

CLINICAL EVALUATION OF CARDIOVASCULAR DISEASE: IMPACT OF OBESITY, PHARMACOECONOMIC BURDEN, AND EPIDEMIOLOGICAL ASSESSMENT IN LAHORE

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Abstract

Cardiovascular disease (CVD) represents a major public health concern worldwide and is associated with substantial morbidity, mortality, and healthcare burden. The present descriptive cross-sectional study was conducted among selected cardiovascular disease patients attending healthcare facilities in Lahore to assess obesity patterns, medication expenditure, and commonly observed lifestyle-related and clinical factors among the studied population.

A total of 100 participants were included in the study. Data were analyzed using descriptive statistics, and the Chi-square test was applied to evaluate associations between categorical variables, including gender and obesity status. The findings demonstrated a higher proportion of obesity among female participants compared with male participants. BMI analysis showed that 16% of participants were obese, while hyperlipidemia/cholesterol-related disease, fast food consumption, and smoking were reported in 67%, 59%, and 45% of participants, respectively.

The medication expenditure assessment indicated that most participants reported monthly medicine expenses below 5,000 PKR. However, detailed pharmacoeconomic parameters such as hospitalization costs, treatment adherence, indirect costs, and cost-effectiveness analysis were not evaluated in the present study.

The findings highlight commonly observed lifestyle-related and metabolic patterns among selected cardiovascular disease patients and emphasize the importance of healthy lifestyle practices, dietary awareness, smoking cessation, weight management, and accessible healthcare services. Because of the cross-sectional hospital-based design and limited sample size, the findings should not be generalized to the wider population and do not establish causal relationships.

1 INTRODUCTION:

Cardiovascular disease (CVD) refers to a group of disorders affecting the heart and blood vessels, including coronary artery disease, hypertension-related heart disease, arrhythmias, cardiomyopathies, and heart failure.¹ The heart is a muscular organ consisting of four chambers: two atria and two ventricles. Deoxygenated blood enters the right atrium, passes into the right ventricle, and is pumped to the lungs for oxygenation. Oxygenated blood then enters the left atrium, moves to the left ventricle, and is circulated throughout the body.² Any impairment in cardiac structure or function may reduce cardiac output and contribute to the development or progression of cardiovascular disorders. Heart failure (HF) is one important clinical manifestation of cardiovascular disease in which the heart is unable to pump sufficient blood to meet the body's metabolic demands.³ The disease develops due to structural or functional abnormalities of the heart that impair ventricular filling or ejection of blood. Common contributing conditions include hypertension, arrhythmias, diabetes mellitus, obesity, cardiomyopathy, valvular heart disease, and hyperlipidemia.^{1, 4} Cardiovascular diseases are diagnosed using clinical evaluation, laboratory investigations, and imaging techniques including electrocardiography, echocardiography, lipid profile assessment, and blood glucose testing.⁵ Studies have shown that obesity contributes significantly to the progression of HFs several laboratory and imaging investigations including complete blood count, serum electrolytes, lipid profile, HbA1c, electrocardiography, echocardiography, chest X-ray, and B-type natriuretic peptide testing.⁶ Obesity is considered one of the most significant risk factors for Cardiovascular disease, Excess body weight increases cardiac workload, blood pressure, and lipid accumulation, which may contribute to cardiac hypertrophy and progression of cardiovascular disorders.⁷ Studies have shown that obesity contributes significantly to the progression of HF and increases hospitalization rates. In addition to clinical burden, HF imposes

a major economic burden on healthcare systems worldwide due to repeated hospital admissions and long-term treatment requirements.⁸

The present study aimed to assess obesity patterns, medication expenditure, and commonly observed lifestyle-related factors among selected cardiovascular disease patients attending healthcare facilities in Lahore. Statistical analysis in this study was performed using descriptive statistics and Chi-square tests to evaluate associations between categorical variables.

2 Materials and Methods

2.1 Study Design

A descriptive observational cross-sectional study was conducted to assess obesity patterns, medication expenditure, and commonly observed lifestyle-related factors among selected cardiovascular patients attending hospitals and community pharmacies in Lahore.⁹

2.2 Study Duration

The study was completed within a period of five months.

2.3 Study Settings

Data were collected from selected healthcare facilities in Lahore, including Punjab Institute of Cardiology, Umar Hospital, Bashir Sons Pharmacy, Masud Pharmacy, and Fazal Din Pharmacy. Data collection was performed through patient interviews and survey questionnaires.¹⁰

2.4 Sample Size

A total of 100 cardiovascular disease patients were included in the study.

2.5 Inclusion Criteria

Participants included in the study were adults aged 20 years or older with physician-documented cardiovascular disease or cardiac-related illness who were receiving treatment from hospitals or community pharmacies. Participants commonly presented with associated conditions including hypertension, diabetes mellitus, hyperlipidemia, and obesity.

