

# Association of Demographic Variables with Early Recovery after Coronary Artery Bypass Grafting at Cardiac Care Public Hospital, Karachi

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## ABSTRACT

**OBJECTIVE:** To determine the association of demographic variables with postoperative early recovery in patients undergoing Coronary Artery Bypass Grafting.

**METHODOLOGY:** A descriptive cross-sectional study was conducted at a cardiac care public hospital, Karachi, Pakistan from October 2019 to June 2020, recruiting 225 isolated Coronary Artery Bypass Grafting patients, not having a previous history of any cardiac surgery, combine surgeries, or history of mental disorder and other serious comorbid were included, using a non-probability consecutive sampling technique. Data were analyzed using the SPSS (version 23). Mean±SD and median (IQR) were computed for quantitative variables as appropriate while frequency and percentages for qualitative variables. Spearman's correlation and logistic regression analysis were used to identify the association. The p-value of <0.05 considered as significant.

**RESULTS:** The mean age of participants was 55.13±8.02, majority of the participants were male (80%), of age <60 years (77.3%), belonged to the lower-middle class (81.3%), non-smokers (74.7%), and had normal hospital stay (61.8%). Gender, socioeconomic status, and preoperative status were significantly associated with postoperative recovery; age >60 years, HbA1C level, and preoperative status had a significant relationship with the length of ICU stay, and age >60 years, preoperative status, length of ICU stay and postoperative score were found in association with length of stay in hospital.

**CONCLUSION:** Gender, older age, socioeconomic status, diabetes control, and preoperative status had significant effects on postoperative recovery, length of stay in ICU and hospital after Coronary Artery Bypass Grafting.

**KEYWORDS:** Demographics, recovery, early recovery, postoperative recovery, surgery, coronary artery bypass.

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## INTRODUCTION

Coronary Artery Bypass Grafting (CABG) has a pivotal role in an attempt of vascularizing the myocardium for over 50-years. Approximately more than 400,000 CABG are performed in the U.S. every year<sup>1</sup>. According to a report by the Adult Cardiac Surgery Database, CABG remains the most frequently performed surgery contribute to 54% of all cardiac surgeries in 2016<sup>2</sup> and is the best revascularization strategy, providing the benefit of reduced mortality, myocardial infarction, and repeat revascularization risk in patients with multivessel disease, especially in individuals with diabetes mellitus and high anatomical complexity of Coronary Artery Disease<sup>3</sup> and provides complete revascularization and protection against progression of disease in proximal segment thus restricting against the establishment of a new disease<sup>4</sup>.

There is a post-operative recovery period after every surgery which could be objective or subjective. However, both aspects are of great significance.

Postoperative recovery is a multidimensional process and is defined by the restoration of capabilities and homeostasis following surgery. It mainly focuses on physical, physiological, psychological, and social aspects stabilization to previous normal or improved state<sup>5,6</sup>. Describing subjective endures and events in recovery emphasizes the patients' concerns because they define recovery by regaining pre-operative routine and activity level. The period of recovery starts with sudden deterioration from baseline in immediate post-surgery time and then gradually returns to or better than baseline state<sup>7</sup>. Bowyer A 2016<sup>8</sup> addressed that post-operative recovery has three phases (early, intermediate, and late recovery) which depict different outcomes on a recovery trajectory. The early phase starts with the end of the surgery and lasts till the discharge from the hospital (or up to 7 days after surgery).

Demographic variables such as age, gender, obesity, socioeconomic status, and presence of comorbidities i.e. DM, HTN have important considerations in the

## Association of Demographic Variables with Early Recovery

development and progression of CVDS. Though most of the patients who underwent CABG are male. However, females have high mortality and post-operative complications. Advanced age, HTN, DM, and hyperlipidemia are important predictors of postoperative morbidity<sup>9,10</sup>.

Numerous studies on postoperative outcomes have been conducted, measuring morbidity, mortality, and complications. However, literature is insufficient on postoperative recovery after CABG, covering all aspects of recovery. This study was designed to explore the association of demographic variables with in-hospital early recovery after CABG and focused on determining the high-risk group and potential predictive factors for delayed or poor recovery. The findings of the study may broaden understanding and provide a basis for recommendations and development of guidelines and measures for postoperative care of CABG and information for patients, their families, and discharge planning protocols. This will allow clinicians insight for early assessment and prevention strategies for postoperative complications.

