

Original Article

Analysis of Depression and Anxiety Prior and After Coronary Artery Bypass Graft Surgery and their Association with Age

Depression and Anxiety Prior and After Coronary Artery Bypass

Shafqat Hussain and Muhammad Moeen

ABSTRACT

Objective: The objective of this study is to demonstrate the anxiety and depression scores pre and post-Coronary after bypass graft surgery and the effect of age in changing disorder scores.

Study Design: A Comparative Analytical Study

Place and Duration of Study: This study was conducted at the department of Cardiac Surgery in Ch.Pervaiz Elahi Institute of Cardiology Multan from June 2020 to June 2021.

Materials and Methods: A total of 50 patients participated in the study and were divided into 4 distinct age groups. The patients were required to fill HADS 2 days before and 10 days after the surgery and then anxiety and depression scores were analyzed on the basis of answers given by patients in the questionnaire. The difference between pre and post-surgery was calculated and the increased scores were evaluated. Spearman correlation between age and difference scores was calculated to assess the effect of age on depression and anxiety scores. McNemar tests and ANOVA procedure were also conducted with 'age group' as a factor.

Results: The number of patients who filled the HADS reduced after the surgery irrespective of the anxiety and depression scores before surgery. After analysis, it was discovered that 30% of patients prior while 20.5% after the surgery were anxious, while 22.7% were depressed before surgery and 13.6% after surgery. The depression score also reduced after surgery but the number of high scorers remained the same. A negative co-relation between age and anxiety was calculated (Spearman rho = -.200; p = 0.02) but not with depression (Spearman rho = -.111; p = 0.19). Younger patients showed a significant decline in anxiety after the surgery but had high anxiety scores before surgery (p<0.05), this decline was not seen in depression scores.

Conclusion: As the results reflect, the patients are more mentally stressed before surgery and this disorder must be treated. Younger patients showed reduced symptoms after the surgery and fewer symptoms change is observed in elderly patients.

Key Words: Anxiety, depression, Coronary artery bypass graft, Coronary artery disease, aging disorders.

Citation of article: Hussain S, Moeen M. Analysis of Depression and Anxiety Prior and After Coronary Artery Bypass Graft Surgery and their Association with Age. Med Forum 2021;32(8):86-90.

INTRODUCTION

Almost 20-45% of people with coronary heart disease have been diagnosed with depression¹ Similarly, anxiety has also been found to be prevalent in 20-55% of such patients². These incidences of these mental disorders were also observed in patients who opted for CABG surgery³. Depression is perceived as a significant risk factor in the deposition of arteriosclerotic plaques in coronary arteries⁴.

Department of Cardiac Surgery, Ch.Pervaiz Elahi Institute of Cardiology Multan

Correspondence: Shafqat Hussain, Assoc. Professor of Cardiac Surgery, Ch. Pervaiz Elahi Institute of Cardiology Multan.
Contact No: 0306-7302600
Email: drshafqat736@gmail.com

Received: July, 2021
Accepted: July, 2021
Printed: August, 2021

The pathological relationship between the two diseases can be attributed to hypercortisolaemia related factors, including insulin resistance, or due to sympathetic vagal dys-balance caused by irregular blood pressure, unhealthy lifestyle, or smoking habits⁵. Depression not only contributes to primarily causing coronary heart disease but can also appear during secondary and tertiary preventive techniques: Physical and psychosocial morbidity is increased by presurgical depression and postsurgical depression after 6 months and 5 years CABG-surgery⁶; preoperative depression can be an important indicator of mortality in one month following the surgery⁷; depressed patients undergoing CABG surgery are expected to have diminished functionality and health status benefits within 6 months following the surgery⁸, and depression appearing after the incidence of myocardial infarction (MI) reduces the probability of secondary CHD prevention after four months of MI⁹. Depressed patients with MI have more health costs than non-depressed patients. According to Canadian research, depressed myocardial patients have 41% more medical

costs in the first year after myocardial infarction than MI patients who are not depressed¹⁰.

On the contrary, anxiety doesn't independently contribute to the occurrence of MI. While Depression increases the likelihood of postsurgical morbidity and mortality, anxiety can only pose such risk if it appears as acute preoperative anxiety whereas trait anxiety hasn't yet proved to be fatal¹¹. However, anxiety disorders do increase the chances of sudden cardiac death. This phenomenon is due to pathophysiologically ventricular arrhythmias¹².

In the present time, elderly patients opt more for CABG surgery as compared to the last 10 years. Every year in the UK, 25 000 people undergo CABG surgery, and among them, 1/4th of the patients are above the age of 70 and 8% of them are above the age of 75¹³. Elderly people have a great risk of perioperative mortality. Among various mortality-causing factors, age is considered a significant risk factor¹⁴. Elderly people are affected by depression the most when compared with other physical disorders¹⁵. The effect of age on depression and anxiety has been discussed in previous studies.¹⁶

The objective of this study is to demonstrate the anxiety and depression scores pre and post-CABG surgery and the effect of age in changing disorder scores.

