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MEDICATION ADHERENCE IN CORONARY ARTERY BYPASS GRAFT SURGERY PATIENTS - A PROSPECTIVE STUDY

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ABSTRACT:

Background:

Enhancing medication adherence among middle-aged and elderly patients who have undergone coronary artery bypass graft surgery is essential for achieving improved health outcomes. Ensuring that these patients consistently follow their prescribed medication regimens can significantly impact their recovery and overall well-being.

Aim: To evaluate medication adherence among patients following coronary artery bypass graft (CABG) surgery and to develop strategies for enhancing adherence to prescribed medications in this patient population.

Methodology: A prospective interventional study was carried out in the cardiothoracic and vascular surgery department, involving 110 post-CABG (coronary artery bypass grafting) patients who provided informed consent. Initially, a questionnaire was administered to evaluate their medication adherence, and tools to enhance adherence were provided. At the final visit, the same questionnaire was used to reassess adherence levels, along with evaluating parameters such as blood sugar levels, blood pressure, and ejection fraction (via ECHO).

Results: The study results indicated that 94% of patients exhibited improved medication adherence by the final visit. Additionally, there was a significant improvement in the ejection fraction (EF) rate. By the final visit, patients showed enhanced blood pressure, blood sugar levels, and heart rates.

Conclusion: Pharmacist counseling significantly enhanced patients' knowledge, attitudes, and behaviors. This study demonstrates that pharmacist care positively impacts mortality and morbidity in post-CABG surgery patients. In middle-aged to older adults, adherence to medication is crucial for achieving better health outcomes.

Keywords: Medication adherence, Coronary artery bypass graft surgery, Pharmacist.

1. INTRODUCTION:

Coronary artery disease (CAD) is a leading cause of mortality worldwide, affecting both developed and developing countries. Between 1985 and 2015, the death rate from CAD doubled, with age being the primary risk factor ¹⁻². Coronary artery bypass grafting (CABG) remains the preferred invasive treatment for multi-vessel CAD, especially in patients with diabetes or ischemic heart failure ³. Postoperative challenges following CABG can include pain, insomnia, appetite changes, chest pain, respiratory issues, arrhythmias, palpitations, arm

numbness, gastrointestinal disturbances, weight loss, and anxiety ⁴. Adherence to prescribed treatments is crucial for health outcomes. The World Health Organization (WHO) reported in 2003 that adherence to long-term therapies was as low as 50% globally, and even lower in low- and middle-income countries ⁵. Enhancing drug adherence is vital, as nonadherence can negatively impact patient health and incur unnecessary costs. Nonadherence can be intentional, when patients choose not to follow prescriptions, or unintentional, due to difficulties in medication management ⁶.

For elderly patients, factors such as the number of medications, sensitivity to side effects, cost, and confusion about dosage schedules can lead to nonadherence ⁷. Tools like pillboxes help reduce adherence errors and support independent living for the elderly ⁸. Effective communication with patients and caregivers is essential to improving adherence rates, particularly in conditions like Parkinsonism ⁹. Patient information leaflets (PILs) are included with every medication package to educate patients on proper use, safety precautions, and potential side effects. These technical documents, provided by manufacturers in a standardized format, aim to enhance patient understanding and adherence ¹⁰. Comprehensive counselling, which includes both information sharing and actual consultation, plays a critical role in supporting patient adherence and improving health outcomes ⁴. The aim of this study is to evaluate and enhance medication adherence in patients following coronary artery bypass graft (CABG) surgery.

Objectives:

To evaluate medication adherence among patients who have undergone coronary artery bypass graft (CABG) surgery and to develop and implement tools aimed at improving adherence in this patient population.

2. METHODOLOGY:

Study type: Prospective observational study

Study place and approval number: PSG institute of medical science and research, Coimbatore and Department of cardiothoracic and vascular surgery (CTVS) with the IHEC approval number 22/265 dated on 04-11-2022.

Study criteria:

In a study involving coronary artery bypass graft surgery, 110 patients were included out of 132 based on defined criteria. The study included both male and female patients below 70 years who underwent the surgery, while excluding those who declined consent, pregnant individuals, patients with psychiatric conditions, individuals under 18 years old, and patients who had simultaneous surgeries with CABG.

