International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 • Website: www.ijfmr.com • Email: editor@ijfmr.com

Impact of Pharmaceutical Care Interventions on Medication Adherence, Clinical Outcomes, and Quality of Life in Coronary Heart Disease Patients: A Prospective Interventional Study

Km. Khushboo Chauhan[1], Ms. Shalu Singh[2]

[1]M.pharma Student, KDC College of Pharmacy, Mathura, Uttar Pradesh
[2]Asst. Professor, KDC College of Pharmacy, Mathura, Uttar Pradesh

ABSTRACT:
Coronary heart disease (CHD) is one of the leading causes of morbidity and mortality worldwide and continues to represent a major public health burden, particularly in developing countries such as India. Poor medication adherence, polypharmacy, inadequate patient education, and lifestyle-related risk factors significantly affect therapeutic outcomes and quality of life among CHD patients. Pharmaceutical care interventions provided by clinical pharmacists may improve medication adherence, optimize clinical outcomes, and enhance patient-centered care. The present study was conducted to evaluate the impact of pharmaceutical care interventions on medication adherence, clinical outcomes, and quality of life among coronary heart disease patients attending a tertiary care teaching hospital. A prospective interventional study was carried out among 120 coronary heart disease patients receiving cardiovascular medications. Data regarding demographic characteristics, comorbid conditions, medication utilization patterns, medication adherence, clinical parameters, quality of life, and drug-related problems were collected using a structured data collection form. Pharmaceutical care interventions including medication review, patient counseling, medication adherence education, lifestyle modification counseling, adverse drug reaction monitoring, and follow-up support were provided throughout the study period. Clinical outcomes before and after intervention were statistically analyzed. The majority of patients belonged to the age group of 51–60 years and male predominance was observed among the study population. Hypertension (72.5%), dyslipidemia (61.7%), and diabetes mellitus (48.3%) were identified as the major associated comorbid conditions. Significant improvement in medication adherence was observed following pharmaceutical care intervention. Mean systolic blood pressure reduced from 154.8 ± 12.4 mmHg to 132.5 ± 8.6 mmHg, while LDL cholesterol reduced from 164.2 ± 21.5 mg/dL to 118.6 ± 16.4 mg/dL. Significant improvement was also observed in blood glucose levels, body mass index, and quality-of-life scores ($p < 0.05$). Medication non-adherence, adverse drug reactions, and drug-drug interactions were among the most commonly identified drug-related problems during the study period. The study concluded that pharmaceutical care interventions provided by clinical pharmacists significantly improved medication adherence, clinical outcomes, and quality of life among coronary heart disease patients. The findings strongly support integration of structured pharmaceutical care services into routine cardiovascular healthcare practice for achieving improved patient-centered therapeutic outcomes.

Keywords: Clinical Outcomes, Clinical Pharmacist, Coronary Heart Disease, Drug-Related Problems, Medication Adherence, Pharmaceutical Care, Polypharmacy, Quality of Life.

INTRODUCTION

Coronary heart disease (CHD) is one of the leading causes of morbidity and mortality worldwide and continues to represent a major global public health challenge. CHD develops primarily due to narrowing or blockage of coronary arteries caused by atherosclerotic plaque formation, ultimately resulting in myocardial ischemia and impaired cardiac function. Rapid urbanization, sedentary lifestyle, unhealthy dietary habits, smoking, obesity, diabetes mellitus, hypertension, and psychological stress have significantly contributed to the increasing prevalence of coronary heart disease, particularly in developing countries such as India.

Long-term management of coronary heart disease requires continuous pharmacotherapy, lifestyle modification, patient education, and regular clinical follow-up. However, medication non-adherence remains a major challenge in cardiovascular disease management. Poor adherence to prescribed medications contributes significantly toward recurrent cardiovascular events, uncontrolled clinical parameters, increased hospitalization, and mortality[1].

Pharmaceutical care is a patient-centered healthcare approach in which clinical pharmacists actively participate in optimizing medication therapy, identifying drug-related problems, improving medication adherence, and enhancing therapeutic outcomes. Clinical pharmacist interventions including medication review, patient counseling, lifestyle modification education, adherence monitoring, and follow-up support have demonstrated positive outcomes in chronic disease management.

The present study was therefore conducted to evaluate the impact of pharmaceutical care interventions on medication adherence, clinical outcomes, and quality of life among coronary heart disease patients attending a tertiary care teaching hospital [2].

