil, the results showed that, majority of the studied sample experienced pain at least once. Most patients reported pain on the 1st and 2nd days postoperative, while the highest incidence of pain occurred on the 1st day postoperative.

This result was supported by **Marwa ,et al (2014)** who reported that there were positive correlation between the score of pain in first measurement, respiratory pattern, and oxygen saturation. Also it agrees with **Busch et al. (2012)** who conducted "The Effect of Deep and Slow Breathing on Pain Perception, Autonomic Activity, and Mood Processing-An Experimental Study" who found that after breathing intervention a significant reduction of tension, anger, and depressive feelings in patients with chronic pain.

According to psychological outcomes there was a significant difference was found between the two groups over the study period with increase in definite depression within the control group at final assessment but a reduction in the study group. Mean scores for depression raised from in the control group but reduced from in the study group. The present study show that there were significant decreased in level of anxiety & depression scales among study as compared to control group. Which could be a result of providing pre & post-operative nursing interventions. These results was support by the finding in the result of **Guo, East &Arthur (2012)** who conduct "A preoperative education intervention to reduce anxiety and improve recovery among Chinese cardiac patients: a randomized controlled trial" founded that Participants who received preoperative education experienced a greater decrease in anxiety score and a greater decrease in depression score compared with those who did no. A study on "Effects of preoperative education on postoperative outcomes Among patients undergoing Cardiac Surgery" carried out by **Ramesh et al. (2017**) in which analysis of fourteen studies had been done. The findings of the study showed that preoperative education resulted in reduction of anxiety & depression scale level.

At the same line, **Suzanne, et al.(2017)** who done "Psychological interventions for coronary heart disease" reported that:- For depression, psychological interventions combined with adjunct pharmacology (where deemed appropriate) for an underlying psychological disorder appeared to be more effective than interventions that did not. For anxiety, interventions recruiting participants with an underlying psychological disorder appeared more effective than those delivered to unselected populations. This finding is agreed with **Fathi et al. (2014)** who mentioned in " Preoperative anxiety in candidates for heart surgery" that the candidates for CABG showed high levels of stress prior to the surgery, and after the operation their anxiety levels gradually decreased. The study was disagreement with **Yüksel ,et al(2016)** who conducted" Impact of Experiencing Acute Coronary Syndrome Prior to Open Heart Surgery on Psychiatric Status" reported that There was no significant difference between the two groups in terms of the total score obtained from Beck anxiety & depression scale.

The most common complications among studied patients were wound infection, pneumonia, atelectasis, pain, gastrointestinal complication(as nausea, vomiting and constipation) and dysrhythmia. Which could be as a result of bad condition of the patients preoperatively .In agreement with these study findings with **Taha (2017)** who reported in " Impact of a Designed Teaching Protocol about Nursing Management of Coronary Artery Bypass Grafting on Nurse's Knowledge, Practices and Patient's Outcome" that, less than half of both study and control group developed pneumonia before implementing a designed teaching protocol which decreased for study group post implementation. As well as **Brescia (2017)** who conducted "Determinants of Variation in Pneumonia Rates After Coronary Artery Bypass Grafting" found that, the operative death and major complication rates for CABG procedures were renal failure, re-operation ,pneumonia and wound infection. The present study findings reported that less than half of both study and control group developed pneumonia before implementing nursing interventions which decreased for study group post implementation.

As well as this finding supported by **Hulzebos et al. (2012)** who conducted "Preoperative physical therapy for elective cardiac surgery patients." 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. **As well as ,Valkenet, etal (2016)** reported in "Effects of a pre-operative home-based inspiratory muscle training program on perceived health-related quality of life in patients undergoing coronary artery bypass graft surgery" that Pre-operative inspiratory muscle training has been shown to decrease the incidence of postoperative pneumonia and length of hospital stay in patients undergoing coronary artery bypass graft surgery (CABG). **Snowdon et al. (2014)** reported in "Preoperative intervention reduces postoperative pulmonary complications but not length of stay in cardiac surgical patients: a systematic review." found that preoperative intervention significantly reduced the extubation time and the relative risk of developing postoperative pulmonary complications.

According to the study about large number of control group in compared to small number of study group had atelectasis which is one of the most common pulmonary complications encountered following open-heart operations, these results agree with **Ball, Costantino, & Pelosi, 2016)** who conduct "Postoperative complications of patients undergoing cardiac surgery" due to The lungs are not perfused during a cardiopulmonary bypass, which causes a decrease in functional residual capacity. Therefore, when the lungs begin to re-expand towards the end of the operation, it is possible to observe pulmonary atelectasis areas in various degrees.