Study procedure and questionnaires:

A pre-validated questionnaire was employed to evaluate medication adherence among CABG patients, comprising 15 questions. This questionnaire draws on established scales such as Drug Attitude Inventory (DAI), Personal Evaluations of Transitions in Treatment (PETiT), Medication Adherence Rating Scale (MARS), Clinician Rating Scale (CRS), and Brief Adherence Rating Scale (BARS), which underwent validation by 17 experts. During the first visit after 2 weeks post-discharge, patients were assessed using this questionnaire [Table 1].

TABLES

SI.NO	Questions
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1	I remember the given medicine and the time to take the medicine
2	Have you ever skipped any medicine
3	I will take medicine at the correct time
4	I know the importance and the reason to take the medicines
5	I feel healthy after taking the medicine
6	I take all medicines, even if I feel healthy, without skipping
7	I take my medicine while travelling somewhere
8	I will not change the time and amount of medicines to be taken regularly
9	I Experience side effects while taking the given medicines
10	I Experience side effects while taking the given medicines, If agree What is the side effect?
11	All the medicine I am taking is at a reasonable price
12	I will listen to doctor's advice
13	Does your family support you in remembering all medicines
14	My medicines are improving my long-term health & surviving
15	I am comfortable with the number of medications.

Table 1: Questionnaires for medication adherence among patients

Patient's adherence to prescribed medications was evaluated using a 3-point scale (**1= strongly agree, 2= agree, 3= disagree**), with scores ranging from 21-45 indicating non-adherence. Based on this scoring, patients were classified into categories of good, moderate, and poor adherence. Subsequently, adherence-enhancing tools like Pillbox, Patient Information Leaflets, and Patient Counselling were provided. During the second follow-up visit after a month, patients' adherence was re-assessed using the same medication adherence questionnaire. Additionally, patient parameters such as ECHO (EF rate), blood sugar levels, and blood pressure were measured.

Statistical analysis:

Statistical analysis typically involves using tools like the Paired t-test in software such as SPSS version 24.

3. RESULTS:

In this study, 110 patients met the inclusion and exclusion criteria. The age group of 51–60 years was the most prevalent among the participants. Regarding gender distribution, male patients were predominant, comprising 80.9% of the study population, compared to 19.1% female patients. Co-morbidities significantly contributed to the incidence of coronary artery disease (CAD). The most frequently identified co-morbidity was type 2 diabetes mellitus, followed by hypertension, dyslipidemia, hypothyroidism, bronchial asthma, and psoriasis [Figure 1].

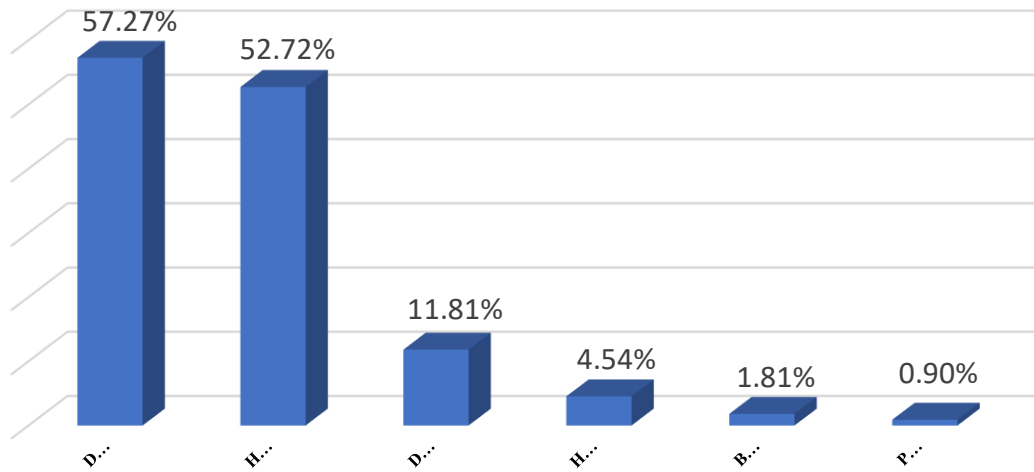


Figure 1: Co-Morbidities in Post-CABG Surgery patients

Another significant factor contributing to cardiovascular disease was social habits. In this study, 12.72% of the participants were alcoholics, and 7.27% were smokers. The two primary types of surgeries performed were ON-PUMP (CABG) and OFF-PUMP (OPCABG), with the majority of patients (66.36%) undergoing OPCABG. During the first follow-up visit after CABG surgery, medication adherence was evaluated using a questionnaire. The adherence levels were categorized as good, moderate, or poor, and based on these assessments, appropriate medication adherence tools were provided [Table 2].

