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EFFECTS OF PRE-OPERATIVE EDUCATION ON POST-OPERATIVE PAIN, ANXIETY AND PATIENT'S SATISFACTION AFTER CORONARY ARTERY BYPASS GRAFT (CABG) SURGERY

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Abstract

Background: Coronary artery disease (CAD) occurs when the coronary arteries become narrowed or blocked, and Coronary Artery Bypass Graft (CABG) surgery is performed to restore blood flow and relieve angina. This study aims to compare the impact of pre-operative education on post-operative outcomes in patients undergoing CABG surgery. ***Aim of the study:*** The aim of the study was to compare the impact of pre-operative education on post-operative outcomes in patients undergoing Coronary Artery Bypass Graft (CABG) surgery. ***Methods:*** This randomized clinical trial was conducted at the Department of Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from January 2015 to June 2015. Fifty patients aged ≥30 years scheduled for elective CABG were randomly assigned to Group I (control, n=25) or Group II (pre-operative education, n=25). Data were collected using structured interviews, the State-Anxiety Questionnaire, VAS, and VRS, and analyzed with SPSS 17.0 (Student's t-test and Chi-square, $p<0.05$. ***Results:*** Most patients were middle-aged (41–60 years) and male (Group I: 96%; Group II:

88%). Post-operative anxiety (41.44 ± 4.73 vs. 56.20 ± 3.30, $p < 0.001$) and VAS pain scores (0–4 POD: 5.72–0.32 vs. 6.28–0.68, $p < 0.05$) were lower, while satisfaction (7.00 ± 0.0 vs. 5.60 ± 0.50, $p < 0.001$) and hospital stay (10.56 ± 0.50 vs. 12.68 ± 0.74 days, $p < 0.001$) improved in Group II. ***Conclusion:*** In this study, pre-operative education significantly reduced post-operative pain and anxiety and improved patient satisfaction following CABG surgery.

Keywords: Pre-Operative Education, Post-Operative Pain, Patient Satisfaction.

INTRODUCTION

Coronary artery disease (CAD) occurs when the walls of the coronary arteries, which supply oxygen and nutrients to the heart, become narrowed or blocked by a gradual build-up of fatty material called atheroma. Coronary Artery Bypass Graft (CABG) surgery is a widely used method to bypass the narrowed segments of the coronary arteries, improving blood supply to the heart, effectively relieving angina, and increasing life expectancy [1]. CABG is particularly common in developed countries, with annual procedure rates exceeding 515,000 in the United States; in 2007, an estimated 408,000 bypass procedures were performed for inpatients in the U.S. [2]. In Bangladesh, an estimated 4,025 CABG surgeries were performed in 2013 [3].

Anxiety, defined as a feeling of fear, uneasiness, or worry, is often generalized and unfocused, manifesting as an overreaction to situations perceived as threatening [4]. Anxiety is a disturbing psychological state that significantly affects patients undergoing CABG surgery. According to a prospective cohort research, preoperative anxiety was expressed by 55.8% of patients admitted for elective CABG [5]. Anxiety may trigger activation of the sympathetic nervous system and hypothalamic-pituitary-adrenal axis, leading to physiological responses such as increased oxygen consumption, reduced immune function, and altered coagulation and autonomic tone[6]. Studies have also demonstrated that anxiety affects autonomic nervous system regulation, causing increased heart rate, cardiac output, and blood pressure [7]. Preoperative anxiety has been associated with delayed wound healing, fluid and electrolyte imbalance, higher infection rates, abnormal vital signs, and increased postoperative pain [8].

Pain is a complex, multidimensional phenomenon involving physical sensation, psychological response, and behavioral aspects [9,10]. Preoperative anxiety has been linked to heightened postoperative pain, highlighting the need for interventions that reduce anxiety prior to surgery. Structured preoperative education has been shown to positively influence postoperative pain, anxiety, and recovery, as demonstrated in pioneering studies by Hayward and Boore in 1975 and 1978 [11]. Patient education, defined as "the process by which health care professionals impart information to patients to alter health behaviors or improve health status," serves as a form of psychological preparation for patients awaiting elective surgery and has been shown to improve a range of outcomes [12].