### METHODOLOGY

A descriptive cross-sectional study was conducted at a cardiac care public hospital, Karachi, Pakistan from October 2019 to June 2020. All isolated CABG patients, not having a previous history of any cardiac surgery, combine surgeries, or history of mental disorder and other serious comorbid were included using a non-probability consecutive sampling technique. Data was collected using an adoptive, structured, and self-reported questionnaire "Postoperative Recovery Profile (PRP)". Data were analyzed using the statistical package for social science (SPSS version 23). Mean  $\pm$  SD and median (IQR) were computed for quantitative variables as appropriate while frequency and percentages for qualitative variables. Spearman's correlation and logistic regression analysis were used to identify the association. The p-value of  $< 0.05$  considered as significant.

Approval for the study was taken from the ethical review committee of Liaquat University of Medical and Health Sciences, Jamshoro. Permission for data collection was taken from the head of the department of the respective institution. The researcher started approaching the individual subject, inform the purposes, detailed data collection process, potential risks, and benefits of the study then asked to give consent. Data was collected on the pre-operative day and the day of discharge.

### RESULTS

A total of 780 cardiac surgeries were performed during the study period; of which 409 (52.4%) were isolated CABG. In this study 225 participants were included, 80% were male, the mean age was  $55.13 \pm 8.02$ ,

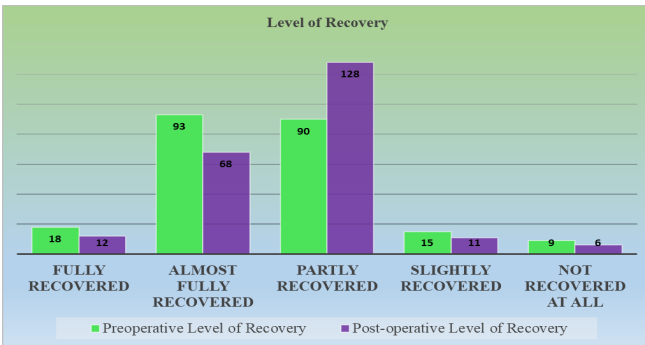
77.3% were  $< 60$  years, 76.4% were overweight and obese, 81.3% belonged from the lower-middle class, 74.7% were non-smokers; 56% had a history of DM, 46.2% HTN, and 52.4% had ejection fraction  $< 50\%$ . Almost half stayed for  $> 2$  days in ICU while 61.8% stayed  $\leq 7$  days in the hospital stay (Table-I).

**TABLE I: BASELINE CHARACTERISTICS OF STUDY PARTICIPANTS (n=225)**

Characteristics	N	%
<b>Age (year)</b>		
	26-79	<b>Range</b>
All Participants (Meanage)	55.13 $\pm$ 8.02	<b>Mean<math>\pm</math>SD</b>
$\leq 60$	174	77.3
$> 60$	51	22.7
<b>Gender</b>		
Male	180	80
Female	45	20
<b>Body Mass Index</b>		
All Participants	25.45 $\pm$ 3.29	<b>Mean<math>\pm</math>SD</b>
Underweight	3	1.4
Normal	50	22.2
Overweight	55	24.4
Obese	117	52.0
<b>Socio-Economic Status</b>		
Lower-Middle Class	183	81.3
Upper-Middle Class	42	18.7
<b>History of Smoking</b>		
Smoker	57	25.3
Non-Smoker	168	74.7
<b>History of Diabetes Mellitus</b>		
HbA1C (All participants)	6.7 (2.47)	Median(IQR)
HbA1C $\leq 7$	129	57.3
HbA1C $> 7$	96	42.7
Non-Diabetic	99	44
Diabetic	126	56
<b>History of Hypertension</b>		
No	121	53.8
Yes	104	46.2
<b>Ejection Fraction (E.F %)</b>		
All Participants	50 (10)	Median(IQR)
$< 50\%$	118	52.4
$\geq 50\%$	107	47.6
<b>Length of Stay in ICU</b>		
All Participants	3 (1)	Median(IQR)
$\leq 2$ days	107	47.6
$> 2$ days	118	52.4
<b>Length of Stay in Hospital</b>		
All Participants	7 (2)	Median(IQR)
$\leq 7$ days	139	61.8
$> 7$ days	86	38.2