MATERIALS AND METHODS

Cardiac Surgery in Ch.Pervaiz Elahi Institute of Cardiology Multan from June 2020 to June 2021. The patients gave their written consent to become part of the survey. All the patients who were included in the study were conscious, had no neurological deficits, were admitted to the hospital on a weekday, had no acute coronary syndrome, didn't have dementia, and didn't undergo CABG surgery in an emergency. The levels of depression and anxiety were noted 2 days before the CABG surgery and also 10 days following the surgery. All the participants of the study were divided into four groups based on their age by means of quartile prior to the conduction of the study. The age groups were: 30-35 years (n=10), 36- 46 (n=10), 47-60 (n=15), 61-72 (n=15). The patients were administered to specially developed, self-report questionnaire for patients with physical illness, "Hospital Anxiety and Depression Scale" (HADS) to measure depression and anxiety levels in patients¹⁷. The questionnaire included 14 questions, 7 to analyze depression and the other 7 to examine anxiety. The questions were related to symptoms of these disorders in the past week. Four multiple options were given to select the one option that best described the symptom and were different for every question. The values obtained by HADS could be analyzed in two ways. Firstly, the scores were simply counted to know the number of symptoms of the disorders. On the other hand, the scores obtained were used to classify patients with increased and non-elevated depression and anxiety levels. According to previous studies¹⁸, it was observed that the average score for

elevated anxiety and depression is 8¹⁹. The sensitivity for this cut-off is 0.70 and specificity is 0.90¹⁹.

Statistical Analysis: All statistical analysis was carried out using SPSS (version 18). The McNemar test was used to analyze the significance of the difference in the proportion of patients with high anxiety and depression levels before and after the CABG surgery. The difference in values and anxiety were found out by using the principle of subtraction: values of variables 10 days after the surgery were subtracted from the respective values 2 days before the surgery. A positive result demonstrated a higher pre-surgical level while the negative results showed an elevated post-surgical level of the studied variables. Spearman rho correlations were developed between patient's age and the difference of the analyzed variables in the HADS to ascertain the relationship between age and depression and anxiety, respectively. Mean along with standard deviation was calculated for all the categorical data. Additionally, ANOVA analysis was conducted to detect an association between "age" and pre and post-surgical variables (time). The "Fishers Least Significant Differences" test (LSD) was used to test the significance of this interaction. A p-value less than 0.05 were considered statistically significant.

RESULTS

A total of 50 patients were included in the study, out of which two patients (4.0%) were not able to fill the HADS after 10 days of CABG surgery as they had suffered medical problems after the surgery. However, there was no proof that these medical problems were age-dependent although the patients who suffered them were more than the age of 70 (Table 1).

The percentage of patients filling the HADS varied with ages (Table 1). This difference remained insignificant prior to the surgery (Fisher's exact=0.10). Whereas, 10 days following the surgery, significant difference was observed (Chi-square = 14.5, df = 2; p < 0.001). As the age group increased, the number of patients filling HADS decreased. However, statistically significant difference was found only when the age group 30-35 years was compared with 61-72 years group (Chi-square = 10.2; df = 1; p < 0.001) and age group "30-35 years" with age group "47- 60 years" (Chi-square = 3.6; df = 1; p = 0.01).

Data analysis for anxiety demonstrated that 30% of patients prior while 20.5% after the surgery were anxious, whereas 10.6% of these patients had high levels of anxiety both before and after the surgery. Similarly, 22.7%, 13.6%, and 6.4% of patients were depressed at prior, after, and at both times of the surgery, respectively. However, the percentage changes for both disorders were not significant according to the McNemar Test.

Moreover, a significant correlation relation between change in anxiety and age was observed (Spearman rho = -.200; p = 0.02), but age did not have any significant

effect on change in depression scores (Spearman rho = -.111; p = 0.19). This indicated that younger patients have a large difference between levels of anxiety before and after the surgery. The same results were obtained through ANOVA analysis. The study proved a significant interaction between the factors "age group" and "time" for anxiety (F(2, 92) = 2.87; p = 0.02), and a significant effect for the factor "time" (F(1, 93) = 9.85; p = 0.001). The anxiety scores were significantly reduced 10 days after surgery when compared with the values of 2 days before surgery. These changes were, however, age-dependent as LSD posthoc test indicated significant changes only in the youngest age group, 30-35 years (Table 2). The results of this test are also supported by the nonparametric McNemar test, the youngest age group showed diminished anxiety. (McNemar = 4.01; df = 1; p = 0.02).