Patient eligibility was assessed using available medical history, prescription records, and

participant interviews. Because standardized diagnostic investigations such as echocardiography, ejection fraction measurements, BNP/NT-proBNP levels, and NYHA classification were not uniformly available, the study population was limited to selected cardiovascular patients rather than exclusively confirmed heart failure patients.¹¹

2.6 Exclusion Criteria

The following participants were excluded from the study:

- Individuals below 20 years of age
- Pregnant women
- Lactating mothers
- Patients with malignancy
- Patients with severe liver disease
- aData Collection Procedure

Data were collected through structured interviews and survey questionnaires conducted at hospitals and pharmacies. Demographic characteristics, BMI-related information, medication expenditure, and lifestyle-related factors were recorded. To minimize duplicate sampling, each participant was interviewed only once during the study period, and demographic records were reviewed before data entry to avoid repeated inclusion of the same individual.¹²

Table 1. Gender Distribution of Patients

Gender	Number of Patients	Percentage (%)
Male	60	60%
Female	40	40%
Total	100	100%

3.1 Obesity Analysis

Female participants demonstrated a higher proportion of obesity compared with male participants within the studied cardiovascular

2.7 Statistical Analysis

Data analysis was performed using IBM SPSS Statistics version 26 and Microsoft Excel. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized using mean \pm standard deviation where applicable.¹³ The Chi-square test was applied to assess associations between categorical variables, including gender and obesity status. A p-value < 0.05 was considered statistically significant.¹⁴

2.8 Ethical Considerations

The study was conducted in accordance with institutional ethical principles for research involving human participants. Informed verbal consent was obtained from all participants before data collection. Participant confidentiality and anonymity were maintained throughout the study, and collected information was used solely for research purposes.

3 Result

A total of 100 patients were included in the study, comprising 60 (60%) males and 40 (40%) females. The age of participants ranged from 20 to 80 years.

disease patient population. Among male participants, 8% were obese, whereas 28% of female patients were obese.

Table 2. Obesity Distribution According to Gender

Gender	Obese (%)	Non-Obese (%)
Male	8%	92%
Female	28%	72%

3.2 Body Mass Index (BMI) Distribution

BMI analysis demonstrated that 16% of patients were categorized as obese, 28% as overweight, 52%

had normal BMI, and the remaining patients were underweight.

Table 3. BMI Classification of Patients

BMI Range (kg/m ²)	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30 and above	Obese

Table 4. BMI Distribution Among Patients

BMI Category	Number of Patients	Percentage (%)
Underweight	4	4%
Normal	52	52%
Overweight	28	28%
Obese	16	16%
Total	100	100%

3.3 Economic Status and Medication Expenditure Assessment

The socioeconomic assessment showed that 69% of participants had a monthly income of 30,000

PKR or more, whereas 31% reported monthly income below 30,000 PKR.

Table 5. Monthly Income Distribution

Monthly Income	Number of Patients	Percentage (%)
Less than 30,000 PKR	31	31%
30,000 PKR or More	69	69%
Total	100	100%

A basic assessment of self-reported monthly medication expenditure demonstrated that 60% of participants spent less than 5,000 PKR per

month on medicines, while 40% reported monthly medication expenditure of 5,000 PKR or more.

Table 6. Monthly Medication Expenditure

Monthly Expenditure on Medicines	Number of Patients	Percentage (%)
Less than 5,000 PKR	60	60%
5,000 PKR or More	40	40%
Total	100	100%

The findings indicate variability in medication-related financial burden among the studied cardiovascular patients. However, the present study only included a basic assessment of medication expenditure and did not evaluate broader pharmacoeconomic parameters such as hospitalization costs, indirect economic burden, treatment adherence, comparison between

branded and generic medicines, or cost-effectiveness outcomes.

3.4 Commonly Observed Lifestyle-Related and Clinical Factors

The assessment demonstrated that obesity, hyperlipidemia/cholesterol-related disease, fast food consumption, and smoking were commonly reported among the studied cardiovascular disease patients for Cardiovascular disease.

Table 7. Distribution of Epidemiological Risk Factors

Risk Factor	Number of Patients	Percentage (%)
Obesity	16	16%
Cholesterol-related Disease	67	67%
Fast Food Consumption	59	59%
Smoking	45	45%

3.5 Distribution of Lifestyle-Related Risk Factors

The study evaluated the frequency of several lifestyle-related and clinical risk factors among the selected cardiovascular patients. Obesity,

cholesterol-related disorders, fast food consumption, and smoking were commonly observed among participants.