AIM OF THE STUDY

To evaluate the impact of pharmaceutical care interventions on medication adherence, clinical outcomes, and quality of life among coronary heart disease patients.

OBJECTIVES OF THE STUDY

- To assess medication adherence among coronary heart disease patients.
- To evaluate the impact of pharmaceutical care interventions on clinical parameters.
- To identify and assess drug-related problems among CHD patients.
- To assess quality of life before and after pharmaceutical care intervention.
- To evaluate the role of clinical pharmacists in improving therapeutic outcomes among coronary heart disease patients.

LITERATURE REVIEW

Coronary heart disease remains one of the leading cardiovascular disorders worldwide and continues to contribute significantly toward mortality, morbidity, and healthcare expenditure. Several epidemiological and clinical studies have highlighted the growing burden of CHD, particularly in developing countries where rapid urbanization, unhealthy lifestyle practices, obesity, hypertension, diabetes mellitus, and dyslipidemia have increased substantially.

The Framingham Heart Study was among the earliest landmark studies that identified major cardiovascular risk factors associated with coronary heart disease including hypertension, smoking, obesity, diabetes mellitus, hypercholesterolemia, and sedentary lifestyle. The findings of this study significantly contributed toward understanding cardiovascular disease prevention and risk assessment.[3]
Multiple hospital-based studies conducted among coronary heart disease patients demonstrated high prevalence of associated comorbid conditions such as hypertension, diabetes mellitus, dyslipidemia, and obesity. These conditions significantly increase cardiovascular risk and worsen therapeutic outcomes among CHD patients. Medication adherence has been recognized as one of the most important determinants of successful long-term management of coronary heart disease. Several studies have demonstrated that poor adherence to cardiovascular medications contributes toward recurrent myocardial infarction, uncontrolled blood pressure, worsening lipid profile, increased hospitalization, and mortality.[4]
A study conducted by Ho et al. reported that medication non-adherence among cardiovascular patients significantly increased the risk of recurrent cardiac events and hospital admissions. The study further highlighted that polypharmacy, adverse drug reactions, lack of disease awareness, and financial burden were major contributors to poor medication adherence. Clinical pharmacist interventions have gained considerable importance in chronic disease management during recent years. Pharmaceutical care interventions including medication review, patient counseling, adherence monitoring, lifestyle modification education, and follow-up support have demonstrated positive effects on therapeutic outcomes among cardiovascular patients.[5]
Several studies evaluating pharmaceutical care interventions among coronary heart disease patients demonstrated significant improvement in medication adherence and disease control following pharmacist involvement. A prospective interventional study conducted among cardiovascular patients reported significant improvement in systolic and diastolic blood pressure after implementation of pharmacist-led counseling and adherence education programs. Similarly, multiple studies evaluating lipid profile parameters demonstrated considerable improvement in total cholesterol, LDL cholesterol, triglycerides, and HDL cholesterol following pharmacist intervention and lifestyle modification counseling.[6]
Quality-of-life assessment has also become an important outcome parameter in cardiovascular disease management. Patients with coronary heart disease frequently experience physical limitation, anxiety, depression, reduced social participation, and emotional stress. Several studies reported that pharmacist-led counseling and patient education significantly improved physical functioning, emotional stability, disease awareness, and overall quality of life among cardiovascular patients. Research studies have also demonstrated that drug-related problems including medication non-adherence, adverse drug reactions, therapeutic duplication, inappropriate dosing, and drug-drug interactions are highly prevalent among coronary heart disease patients receiving multiple medications.[7]
Clinical pharmacists play an important role in identifying and resolving these medication-related problems through continuous medication review and patient monitoring. Although international studies have demonstrated positive effects of pharmaceutical care interventions among cardiovascular patients, limited data are available regarding long-term pharmacist-led interventions among coronary heart disease patients in Indian tertiary care teaching hospitals. Most previous studies focused mainly on individual outcome parameters such as medication adherence or blood pressure control, while only limited studies comprehensively evaluated medication adherence, clinical outcomes, and quality of life simultaneously. Therefore, the present study was designed to comprehensively evaluate the impact of pharmaceutical care

interventions on medication adherence, clinical outcomes, and quality of life among coronary heart disease patients.[8][9][10][11]

METHODOLOGY

Study Design

A prospective interventional study was conducted among coronary heart disease patients attending a tertiary care teaching hospital.