Table No.1: Percentage of a medical complication that detained patients from editing the HADS and proportion of HADS completed divided into age groups (N = 50)

Age groups (years)	Percentage of medical complications	Percentage of HADS filled in two days before CABG surgery	Percentage of HADS filled in ten days after CABG surgery
30-35 (10)	2.0%	100%	85.5%
36-46 (10)	6.0%	92%	82%
47-60 (15)	4.5%	96.7%	66.3%
61-72 (15)	12.7%	84.5%	52%
Total	6.3%	93.3%	71.45%

Table No.2: Mean values and Standard Deviation (SD) of anxiety and depression two days before and ten days after CABG surgery divided into four age groups (N=50)

Age group (years, N)	Anxiety two days before CABG surgery (mean, SD)	Anxiety ten days after CABG surgery (mean, SD)	Depression two days before CABG surgery (mean, SD)	Depression ten days after CABG surgery (mean, SD)
30-35 (10)	8.55 (5.51)	5.01 (4.5)	7.25 (5.22)	5.74 (4.45)
36-46 (10)	5.83 (2.58)	5.25 (3.28)	5.02 (3.82)	4.82 (4.34)
47-60 (15)	7.10 (3.5)	7.07 (4.25)	6.44 (4.75)	5.55 (4.24)
61-72 (13)	6.75 (4.85)	5.44 (4.07)	5.88 (2.75)	5.45 (4.94)

Table No.3: Number and percentages [%] of high-scoring in anxiety and depression (HADS value ≥ 8) two days before and ten days after CABG surgery divided into four age groups (N=50)

Age groups (years, N)	Anxiety high-scoring 2 days before CABG surgery	Anxiety high-scoring 10 days after the CABG surgery	Depression high-scoring 2 days before CABG surgery	Depression high-scoring 10 days after CABG surgery
30-35 (10)	7 (70%)	5(50%)	6(60%)	3(30%)
36-46 (10)	5(50%)	3(30%)	3(30%)	4(40%)
47-60 (15)	6(40%)	4(26.7%)	4(26.7%)	3(20%)
61-72 (13)	4(30.8%)	6(46.1%)	6(46.1%)	5(38.5%)

On the other hand, depression scores do reduce after surgery but the number of high-scoring does not reduce with time (Table 3 represents number of high scorers). Whereas, significant correlation was found between depression and factor "time" (p<0.05).

DISCUSSION

The effect of age was seen on the completion of HADS after the surgery and not before it. But it is to be noted that this inability to complete HADS was not because of the medical complications the patients faced after the surgery. It may be due to weakness after the surgery, physical impairment, or the research may affect the mental status of elderly patients. HADS also addressed the psychological concerns of the participants. Most of the old patients avoid answering questions related to this due to which it was unable to know about their mental comorbidity. It was initially assumed that the patients who were anxious or depressed before the surgery, will not fill the HADS after surgery. But this assumption was proved wrong after analyzing the data as no relation could be seen between anxiety and depression score before surgery and incompleteness of HADS after surgery. The results of the study are also congruent to clinical practices.

The decline in anxiety and depression scores suggests that the patients were under mental stress before the surgery. Our results are consistent with the other literature studies²⁰. Also, anxiety and depression scores are inversely proportional to age. By studying this relation and the results of the ANOVA procedure, it was revealed that younger patients have a greater decline in scores before and after surgery.

The varying pattern of changing disorders score with age may be due to some reasons. Patients, both young and old, may think about death before surgery because it is a common complication in CABG surgery. The

elderly patients look forward to the relief after the surgery than the strain imposed on CHD. On the other hand, young patients, suffer fewer symptoms of CHD. The pattern may also be because elderly patients often think about death and the stimulus if death is not new to them so they are less anxious at the thought of it. But young patients are not so sure of their death and often estimate their age. So, they are more afraid of the loss and experience anxiety at the thought of losing all those years of their life. One of the elderly patients of our study revealed that old people suffer CHD for many years of their life so they are used to the feeling of being sick so the stimulus is not new to them.

Unexpectedly, only 6.4% of patients had increased depression scores both before and after surgery. Due to the longitudinal design of our study, such a low score was obtained. While other studies on this subject only measure scores at the one-time point.

CONCLUSION

As the results reflect, the patients are more mentally stressed before surgery and this disorder must be treated. Younger patients showed reduced symptoms after the surgery and fewer symptoms change is observed in elderly patients.