CATEGORY	STEPS TO BE TAKEN FOR ADHERENCE
Good	Patient counselling
Moderate	Patient Information Leaflet
Poor	Pill box

Table 2: Category and medication adherence tools

During the second follow-up visit, which occurred a month later, the same medication adherence questionnaire was administered to evaluate the participants' adherence to their medications and the provided medication tools. When comparing adherence patterns between the initial and final visits, there was a notable improvement in the regularity of medication intake, which corresponded with better overall patient health [Figure 2].

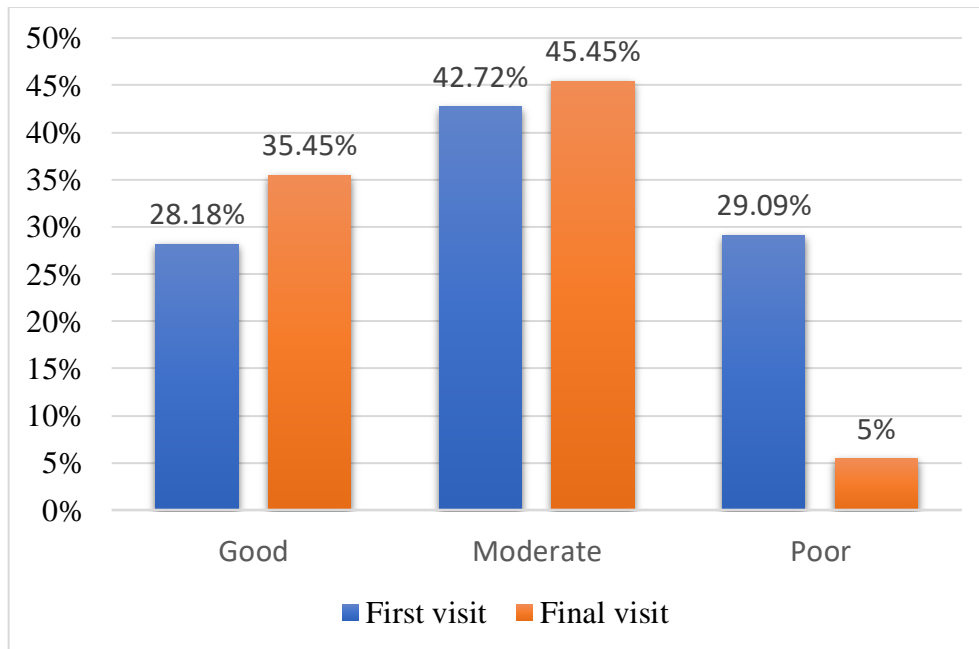


Figure2: medication adherence comparison in post-CABG patients

The primary barriers to medication adherence were identified as forgetfulness (14.54%), financial constraints (7.27%), inadequate follow-up (6.36%), health beliefs (4.54%), and side effects (2.72%) [Figure 3].