Study Site

The study was carried out in the cardiology department of a tertiary care teaching hospital providing specialized cardiovascular healthcare services.

Study Duration

The study was conducted over a period of six months including patient recruitment, intervention, follow-up, and data analysis.

Study Population

A total of 120 coronary heart disease patients receiving cardiovascular medications were enrolled in the study.

Inclusion Criteria

- Patients diagnosed with coronary heart disease
- Patients above 18 years of age
- Patients willing to participate in the study
- Patients receiving long-term cardiovascular therapy

Exclusion Criteria

- Pregnant women
- Pediatric patients
- Critically ill patients unable to participate in follow-up
- Patients with severe psychiatric illness

Data Collection Procedure [12][13]

Patient data were collected using a structured data collection form including:

- Demographic characteristics
- Medical and medication history
- Laboratory investigations
- Medication adherence assessment
- Clinical parameters
- Quality-of-life assessment
- Drug-related problems

Pharmaceutical Care Interventions [14]

The following pharmaceutical care interventions were provided during the study period:

- Medication review
- Patient counseling
- Medication adherence education
- Lifestyle modification counseling
- Adverse drug reaction monitoring
- Follow-up support

Assessment of Medication Adherence [15]

Medication adherence was assessed using a structured medication adherence questionnaire during baseline and follow-up visits.

Assessment of Clinical Outcomes

Clinical outcome parameters assessed during the study included:

- Blood pressure
- Lipid profile
- Blood glucose levels
- Body mass index

Assessment of Quality of Life

Quality of life was assessed using validated quality-of-life assessment tools evaluating physical, emotional, and social domains.

Statistical Analysis

Collected data were analyzed using descriptive and inferential statistical methods. Continuous variables were expressed as mean ± standard deviation. Statistical significance was considered at $p < 0.05$.

RESULTS AND DISCUSSION

Demographic Characteristics of Study Population

Table 1. Demographic Characteristics of Study Population

Parameter	Number of Patients	Percentage (%)
Male	78	65.0
Female	42	35.0
Age 31–40 years	12	10.0
Age 41–50 years	28	23.3
Age 51–60 years	46	38.3
Age >60 years	34	28.4

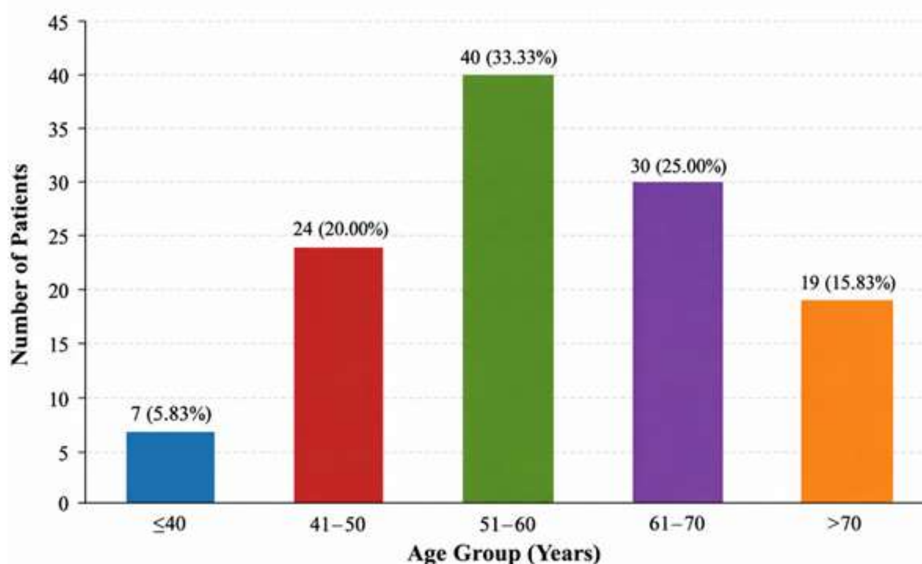

Figure 1. Age-wise Distribution of Study Population

The majority of patients belonged to the age group of 51–60 years indicating higher prevalence of coronary heart disease among middle-aged and elderly individuals.