Randomized experimental studies have confirmed these benefits. For example, a post-test study of 40 CABG patients found that those who received both pre- and post-admission education had significantly higher preoperative knowledge, more positive mood states, and better physical recovery than the control group receiving routine post-admission education [13]. Preoperative education has thus been employed as a nonpharmacological intervention to reduce postoperative pain and anxiety, with techniques including information sharing, patient counseling, and relaxation strategies [14-16].

Meta-analyses and reviews further support these findings. Devine and Cook reviewed 102 studies examining psycho-educational interventions and reported positive effects of preoperative education on postoperative pain and patient satisfaction [17]. Hathaway reviewed 68 studies involving 2,413 patients in experimental groups and 1,605 in control groups, endorsing the beneficial impact of preoperative teaching on postoperative outcomes [18].

Given this evidence, the present study aims to compare the impact of pre-operative education on post-operative outcomes in patients undergoing Coronary Artery Bypass Graft (CABG) surgery.

Objective

- To compare the impact of pre-operative education on post-operative outcomes in patients undergoing Coronary Artery Bypass Graft (CABG) surgery.

METHODOLOGY & MATERIALS

This randomized clinical trial (RCT) was conducted at the Department of Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, between January 2015 and June 2015. A total of 50 patients, aged 30 years or older, of both sexes, scheduled for elective Coronary Artery Bypass Graft (CABG) surgery were enrolled. Patients were randomly assigned into two groups of 25 each: Group I (control), who did not receive pre-operative education, and Group II (intervention), who received pre-operative education.

Inclusion Criteria

- Patients scheduled for elective CABG surgery.
- Aged 30 years or older.
- Both sexes were eligible.
- ASA (American Society of Anesthesiologists) physical status grade II or III.
- Able to provide informed consent independently.

Exclusion Criteria

- Patients unwilling to participate in the study.
- Patients undergoing emergency CABG.
- Patients with previous CABG or other open-heart surgeries who were familiar with the procedures.
- Patients with post-operative complications or extended stays in the intensive care unit.
- Patients with low intellectual capacity.
- Patients with psychological disorders.

Randomization was performed using a computer-generated random sampling technique. The study employed pre-operative education tools, a non-invasive blood pressure (NIBP) machine, ECG monitor, pulse oximeter, and structured data collection sheets, including the State-Anxiety Questionnaire, Visual Analogue Scale (VAS), and Verbal Rating Scale (VRS). Data were collected via face-to-face interviews using these structured instruments. Statistical analysis was conducted using SPSS version 17.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as mean ± SD and compared using Student's t-test, while categorical data were analyzed using the Chi-square test with Yates correction. P-values less than 0.05 were considered statistically significant. Ethical approval was obtained from the concerned department, and written informed consent was obtained from all participants. Participant anonymity was maintained, and they were informed that they could withdraw from the study at any time without affecting their treatment.

RESULTS

Table 1: Age Distribution of the Study Population

Age Group (years)	Study group	
	Group I	Group II
< 40	8.0%	12.0%
41–50	40.0%	36.0%
51–60	28.0%	44.0%
> 60	24.0%	8.0%
Total	**100.0%**	**100.0%**

The age of the study population ranged from less than 40 years to over 60 years. The highest proportion of patients in both groups were between 41–60 years, indicating that middle-aged adults constituted the majority of CABG cases in this study.