Figure I demonstrated the comparison of the pre-operative and post-operative levels of recovery. In this study, recovery is divided into five categories. In pre-operative, 90 (40%) of the study participants were partly recovered state. While, in the postoperative phase, the graph gradually increased to 128 (56.9%). In pre-operative, 93 (41.3%) participants were almost fully recovered. On the other hand, 68 (30.2%) in post-operative. Only 9 (4%) pre-operative & 6 (2.7%) post-operative not recovered at all.

**FIGURE I: COMPARISON OF PRE-OPERATIVE & POST-OPERATIVE LEVEL OF RECOVERY**



**TABLE II: SPEARMAN CORRELATION OF PARTICIPANTS CHARACTERISTICS WITH POST-OPERATIVE LEVEL OF RECOVERY**

Variable	Level of Recovery	
	Post-Op	p-Value
Age	0.62	0.35
Gender	0.14	0.03*
Socio - Economic Status	- 0.25	< 0.001*
Body Mass Index	0.04	0.59
Ejection Fraction (%)	- 0.12	0.06
Smoking	- 0.05	0.42
Diabetes Mellitus	0.13	0.05
HbA1C Level	0.05	0.50
Hypertension	- 0.09	0.16
Preoperative baseline Score	0.32	<0.0001*
Length of Stay in ICU	0.02	0.75
Length of Stay in Hospital	- 0.15	0.02*

**TABLE III: MULTIVARIATE ANALYSIS OF FACTORS ASSOCIATED WITH POST-OPERATIVE RECOVERY, LENGTH OF ICU & HOSPITAL STAY**

	Postoperative Level of recovery			ICU stay up to 2 days			Hospital stay up to 7 days		
	Exp (B)	95% C.I	p	Exp (B)	95% C.I	p	Exp (B)	95% C.I	p
<b>Preoperative Baseline Status</b>									
Fully Recovered	-	-	-	10.81	1.07-109.24	0.04	37.94	3.33-432.07	0.00
Almost Recovered	-	-	-	9.60	1.12-81.99	0.03	15.02	1.77-126.75	0.01
Partly-recovered	-	-	-	5.74	0.67-49.08	0.11	11.03	1.31-92.96	0.02
Slightly-recovered	-	-	-	6.22	0.59-64.91	0.12	12.02	1.16-124.31	0.03
Not-recovered at All	-	-	-	Reference			Reference		
<b>Age</b>									
≤60	0.78	0.42-1.45	0.43	2.02	1.02-3.994	0.04	2.05	1.06-3.95	0.03
>60	Reference			Reference			Reference		
<b>Gender</b>									
Male	0.27	0.27-0.160	0.12	-	-	-	-	-	-
Female	Reference			-	-	-	-	-	-
<b>Socio-economic Class</b>									
Lower-middle Class	1.47	1.47-1.75	0.00	-	-	-	-	-	-
Upper-middle Class	-			-	-	-	-	-	-
<b>Body Mass Index</b>									
Underweight	0.01	0.01-0.17	0.03	-	-	-	-	-	-
Normal	0.41	0.41-0.45	0.51	-	-	-	-	-	-
Overweight	0.51	0.51-0.63	0.96	-	-	-	-	-	-
Obese	Reference			-	-	-	-	-	-
<b>HbA1C Level</b>									
≤7	-	-	-	2.27	1.29-3.99	0.00	1.47	0.83-2.61	0.18
>7	-			Reference			Reference		
<b>Length of Stay in ICU</b>									
≤2days	-	-	-	-	-	-	5.52	3.01-10.13	0.00
>2days	-			-			Reference		

Table II: explained the association of patients' characteristics with the postoperative level of recovery. The results showed that gender, socio-economic class, preoperative baseline score, and the total length of stay in hospital had a statistically significant relationship with the postoperative level of recovery ( $p < 0.05$ ). All other variables could not attain a significant level ( $p > 0.05$ )