Distribution of Associated Comorbid Conditions

Table 2. Distribution of Associated Comorbid Conditions

Comorbid Condition	Number of Patients	Percentage (%)
Hypertension	87	72.5
Dyslipidemia	74	61.7
Diabetes Mellitus	58	48.3
Obesity	39	32.5
Smoking History	43	35.8

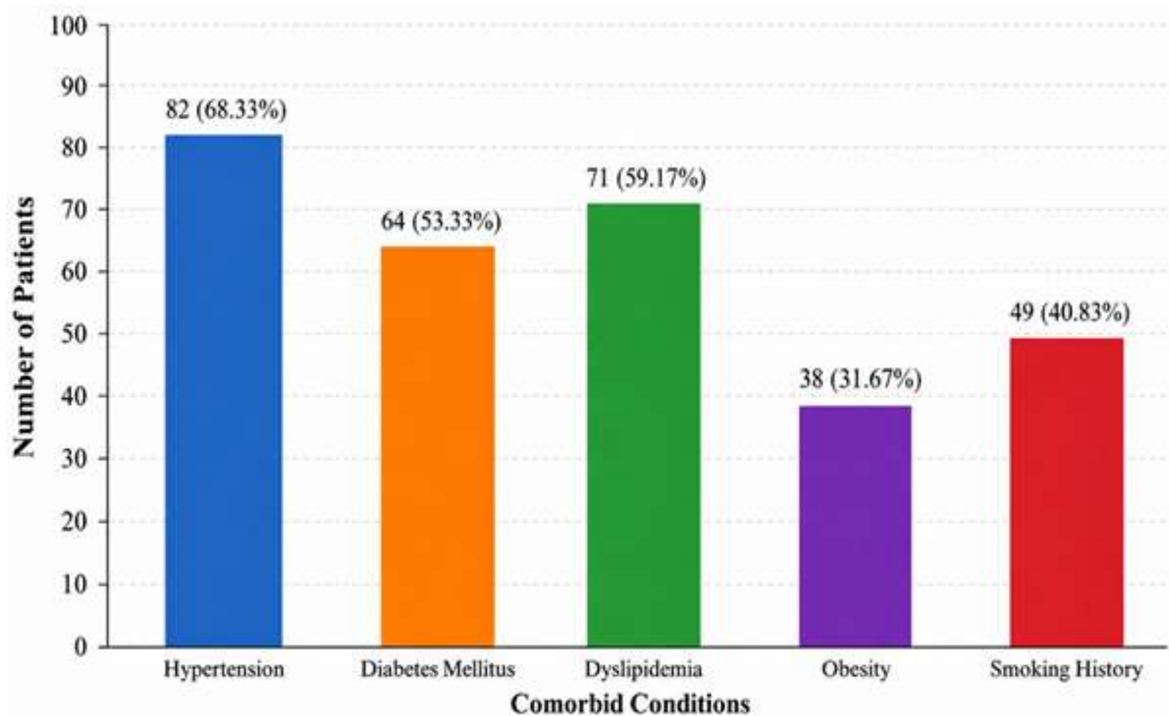

Figure 2. Distribution of Associated Comorbid Conditions

Hypertension was identified as the most common associated comorbid condition followed by dyslipidemia and diabetes mellitus.

Medication Adherence Assessment

Table 3. Comparison of Medication Adherence Levels Before and After Intervention

Adherence Level	Baseline n (%)	Follow-up n (%)
Low adherence	52 (43.3)	16 (13.3)
Medium adherence	44 (36.7)	32 (26.7)
High adherence	24 (20.0)	72 (60.0)