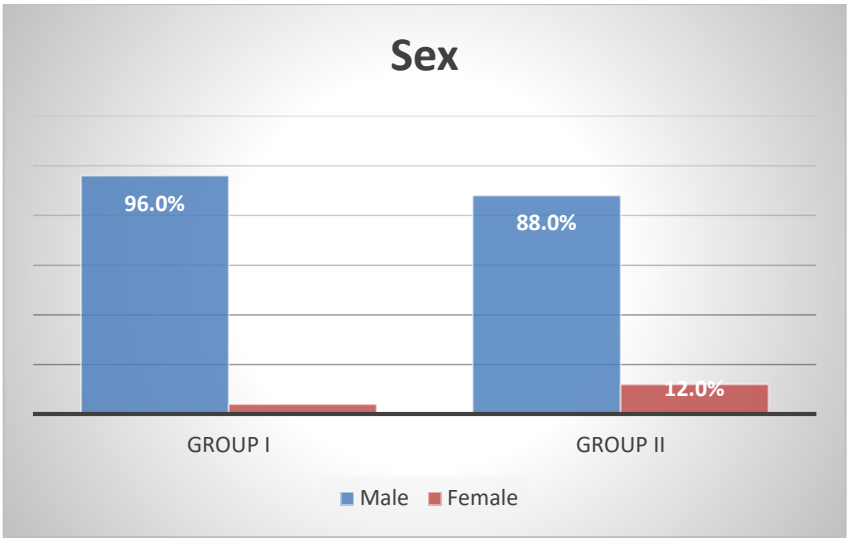

Figure 1: Sex Distribution of the Study Population

Male patients predominated in both groups, accounting for 96% in Group I and 88% in Group II.

Table 2: Comparison of Pre- and Post-Operative Anxiety Scores Between Groups

Anxiety Score	Study group		p-value
	Group I (Mean ± SD)	Group II (Mean ± SD)	
Pre-operative anxiety score	53.08 ± 4.91	55.40 ± 5.17	0.110
Post-operative anxiety score	56.20 ± 3.30	41.44 ± 4.73	<0.001

Table 2 shows no significant difference in mean pre-operative anxiety scores between the two groups ($p > 0.05$). However, the post-operative anxiety score was lower in Group II than in Group I, which was statistically highly significant ($p < 0.001$).

Table 3: Comparison of Post-Operative Pain Scores (VAS) Between Groups

VAS Score	Study group		p-value
	Group I (Mean ± SD)	Group II (Mean ± SD)	
0 POD	6.28 ± 0.79	5.72 ± 0.61	0.007
1st POD	5.32 ± 1.10	4.68 ± 0.80	0.020
2nd POD	3.96 ± 1.05	2.92 ± 0.70	<0.001
3rd POD	2.52 ± 0.50	1.84 ± 0.84	<0.001
4th POD	0.68 ± 0.47	0.32 ± 0.27	0.010

Table 3 shows that the mean VAS score (pain intensity) was significantly lower in Group II than in Group I during the post-operative observation from 0 POD to 4th POD ($p < 0.01$).

Table 4: Comparison of Mean VRS Score Between Group I and Group II

Study Group	Study group		p value
	Group I	Group II	
VRS (Satisfaction Level)	5.60 ± 0.50	7.0 ± 0.0	<0.001

Table 4 shows that the mean VRS score (satisfaction level) was significantly higher in Group II than in Group I during post-operative observation ($p < 0.001$).

Table 5: Comparison of Length of Hospital Stay Between Groups

Variable	Study group		p-value
	Group I (Mean ± SD)	Group II (Mean ± SD)	
Length of hospital stay	12.68 ± 0.74 days	10.56 ± 0.50 days	<0.001

Table 5 shows that the mean length of hospital stay was significantly lower in Group II than in Group I during post-operative observation ($p < 0.001$).

DISCUSSION

Coronary artery disease (CAD) is a leading cause of mortality worldwide. Patients unresponsive to medical treatment often require Coronary Artery Bypass Graft (CABG) surgery. The number of patients undergoing CABG surgery has increased in Bangladesh as well as in other parts of the world. The aim of this study is to find out the effects of pre-operative education on post-operative pain, anxiety, and patient satisfaction after Coronary Artery Bypass Graft (CABG) surgery. It was a randomized clinical trial among the patients who were admitted to the Department of Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU) for CABG surgery.

In this study, the maximum age was found in the 4th and 5th decades in both groups. Males were predominant in both groups: 24 (96%) males were in Group I and 22 (88%) were in Group II. Compared with O'Brien *et al*.[19] study, they showed that 263 (70.1%) were men and 112 (29.9%) were women, and the mean age was 66 years (range: 20–91 years).