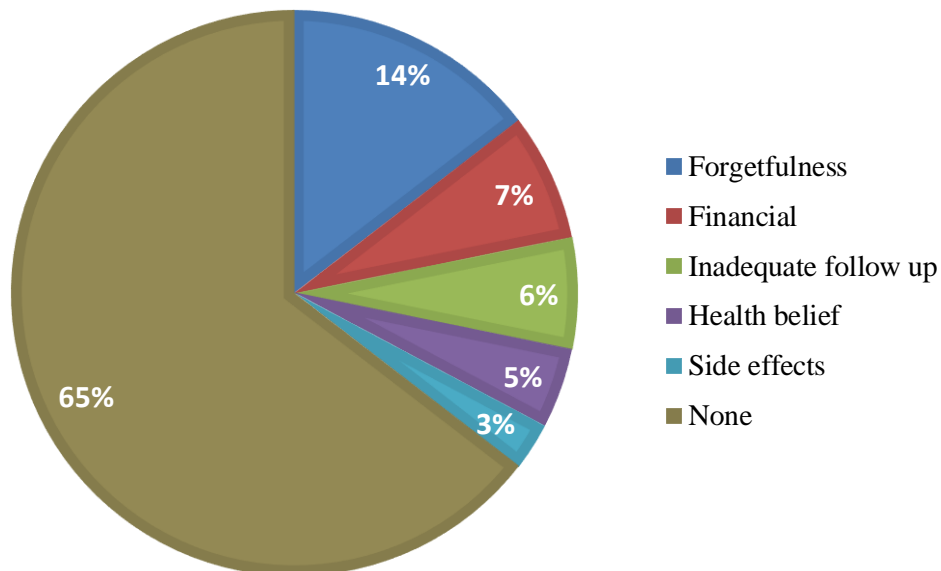


FIGURE 3: Barriers of Adherence in Post CABG Surgery Patients

The data was analyzed using SPSS version 24, employing a paired t-test with a p-value of $p < 0.001$. Medication adherence improved significantly when comparing the first visit to the final visit, with a mean \pm standard deviation of 4.618 ± 4.014 . Among the 110 patients, 94% showed improved adherence to their medication regimen, while 5.4% were unable to maintain adherence. The ejection fraction (EF) rate, which had a mean \pm standard deviation of 4.055 ± 10.978 , demonstrated a significant improvement with a p-value less than 0.001 when comparing the initial and final visits. Additionally, systolic blood pressure (BP) (17.964 ± 19.976) and diastolic BP (14.568 ± 15.417) both showed significant reductions, with p-

values less than 0.001. Blood sugar levels, with a mean \pm standard deviation of 0.018 ± 0.134 , also showed a significant improvement, with a p-value of 0.158 when comparing the first and final visits.

4. DISCUSSION:

After coronary artery bypass graft (CABG) surgery, improved medication adherence rates were associated with a reduced hospitalization rate ¹¹. This study identified forgetfulness, inadequate follow-up, and health beliefs as barriers to adherence, echoing findings by Haritha Arnipalli et al., who cited forgetfulness, poverty, and inadequate follow-up as common reasons for poor adherence. Most patients in this study reported good or moderate health, with only a few reporting poor health ¹². According to baseline patient data, Ujjaini Khanderia et al. found that patients' self-reported adherence behavior varied by age ¹³. This study also noted that using a pillbox significantly improved regular follow-up and decreased non-adherence among CABG patients, similar to findings by Odette N. Gould et al., who observed a decrease in non-adherence with pillbox usage in middle-aged and elderly patients ⁷.

Pillbox usage is anticipated to improve significantly in the coming years, playing a crucial role in enhancing medication adherence across various diseases. In this study, the pillbox was essential in mitigating non-adherence. Igor Straka et al. demonstrated that pillbox usage in Parkinson's disease (PD) patients led to improved motor function. This method is also applicable to post-CABG surgery patients, helping to reduce medication errors ⁹. Consequently, pillboxes are integral to medication administration tools. Additionally, the Patient Information Leaflet (PIL) proved beneficial for patients who struggled with regular medication intake, enhancing their drug knowledge. In this study, patient counseling significantly improved medication adherence, paralleling the findings of Sarfaraz MD et al., who reported that counseling patients on medication use enhanced adherence and overall well-being. The use of adherence tools in this study also resulted in improved blood pressure and blood sugar levels ¹⁴. This finding aligns with Sarah Pousinho et al.'s study, which observed improvements in HbA1c, blood pressure, lipid profiles, and medication adherence in the intervention group during the follow-up period ¹⁵. Moreover, although ejection fraction typically increases after CABG surgery, this study found a substantial improvement in ejection fraction rates above 50%, reaching 77%, due to enhanced medication adherence. This result is consistent with Perry et al.'s study, which reported improvements in left ventricular ejection fraction ¹⁶.