Author's Contribution:

Concept & Design of Study:	Shafqat Hussain
Drafting:	Muhammad Moeen
Data Analysis:	Muhammad Moeen
Revisiting Critically:	Shafqat Hussain, Muhammad Moeen
Final Approval of version:	Shafqat Hussain

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. May HT, Horne BD, Knight S, Knowlton KU, Bair TL, Lappé DL, et al. The association of depression at any time to the risk of death following coronary artery disease diagnosis. *European Heart Journal-Quality of Care and Clinical Outcomes* 2017;3(4):296-302.
2. Olsen SJ, Schirmer H, Wilsgaard T, Bønaa KH, Hanssen TA. Cardiac rehabilitation and symptoms of anxiety and depression after percutaneous coronary intervention. *Eur J Preventive Cardiol* 2018;25(10):1017-25.
3. Murphy B, Le Grande M, Alvarenga M, Worcester M, Jackson A. Anxiety and depression after a cardiac event: prevalence and predictors. *Frontiers Psychol* 2020;10:3010.
4. Carney RM, Freedland KE. Depression and coronary heart disease. *Nature Reviews Cardiol* 2017;14(3):145-55.
5. Shi S, Liu T, Liang J, Hu D, Yang B. Depression and risk of sudden cardiac death and arrhythmias: a meta-analysis. *Psychosomatic Medicine* 2017;79(2):153-61.
6. Takagi H, Ando T, Umemoto T. Perioperative depression or anxiety and postoperative mortality in cardiac surgery: a systematic review and meta-analysis. *Heart and vessels* 2017;32(12):1458-68.
7. Poole L, Ronaldson A, Kidd T, Leigh E, Jahangiri M, Steptoe A. Pre-surgical depression and anxiety and recovery following coronary artery bypass graft surgery. *J Behavioral Med* 2017;40(2):249-58.
8. Rodrigues HF, Furuya RK, Dantas RAS, Rodrigues AJ, Dessotte CAM. Association of preoperative anxiety and depression symptoms with postoperative complications of cardiac surgeries. *Revista latino-americana de enfermagem* 2018;26.
9. Feng L, Li L, Liu W, Yang J, Wang Q, Shi L, et al. Prevalence of depression in myocardial infarction: a PRISMA-compliant meta-analysis. *Medicine* 2019;98(8).
10. Palacios J, Khondoker M, Mann A, Tylee A, Hotopf M. Depression and anxiety symptom trajectories in coronary heart disease: Associations with measures of disability and impact on 3-year health care costs. *J Psychosomatic Res* 2018;104:1-8.
11. Chen YY, Xu P, Wang Y, Song TJ, Luo N, Zhao LJ. Prevalence of and risk factors for anxiety after coronary heart disease: Systematic review and meta-analysis. *Medicine* 2019;98(38).
12. Zhang Y, Chen Y, Ma L. Depression and cardiovascular disease in elderly: current understanding. *J Clin Neurosci* 2018;47:1-5.
13. Natarajan A, Samadian S, Clark S. Coronary artery bypass surgery in elderly people. *Postgraduate Med J* 2007;83(977):154-8.
14. Geissler HJ, Hölzl P, Marohl S, Kuhn-Régner F, Mehlhorn U, Südkamp M, et al. Risk stratification in heart surgery: comparison of six score systems. *Eur J Cardio-thoracic Surg* 2000;17(4):400-6.
15. Noël PH, Williams JW, Unützer J, Worchel J, Lee S, Cornell J, et al. Depression and comorbid illness in elderly primary care patients: impact on multiple domains of health status and well-being. *The Annals of Family Med* 2004;2(6):555-62.
16. Flint AJ, Peasley-Miklus C, Papademetriou E, Meyers BS, Mulsant BH, Rothschild AJ, et al. Effect of age on the frequency of anxiety disorders in major depression with psychotic features. *Am J Geriatric Psychiatry* 2010;18(5):404-12.
17. Yue T, Li Q, Wang R, Liu Z, Guo M, Bai F, et al. Comparison of Hospital Anxiety and Depression Scale (HADS) and Zung Self-Rating Anxiety/Depression Scale (SAS/SDS) in evaluating anxiety

- and depression in patients with psoriatic arthritis. *Dermatol* 2020;236(2):170-8.
18. Lemay KR, Tulloch HE, Pipe AL, Reed JL. Establishing the minimal clinically important difference for the hospital anxiety and depression scale in patients with cardiovascular disease. *J Cardiopulmonary Rehabilitation Prevention* 2019;39(6):E6-E11.
 19. Farokhnezhad Afshar P, Bastani F, Haghani H, Valipour O. Hospital anxiety and depression in the elderly with chronic heart failure. *Iran J Nursing* 2019;32(120):87-97.
 20. Açikel MET. Evaluation of depression and anxiety in coronary artery bypass surgery patients: A prospective clinical study. *Brazilian J Cardiovascular Surg* 2019;34:389-95.