Regarding length of hospital stay, the present study indicated that there was a significant difference detected between both groups regarding of average length of ICU stay (LOS), preoperative days, postoperative days and time of extubation were less in study group than control group and differed significantly between both groups. These is due to the closed of cardiac surgical word for maintenance reasons when the study group was taken. This in agreement with **Valkenet et al. (2011)** who conducted "The effects of preoperative exercise therapy on postoperative outcome: a systematic review." 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.

As well as the results agree with **Almashrafi, et al (2016)** who conducted "Factors associated with prolonged length of stay (LOS) following cardiac surgery in a major referral hospital" in Oman: a retrospective observational study. reported that in general, complications are known to prolong LOS following cardiac surgery. For example, new onset of atrial fibrillation, renal dysfunction, and deep sternal wound infection, were associated with increased ICU and postoperative LOS & found that the hospital stay increased monotonically with the number of complications.

The present study show that, there were statistically significant relation between socio demographic characteristics (age, sex, marital status & education) of study group related to anxiety level these results with an agreement with **Prado & Chover . (2019).** who conducted "Pre-operative Anxiety in Patients Undergoing Cardiac Surgery." in spain .Reported that Regarding socio-demographic variables, a statistically significant, inversely proportional relationship was found between the level of studies and the level of anxiety. As well as **Aboalizm , Gahsh, & Masry. (2016).** Who conducted "Early Nursing Preparation on Anxiety Among Patients Undergoing Cardiac Catheterization". Reported that , There were highly statistically significant difference and correlation existed between anxiety and age, gender and level of education.

The present study show that, there were statistically significant relation between socio demographic characteristics (age, sex, marital status & education) of study group related to depression level, these results with disagreement with **Rodrigues ,et al(2018).** who conducted "Association of preoperative anxiety and depression symptoms with postoperative complications of cardiac surgeries". Reported that , no differences were found in the evaluation of anxiety and depression symptoms in relation to age &marital status.

The present study show that, there were statistically significant relation between socio demographic characteristics of study group related to pain at third day & sex. While, there were no statistically significant relation between socio demographic characteristics of study group related to pain at third day with age, marital status & education .These results supported by **Bjørnnes, et al (2018).** Who conducted "The association between hope, marital status, depression and persistent pain in men and women following cardiac surgery" reported that, Addressing pain particularly for women living alone may be important targets for interventions to improve outcomes following cardiac surgery.

The present study show that, there were statistically significant relation between socio demographic characteristics of study group related to complication postoperative & education. While, there were no statistically significant relation between socio demographic characteristics of study group related to complication postoperative with age, sex & marital status. These results disagreement with **Kurfirst, et al (2014).**Who conducted "Health-related quality of life after cardiac surgery-the effects of age, preoperative conditions and postoperative complications". Reported that The most frequent postoperative complications in the group of older patients were previously described as heart failure, dysrhythmia, postoperative bleeding, ventilation problems, neurophysical disorders, myocardial dysfunction, and renal failure.

5. CONCLUSION

Based upon the study findings, the study concluded that applying the evidence of pre and post-operative care was effective in improving physiological and psychological Outcomes for open heart surgery patients.

6. RECOMMENDATIONS

Based on results of the present study, the following can be recommended:

I. For patients:

1. Effective education and information are required to enhance understanding of pre & post-operative care.

2. Prepare and provide information prior to surgery to prepare patients in the form of booklets.

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II. In services:

Arrange with patient to follow-up care through phone calls& clinic visits would help to pinpoint problems and solve it.

III :-On the educational level:-

1- Equip the open heart intensive care unit with simple illustrated guidelines protocol covering the evidence of pre and post-operative care for open heart surgery patient's.

2- Develop an in service audiovisual materials training/education about pre and post-operative care after open heart surgery patient's.

III.For research (future study):

1. Repeat analyzed studies about open heart surgery in males and females that will helpfully lead to more effective and preventive – based strategies for future.

2. Study the incidence of infection among open heart surgery patient to recognize the prevalence of the problem all over Egypt.

3- Replication of the current study on larger probability sample is recommended to achieve generalized ability and wider utilization of the designed program.

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