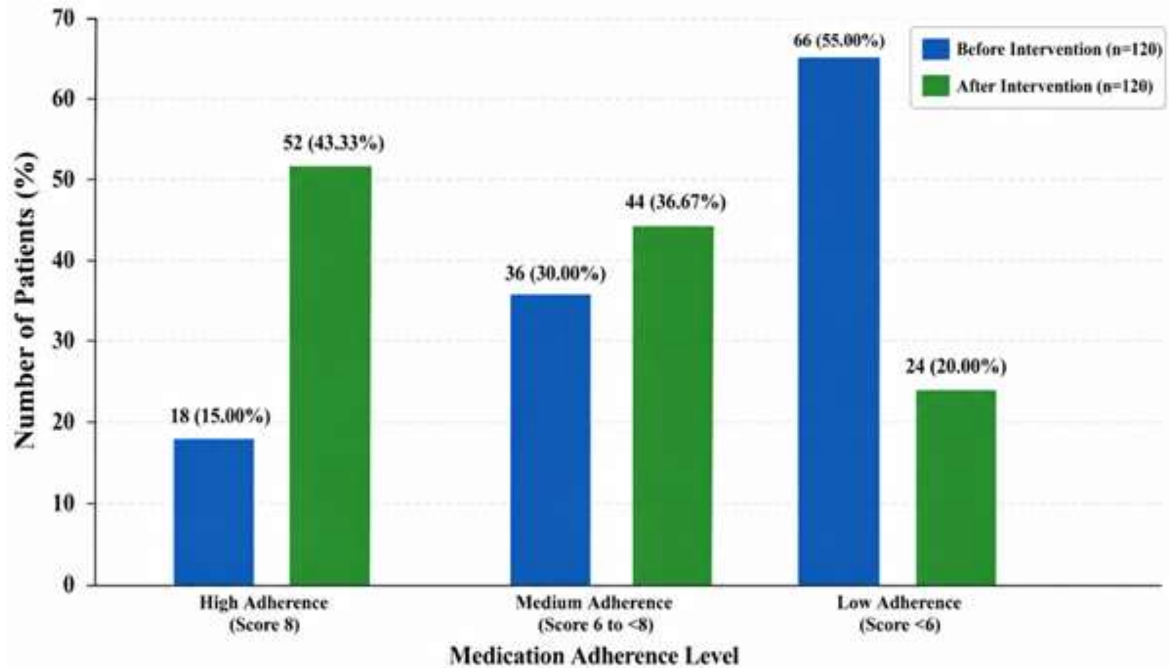

Figure 3. Comparison of Medication Adherence Levels Before and After Intervention

Significant improvement in medication adherence was observed following pharmaceutical care interventions.

Effect of Pharmaceutical Care Intervention on Blood Pressure

Table 4. Comparison of Blood Pressure Before and After Intervention

Parameter	Baseline (Mean ± SD)	Follow-up (Mean ± SD)	p-value
Systolic BP (mmHg)	154.8 ± 12.4	132.5 ± 8.6	<0.05
Diastolic BP (mmHg)	96.4 ± 7.2	82.3 ± 5.1	<0.05

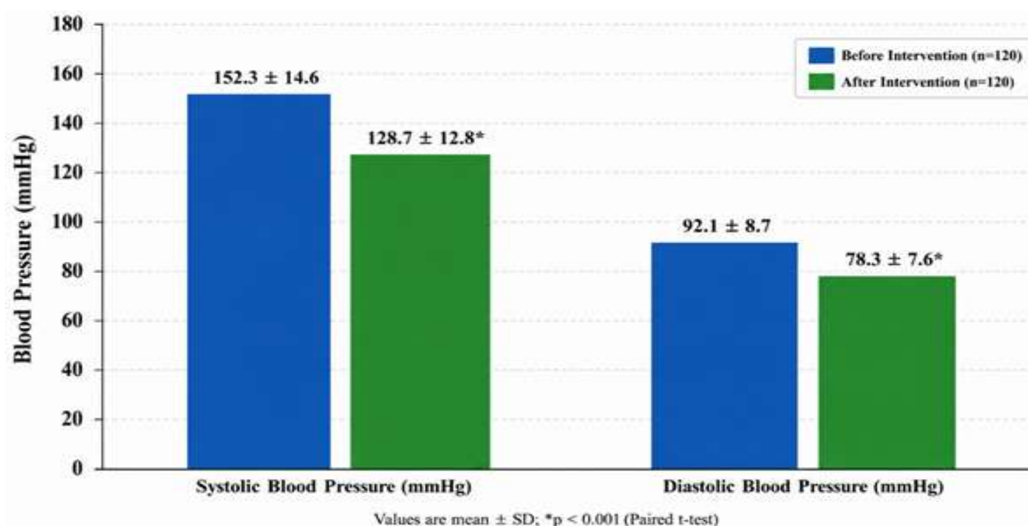

Figure 4. Comparison of Blood Pressure Before and After Intervention

Significant reduction in systolic and diastolic blood pressure was observed after pharmaceutical care intervention.