5. CONCLUSION:

Post-CABG surgery patients were provided with tools such as pill boxes, patient information leaflets, and counseling to enhance medication adherence. This intervention led to significant improvements in ejection fraction rates, blood sugar, and blood pressure levels, along with better knowledge, attitudes, and behaviors. Pharmacists, working with other healthcare professionals, played a crucial role in monitoring adherence and addressing barriers like forgetfulness, medication complexity, and dosage confusion. Their education efforts improved patients' willingness to adhere to medications and fostered a desire for self-improvement, positively impacting health outcomes. Pharmacist care was shown to be beneficial in reducing mortality and morbidity in these patients, especially in middle-aged and older groups where adherence is critical for better health.

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6. REFERENCES:

1. Malakar AK, Choudhury D, Halder B, et al., 2019. A review on coronary artery disease, its risk factors, and therapeutics. *J Cell Physiol.* 234(10),16812-16823.
2. Madhavan MV, Gersh BJ, Alexander KP, et al., 2018. Coronary artery disease in patients ≥ 80 years of age. *J Am Coll Cardiol.* 71(18),2015-2040.
3. Cebeci F, Celik SS. 2008. Discharge training and counselling increase self-care ability and reduce post discharge problems in CABG patients. *J Clin Nurs.* 17(3),412-20.
4. Polzl L, Thielmann M, Cymorek S, et al., 2022. Impact of myocardial injury after coronary artery bypass grafting on long-term prognosis. *Eur Heart J.* 43(25),2407-2417.
5. WHO. Adherence to long-term therapies: evidence for Action: World Health Organization, 2003
6. Mira JJ, Navarro I, Botella F, et al., 2014. A spanish pillbox app for elderly patients taking multiple medications: randomized controlled trial. *J Med Internet Res.* 16(4),e99.
7. Gould ON, Todd L, Irvine-Meek J, 2009. Adherence devices in a community sample: How are pillboxes used? *Canadian Pharmacists Journal / Revue des Pharmaciens du Canada.* 142(1),28-35.
8. Hayes TL, Larimer N, Adami A, et al., 2009. Medication adherence in healthy elders: small cognitive changes make a big difference. *Journal of aging and health.* 21 (4),567-80.
9. Straka I, Minar M, Grofik M, et al., 2022. Effect of pillbox organizers with alarms on adherence to pharmacotherapy in parkinson disease patients taking three and more daily doses of dopaminergic medications. *J Pers Med.* 12(2),179.
10. Herber OR, Gies V, Schwappach D, et al., 2014. Patient information leaflets: informing or frightening? A focus group study exploring patients' emotional reactions and subsequent behavior towards package leaflets of commonly prescribed medications in family practices. *BMC Fam Pract.* 15,163.
11. Balasi, L.R., Paryad, E., Booraki, S., et al., 2015. Medication adherence after CABG and its related to medication belief. *Biomedical and Pharmacology Journal,* 8, 603-610.
12. Arnipalli, Haritha, Bala, Sudha, Pandve, Harshal, 2020. Medication adherence and its determinants among women of cardiovascular disease of tertiary Care hospital, hyderabad. *Indian Journal of Cardiovascular Disease in Women WINCARS* 5. 315-321.
13. Khanderia U, Townsend KA, Erickson SR, et al., 2008. Medication adherence following coronary artery bypass graft surgery: assessment of beliefs and attitudes. *Ann Pharmacother.* 42(2),192-9.
14. Sarfaraz d, George, Amrutha; S, Nivya, et al., 2020 "Development and evaluation of patient information leaflet usefulness in Patients with hypertension in a tertiary care teaching hospital," *Manipal Journal of Pharmaceutical Sciences.* 6(2), 8.

15. Pousinho S, Morgado M, Falcão A, et al., 2016. Pharmacist interventions in the management of type 2 diabetes mellitus: A systematic review of randomized Controlled Trials. *J Manag Care Spec Pharm.* May;22(5):493-515.
16. Valerie santschi, Arnaud chiolero, April L. colosimo, et al.,2014. Improving blood pressure control through pharmacist interventions: A meta-analysis of randomized controlled trials. *Journal of the American Heart Association.* 3, e000718.