In the present study, the mean VAS score was significantly lower in Group II than Group I in the post-operative observation from 0 POD to 3rd POD ($p < 0.05$). This means patients who received preoperative education had significantly less pain than the control group. Gonzales *et al*.[20], showed that preoperative education reduces postoperative pain in patients undergoing same-day surgical procedures and in patients having cardiac surgery. In Nelson *et al*.[21] study, pain was found to be reduced by good pre-operative education. A randomized controlled trial conducted by Shuldham *et al*.[22] of 356 CABG surgical patients with 188 in the experimental group that received the intervention and 168 in the control group found no significant differences between the groups in patients' outcomes of pain; that result is dissimilar to our study.

In the present study, there was no significant difference in mean pre-operative anxiety score between the two groups (>0.05). But there was a significant difference in post-operative anxiety score between the two groups ($p<0.01$). This means anxiety was significantly reduced in the intervention group. Twiss *et al*.[23] performed a study to find out the effect of anxiety on CABG patients. There was less anxiety shown by the experimental group than the control group ($p=0.022$). Following surgery, the difference in the mean standard deviation for experimental and control groups was 9.53 and 11.53, respectively. A randomized controlled trial conducted by Shuldham *et al*.[22] of 356 CABG surgical patients with 188 in the experimental group and 168 in the control group found no significant differences between the groups in patients' outcomes of anxiety; that result does not support our study.

In another study, Sorlie *et al*.[24] showed that variance of the outcome variables was examined using MANOVA. The intervention group presented less anxiety (p=0.046) as well as improved health (p=0.005). Guo *et al*.[25] study showed that the preoperative education group had significantly lower HADS (Hospital Anxiety and Depression Scale) anxiety scores at follow-up when compared to the usual care group (mean difference -3.6; 95% CI -4.62 to -2.57; P<0.001). Regardless of the method of analysis used, participants in the preoperative education group appeared to have a greater reduction in anxiety than those in the usual care group.

Another study showed that participants agreed that receiving education pre-operatively reduced their anxiety, helped them know what to expect in terms of post-operative precautions, and enabled them to feel prepared by making preparations at home prior to admission [26].

In the current study, the mean VRS (Verbal Rating Scale) score for patient satisfaction was significantly higher in Group II than Group I in the post-operative observation (p <0.05). This means patients who received pre-operative education were highly satisfied. Parry *et al*.[27] involved 95 patients (men/women) undergoing non-emergency CABG, randomized into experimental (n=45) and control (n=50) groups. The experimental group was provided with specific education. 98% of patients in the experimental group were satisfied with reported improved physical functioning (p=0.12), along with reduced post-operative pain (p=0.20). Hence, there is a positive impact on CABG outcome. A randomized controlled trial conducted by Shuldham *et al*.[22] of 356 CABG surgical patients with 188 in the experimental group that received the intervention and 168 in the control group found no significant differences between the groups in patient satisfaction after CABG surgery; that result is inconsistent with our study.

In this study, the mean length of hospital stay was significantly lower in Group II than Group I in post-operative observation (p <0.05). Shuldham *et al*.[28] showed that length of hospital stay had significant differences in the experimental group. Shuldham *et al*.[22] also showed in their study that the experimental group had a significant difference in length of hospital stay (P=0.01). In Nelson *et al*.[21] study, a shortened hospital stay was found in the pre-operative education group. A randomized controlled trial conducted by Shuldham *et al*.[22] of 356 CABG surgical patients with 188 in the experimental group and 168 in the control group found a significant difference in length of hospital stay, with the experimental group having the longer stay; that result differs from our study.

Limitations of the study

The limitations of this study are as follows:

- It was conducted at a single center.
- The sample size was small, and the study period was short.

CONCLUSION

Under the conditions of the present study, we can conclude that post-operative pain and anxiety were significantly reduced, and patients who received pre-operative education were highly satisfied after CABG surgery.

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