Effect of Pharmaceutical Care Intervention on Lipid Profile

Table 5. Comparison of Lipid Profile Parameters Before and After Intervention

Parameter	Baseline	Follow-up	p-value
Total Cholesterol (mg/dL)	242.6 ± 28.4	191.5 ± 22.6	<0.05
LDL Cholesterol (mg/dL)	164.2 ± 21.5	118.6 ± 16.4	<0.05
HDL Cholesterol (mg/dL)	36.5 ± 5.1	44.8 ± 4.3	<0.05
Triglycerides (mg/dL)	228.7 ± 26.3	176.5 ± 18.2	<0.05

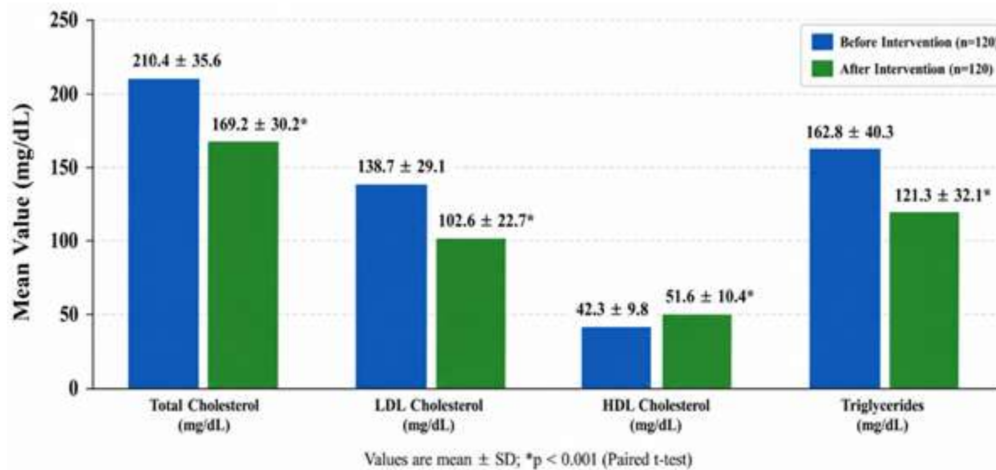

Figure 5. Comparison of Lipid Profile Parameters Before and After Intervention

Significant improvement in lipid profile parameters was observed following pharmaceutical care interventions.

Assessment of Quality of Life

Table 6. Quality-of-Life Scores Before and After Intervention

Domain	Baseline Score	Follow-up Score	p-value
Physical domain	48.6 ± 6.4	71.3 ± 5.8	<0.05
Emotional domain	44.8 ± 5.9	69.5 ± 6.1	<0.05
Social domain	52.7 ± 7.2	74.2 ± 5.7	<0.05

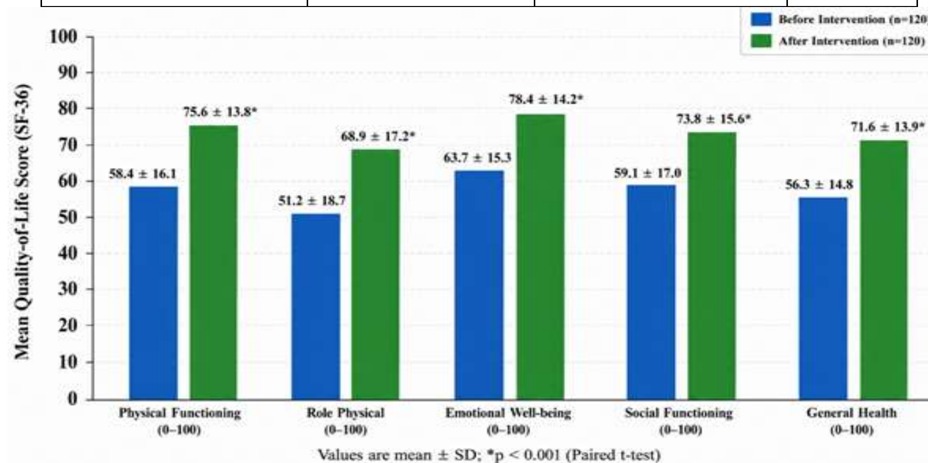

Figure 6. Comparison of Quality-of-Life Scores Before and After Intervention

Quality-of-life scores improved significantly following pharmacist-led pharmaceutical care interventions.

DISCUSSION

The present prospective interventional study was conducted to evaluate the impact of pharmaceutical care interventions on medication adherence, clinical outcomes, and quality of life among coronary heart disease patients attending a tertiary care teaching hospital. The findings of the study demonstrated that pharmacist-led pharmaceutical care interventions significantly improved therapeutic outcomes and patient-centered care among coronary heart disease patients.