Table 8. Frequency of Evaluated Risk Factors Among Patients

Risk Factor	Frequency Observed
Obesity	Frequently Observed
Fast Food Consumption	Commonly Reported
Smoking	Moderately Reported
Beverage Intake	Less Frequently Reported

The findings descriptively indicate that obesity and unhealthy dietary habits were commonly present among the studied cardiovascular patients. However, because all participants already had cardiovascular disease and no healthy comparison group was included, the study does not establish causal or predictive associations between these factors and heart disease occurrence.

3.6 Statistical Analysis

To evaluate differences in obesity distribution according to gender among the studied cardiovascular patients, the Chi-square test of independence was applied. A p-value < 0.05 was considered statistically significant.

Table 9. Chi-square Test for Association Between Gender and Obesity

Variable	Category	Observed (O)	Expected (E)
Male	Obese	5	9.6
Male	Non-Obese	55	50.4
Female	Obese	11	6.4
Female	Non-Obese	29	33.6

Chi-square value (χ^2) = 6.56
Degrees of freedom (df) = 1
p-value \approx 0.01

The Chi-square analysis demonstrated a statistically significant association between gender and obesity status among the studied cardiovascular patients ($p < 0.05$). Female participants showed a higher proportion of obesity compared to male participants, indicating variation in obesity distribution according to gender within the study population.

4 Discussion

This descriptive cross-sectional study evaluated obesity patterns, medication expenditure, and commonly observed lifestyle-related factors among selected cardiovascular disease patients attending hospitals and community pharmacies in Lahore. A total of 100 participants were included in the study, comprising 60% males and 40% females. The findings demonstrated variation in obesity distribution according to gender. Female participants showed a higher proportion of obesity

compared with male participants. Chi-square analysis demonstrated a statistically significant association between gender and obesity status within the studied cardiovascular disease patient population ($p < 0.05$). However, because all participants already had cardiovascular disease and no healthy comparison group was included, these findings should be interpreted only as descriptive observations within the study sample and not as evidence of causation or disease prediction.

BMI analysis showed that 52% of participants had normal BMI, 28% were overweight, 16% were obese, and 4% were underweight. Cholesterol-related disease was reported in 67% of participants, fast food consumption in 59%, smoking in 45%, and obesity in 16% of patients. These findings indicate that several lifestyle-related and metabolic factors were commonly observed among the studied cardiovascular disease patients. The medication expenditure assessment demonstrated that most participants reported monthly medicine expenses below 5,000 PKR, while a smaller proportion reported higher treatment-related costs. These findings provide a basic overview of treatment-related financial burden among the studied patients. However, the study did not include detailed pharmaco-economic parameters such as hospitalization costs, indirect economic burden, treatment adherence, comparison between branded and generic medicines, or cost-effectiveness analysis. Therefore, the economic findings should be interpreted as a preliminary expenditure assessment rather than a comprehensive pharmaco-economic evaluation.

The study was limited by its hospital- and pharmacy-based convenience sampling approach and relatively small sample size. Since participants were recruited from selected healthcare facilities, the findings cannot be generalized to the wider Lahore population. In addition, standardized diagnostic confirmation through echocardiography, ejection fraction measurements, BNP/NT-proBNP levels, or NYHA classification was not uniformly available for all participants. Therefore, the findings should be interpreted as observations among selected

cardiovascular disease patients rather than exclusively confirmed heart failure patients.

Overall, the study highlights commonly observed lifestyle-related and metabolic patterns among cardiovascular disease patients attending healthcare facilities in Lahore. Further large-scale population-based studies with standardized diagnostic criteria are recommended to better evaluate cardiovascular disease patterns and associated factors in the general population.

5 Conclusion

Cardiovascular disease remains an important public health concern among patients attending healthcare facilities in Lahore. The present descriptive cross-sectional study identified several commonly observed lifestyle-related and metabolic factors among selected cardiovascular disease patients, including hyperlipidemia/cholesterol-related disease, unhealthy dietary habits, smoking, and obesity.

Among the evaluated factors, cholesterol-related disease and fast food consumption were reported more frequently than obesity within the study population. Female participants demonstrated a higher proportion of obesity compared with male participants. The study also provided a basic assessment of medication-related financial burden among cardiovascular disease patients, although detailed pharmaco-economic components were not evaluated.

The findings emphasize the importance of promoting healthy lifestyle practices, dietary awareness, smoking cessation, weight management, and accessible healthcare services among cardiovascular disease patients. However, because the study was cross-sectional, hospital-based, and conducted with a limited sample size, the findings should not be generalized to the wider population and do not establish causal relationships between evaluated factors and cardiovascular disease occurrence.

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Data Availability Statement

The data presented in this study are available on request from the corresponding author

Ethics approval and consent to participate

Not applicable

Patient consent for publication

Not applicable

AI use disclosure

Not applicable.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Authors' Contributions

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