Table III showed a multivariate analysis of factors associated with length of ICU and hospital stay and ordinal logistic regression with the postoperative level of recovery. The models explained that socio-economic class and underweight category of body mass index had a significant relationship with the early postoperative level of recovery. The lower-middle class has 1.47 times more likely to have a higher level of recovery than the upper-middle class. In comparison with obese patients, underweight had less likely to have a better recovery. Those who had age  $\leq 60$  years are two times more likely to have a normal ICU and hospital stay than those older than 60. Similarly, those who had normal HbA1C levels have a 2.27 times greater chance of normal ICU stay compared with the high HbA1C group. When looking at preoperative status, fully recovered and almost recovered had ten times more likely to have normal ICU stay than not recovered at all; while all preoperative levels had much more chance of having a normal hospital stay than reference category. Moreover, those who had an ICU stay of  $\leq 2$  days, are 5.52 times more chance of having a normal hospital stay up to 7 days.

## DISCUSSION

The current study showed that isolated CABG is 52% of the total surgeries performed in the study setup which is in line with the previously conducted studies and databases<sup>2</sup>. Other studies reported a higher prevalence<sup>11,12</sup>.

The mean age of participants was 55.13 (8.02) years range from 26 to 79 years. The mean age was found lower from previous studies<sup>12-15</sup>. The lesser mean age indicated that the population of the country gets CVDs at an earlier age than the rest of the world. However, similar results were revealed by a study from Agha Khan University Hospital, Pakistan<sup>9</sup>. Worldwide demographic characteristics are continuously changing and age-structure differed across the world. It is of greater consideration, that majority of participants of this study were age below 60 years. In contrast, the worldwide majority of patients who underwent CABG had a greater age class<sup>12,13,15</sup>. The study found no significant association between age and postoperative level of recovery and length of stay in ICU. However, a significant association has been found between the age group above 60 years with Length of stay in ICU and Length of stay in hospital<sup>16</sup>. In addition to older age, preoperative baseline score

has been found in significant association with length of ICU and hospital stay and moderate positive correlation with the postoperative score; indicating that those with the lower preoperative score had longer ICU and hospital stay while high baseline score will result in good score postoperatively. Moreover, the length of hospital stay had also a statistically significant negative association with the postoperative level of recovery.

Since all CABG patients must be in close monitoring in ICU. Longer ICU stay results in worsening mortality and morbidity postoperatively and significantly associated with lower quality of recovery<sup>17</sup>. The study found longer ICU stay in relationship with longer hospitalization, and was in line with a previously conducted study<sup>17</sup>. The participants of this study have comparatively less ICU and hospital stay<sup>11,15</sup> but similar to Siddiqui MM 2020<sup>18</sup> from Rawalpindi, Pakistan.

Gender roles can play an important part in postoperative recovery. The findings of this study expressed more participation of males, concurred with the previously conducted studies<sup>9,12-14</sup>. The study demonstrated a significant relationship of gender with the postoperative level of recovery. Males recovered 0.27 times less likely to the next level of recovery compared with the female but these findings did not reach a significant level ( $p = 0.12$ ). Moreover, no association was found between gender and length of ICU and hospital stay. A study reported no difference in the mortality, improvement, and recovery after CABG between males and females<sup>15</sup>. However, better recovery has been reported in males<sup>19</sup> while Female gender and diabetes were identified as independent risk factors for non-recovery<sup>20</sup>.

The data showed that compared to obese patients, underweight had less likely to have a better level of recovery confirming the obesity paradox. Underweights had longer ICU and hospital stay and mortality<sup>21</sup>. Moreover, the HbA1C level was associated with the length of ICU stay and in agreement with Finger B et al.<sup>22</sup> but differed from Almogati JG 2019<sup>23</sup>.

## CONCLUSION

CABG is a highly performed cardiac surgery. Gender, socioeconomic status, preoperative status were found in significant association with postoperative early recovery. Age  $> 60$ , HbA1C level, and preoperative state were in a significant relationship with the length of ICU and hospital stay.

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**Conflict of Interest:** There is no conflict of interest.

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## AUTHOR CONTRIBUTION

Khan AU: Concieve idea, data collection, analysis, final draft, design

Khan E: Development of idea, critical review, manuscript revision, supervision

Ghaffar A: Idea, critical review

Ali M: Literature search, drafting, data entry, analysis

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