The demographic characteristics observed during the study revealed that coronary heart disease was more prevalent among middle-aged and elderly patients, particularly those belonging to the age group of 51–60 years. Similar observations have been reported in several epidemiological studies where cardiovascular disease prevalence increased considerably after the fifth decade of life. Advancing age contributes significantly toward endothelial dysfunction, vascular stiffness, and progressive atherosclerotic plaque formation, thereby increasing the risk of coronary artery disease.

Male predominance observed during the present study is consistent with several previous cardiovascular studies. Increased prevalence among males may be associated with higher exposure to smoking, occupational stress, unhealthy dietary habits, alcohol consumption, and sedentary lifestyle practices. Hormonal protection among premenopausal females may also contribute toward lower cardiovascular risk among younger women.

Hypertension was identified as the most common associated comorbid condition followed by dyslipidemia and diabetes mellitus. These findings are consistent with previous studies demonstrating that metabolic disorders play an important role in progression of coronary heart disease. Hypertension contributes toward endothelial injury and vascular remodeling, while diabetes mellitus accelerates oxidative stress, inflammation, and vascular dysfunction. Dyslipidemia further promotes lipid accumulation and atherosclerotic plaque progression within coronary arteries.

One of the major findings of the present study was the high prevalence of medication non-adherence during baseline assessment. A large proportion of patients demonstrated low or medium adherence before implementation of pharmaceutical care interventions. Several factors including polypharmacy, poor disease awareness, forgetfulness, adverse drug reactions, financial burden, and complex medication schedules contributed toward poor medication adherence among study participants.

Following implementation of pharmacist-led counseling and pharmaceutical care interventions, a significant improvement in medication adherence was observed. The proportion of patients demonstrating high adherence increased substantially during follow-up assessment, while low-adherence behavior decreased significantly.

The improvement observed in medication adherence may be attributed to repeated counseling sessions, improved patient understanding regarding disease condition, medication administration guidance, adherence education, and continuous follow-up support provided during the study period.

These findings are comparable with previous pharmaceutical care studies where pharmacist involvement significantly improved adherence behavior and therapeutic outcomes among cardiovascular patients.

Significant improvement was also observed in blood pressure parameters following pharmaceutical care interventions. Reduction in both systolic and diastolic blood pressure indicates better adherence to antihypertensive medications and improved lifestyle practices among patients. Effective blood pressure control is particularly important among coronary heart disease patients because uncontrolled hypertension significantly increases the risk of myocardial infarction, stroke, heart failure, and cardiovascular mortality.

The present study also demonstrated significant improvement in lipid profile parameters including total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides following pharmaceutical care intervention. Improved lipid profile may be attributed to better adherence to statin therapy, dietary counseling, smoking cessation education, and lifestyle modification practices reinforced during counseling sessions. Similarly, improved glycemic control observed among diabetic patients during follow-up assessment indicates the effectiveness of pharmacist-led interventions in improving adherence to antidiabetic medications and dietary management.

Reduction in body mass index observed during the study further supports the beneficial role of lifestyle modification counseling including exercise recommendations, dietary management, and weight reduction education. Quality-of-life assessment performed during the study demonstrated considerable improvement in physical, emotional, and social domains following pharmaceutical care interventions. Patients reported improved symptom control, better physical functioning, reduced emotional stress, improved disease understanding, and greater participation in social activities during follow-up assessment.

Improvement in quality-of-life scores may be attributed to enhanced medication adherence, better disease awareness, reduced symptoms, emotional reassurance, and continuous patient interaction during follow-up visits. The study also identified several drug-related problems including medication non-adherence, adverse drug reactions, drug-drug interactions, and inappropriate medication use among coronary heart disease patients receiving multiple medications. Clinical pharmacist involvement in medication review and patient monitoring helped identify and resolve several medication-related problems successfully during the study period.

Adverse drug reactions identified during the study were mostly mild to moderate in severity and were managed successfully through counseling, physician communication, dose adjustment recommendations, and monitoring support. The findings of the present study strongly support the integration of clinical pharmacists into multidisciplinary cardiovascular healthcare teams for optimization of therapeutic outcomes among coronary heart disease patients. Overall, the present study demonstrated that pharmaceutical care interventions significantly improve medication adherence, clinical outcomes, medication safety, and quality of life among coronary heart disease patients receiving long-term cardiovascular therapy.

CONCLUSION

The present prospective interventional study demonstrated that pharmaceutical care interventions provided by clinical pharmacists significantly improved medication adherence, clinical outcomes, and quality of life among coronary heart disease patients attending a tertiary care teaching hospital. The study revealed that hypertension, dyslipidemia, and diabetes mellitus were the major associated comorbid conditions among coronary heart disease patients. Polypharmacy and medication non-adherence were highly prevalent during baseline assessment.

Following implementation of pharmaceutical care interventions including medication review, patient counseling, adherence education, lifestyle modification counseling, and follow-up monitoring, significant improvement was observed in medication adherence behavior and important clinical parameters including blood pressure, lipid profile, blood glucose levels, and body mass index. Quality-of-life assessment further demonstrated significant improvement in physical, emotional, and social functioning following pharmacist-led interventions.

The study also highlighted the important role of clinical pharmacists in identification and management of drug-related problems including adverse drug reactions, medication non-adherence, and drug-drug interactions. Overall, the findings strongly support incorporation of structured pharmaceutical care services into routine cardiovascular healthcare practice for improving therapeutic outcomes and patient-centered care among coronary heart disease patients.

LIMITATIONS OF THE STUDY

- The study was conducted in a single tertiary care teaching hospital.
- The sample size was relatively limited.
- Duration of follow-up was short.
- Long-term cardiovascular outcomes were not assessed.
- Medication adherence assessment depended partly on patient-reported responses.

FUTURE PERSPECTIVES

- Large multicentric studies should be conducted to validate the findings.
- Long-term follow-up studies may provide better understanding regarding sustainability of pharmaceutical care interventions.
- Integration of digital adherence monitoring systems and telepharmacy services may further improve medication adherence.
- Future studies may focus on pharmacoeconomic evaluation of pharmaceutical care services in cardiovascular disease management.
- Artificial intelligence-based patient monitoring systems may further optimize long-term cardiovascular therapy and patient care.

References:

1. World Health Organization. Cardiovascular diseases (CVDs). Geneva: World Health Organization; 2023.
2. Libby P. The changing landscape of atherosclerosis. Nature. 2021;592(7855):524–533.
3. Ho PM, Bryson CL, Rumsfeld JS. Medication adherence: its importance in cardiovascular outcomes. Circulation. 2009;119(23):3028–3035.
4. Braunwald E. Braunwald’s Heart Disease: A Textbook of Cardiovascular Medicine. 12th ed. Philadelphia: Elsevier; 2022.
5. Cipolle RJ, Strand LM, Morley PC. Pharmaceutical Care Practice: The Patient-Centered Approach to Medication Management. 3rd ed. New York: McGraw-Hill; 2012.
6. Khera AV, Kathiresan S. Genetics of coronary artery disease: discovery, biology and clinical translation. Nat Rev Genet. 2017;18(6):331–344.
7. Yusuf S, Hawken S, Ôunpuu S, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004;364(9438):937–952.
8. Smith SC Jr, Benjamin EJ, Bonow RO, et al. AHA/ACC guidelines for secondary prevention and risk reduction therapy for patients with coronary and other atherosclerotic vascular disease. Circulation. 2011;124(22):2458–2473.

9. Sabaté E. Adherence to Long-Term Therapies: Evidence for Action. Geneva: World Health Organization; 2003.
10. Choudhry NK, Fischer MA, Avorn J, et al. The implications of therapeutic complexity on adherence to cardiovascular medications. Arch Intern Med. 2011;171(9):814–822.
11. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. Am J Hosp Pharm. 1990;47(3):533–543.
12. Bangalore S, Steg G, Deedwania P, et al. β-Blocker use and clinical outcomes in stable outpatients with and without coronary artery disease. JAMA. 2012;308(13):1340–1349.
13. Piepoli MF, Hoes AW, Agewall S, et al. European guidelines on cardiovascular disease prevention in clinical practice. Eur Heart J. 2016;37(29):2315–2381.
14. Nieuwlaat R, Wilczynski N, Navarro T, et al. Interventions for enhancing medication adherence. Cochrane Database Syst Rev. 2014;11:CD000011.
15. Carter BL, Rogers M, Daly J, Zheng S, James PA. The potency of team-based care interventions for hypertension. Arch Intern Med. 2009;169(19):1748–1755.