Volume 3, Number 1, 2026 Pages 312-323

Bioscience Insights

ISSN: 3080-3489 (Print)
ISSN: 3080-3497 (Online)

BioSciInsights.com

MEDICATION ADHERENCE, LIFESTYLE BEHAVIOURS, AND PERCEIVED STRESS AMONG PATIENTS WITH HEART FAILURE ATTENDING A TERTIARY CARE HOSPITAL IN KARACHI: A CROSS-SECTIONAL STUDY

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Article Information

Article History

Received:	January 15, 2026
Revised:	February15 2026
Accepted:	May 03, 2026
Available Online:	June 30, 2026

Keywords:
Heart failure; medication adherence; perceived stress; physical activity; dietary behaviour; cardiac rehabilitation; nurse-led care.

Abstract

Background:
Heart failure requires long-term medication adherence and appropriate lifestyle behaviours to support effective disease management and reduce the risk of adverse outcomes. However, medication non-adherence, physical inactivity, unhealthy dietary practices, sedentary behaviour, and psychological stress remain important challenges among patients with heart failure, particularly in settings where structured cardiac rehabilitation services are limited.

Objective:
To assess medication adherence, perceived stress, physical activity, dietary behaviours, and selected cardiovascular risk factors among patients with heart failure attending a tertiary care cardiac outpatient department in Karachi.

Methods:
A hospital-based cross-sectional study was conducted among 50 patients with heart failure aged 30–70 years. Participants were recruited using convenience sampling. Data were collected using the Medication Adherence Report Scale (MARS-5), Perceived Stress Scale (PSS-10), International Physical Activity Questionnaire-Short Form (IPAQ-SF), and selected WHO STEPS items. Descriptive statistics were used to summarize demographic, clinical, and behavioural characteristics. Continuous variables were presented as median and interquartile range (IQR).

Results:
The majority of participants were aged 61–70 years (40.0%) and male (70.0%). Hypertension was reported by 62.0%,

while 50.0% had a family history of cardiac disease and 16.0% had undergone previous PCI. The median MARS-5 score was 22 (IQR: 21–24), while the median PSS-10 score was 21 (IQR: 18–24). Physical activity was low, with a median of 33 MET-min/week (IQR: 0–165), and median sitting time was 10 hours/day (IQR: 6.8–14). Median fruit and vegetable intake was 0.57 servings/day (IQR: 0.43–1), substantially below the recommended level. Current smoking was reported by 10.0% of participants.

Conclusion:

Patients with heart failure demonstrated several modifiable behavioural and psychosocial risk factors, including suboptimal physical activity, prolonged sedentary behaviour, inadequate fruit and vegetable intake, perceived stress, and less-than-optimal medication adherence. These findings support the need for structured, nurse-led education and cardiac rehabilitation strategies within routine heart failure care in Pakistan.

INTRODUCTION

Cardiovascular diseases (CVDs) remain the leading cause of mortality worldwide, accounting for nearly one-third of all deaths and imposing a substantial burden on health systems, particularly in low- and middle-income countries (LMICs) where access to preventive and rehabilitative services is often limited. Heart failure represents one of the most common and disabling manifestations of CVD and is characterized by frequent hospitalizations, reduced functional capacity, impaired quality of life, and high healthcare costs. Although advances in pharmacological therapy have improved survival, optimal outcomes depend not only on medical treatment but also on patients' adherence to prescribed medications and recommended lifestyle modifications [1-4].

Medication adherence and healthy lifestyle practices, including regular physical activity, smoking cessation, stress management, and adherence to a heart-healthy diet, are fundamental components of heart failure management. Evidence suggests that a substantial proportion of cardiovascular events can be prevented through effective control of modifiable risk factors. However, long-term adherence to treatment recommendations remains challenging, with many patients discontinuing medications or failing to maintain recommended lifestyle behaviours after discharge. These behaviours increase the risk of disease progression, recurrent hospital admissions, and premature mortality [5-8].

Nurse-led interventions have emerged as an effective strategy to improve self-management among patients with chronic cardiovascular diseases. Through individualized education, counselling, behavioural reinforcement, and regular follow-up, nurses play an important role in promoting medication adherence and facilitating sustainable lifestyle changes. Recent systematic reviews have demonstrated that nurse-led programmes significantly improve adherence to prescribed therapies and positively influence cardiovascular risk factors, particularly in resource-constrained settings where access to specialist cardiac rehabilitation services is limited [9-12]. Such interventions are considered cost-effective and feasible for integration into routine clinical practice.

Pakistan is experiencing a growing burden of cardiovascular diseases, while access to structured cardiac rehabilitation programmes remains limited. Most available services are concentrated in a few tertiary-care hospitals, leaving many patients without adequate education or long-term support following diagnosis or hospital discharge. In addition, socioeconomic constraints, low health literacy, inadequate follow-up, and limited awareness regarding lifestyle

modification further compromise disease management. These factors may adversely affect medication adherence and the adoption of healthy lifestyle practices among patients with heart failure [13-15].

Despite the increasing burden of heart failure in Pakistan, there is limited evidence describing medication adherence, lifestyle behaviours, perceived stress, and cardiovascular risk factors among patients receiving routine outpatient care. Such information is essential for identifying gaps in self-management and for planning targeted interventions and secondary prevention programmes. Therefore, this study aimed to assess medication adherence, lifestyle behaviours, perceived stress, and selected cardiovascular risk factors among patients with heart failure attending the cardiology outpatient department of a tertiary care hospital in Karachi.

Methodology

A hospital-based cross-sectional study was conducted at the Cardiology Outpatient Department of Dr. Ruth K. M. Pfau Civil Hospital, Karachi, over a six-month period. Ethical approval was obtained from the Institutional Review Committee (IRC) of Dow University of Health Sciences before data collection. The study assessed medication adherence, lifestyle behaviours, perceived stress, and selected cardiovascular risk factors among patients with heart failure.

A total of 50 patients were included using non-probability convenience sampling. This study represents a secondary analysis of baseline data collected from participants enrolled in a quasi-experimental study evaluating a nurse-led intervention among patients with heart failure. Only the baseline measurements, collected before the intervention, were used for the present cross-sectional analysis.

Participants were eligible if they were men or women aged 30–70 years, had a physician-confirmed diagnosis of heart failure, and attended the cardiology outpatient department during the study period. Participants were required to provide written informed consent. Patients with end-stage renal disease, chronic liver disease, advanced malignancy, recent stroke, severe psychiatric illness, cognitive impairment, or previous enrolment in a structured cardiac rehabilitation programme were excluded.

Data were collected using a structured questionnaire consisting of demographic and clinical characteristics and standardized measures of medication adherence, physical activity, perceived stress, diet, and tobacco use. Medication adherence was assessed using the five-item Medication Adherence Report Scale (MARS-5) [16]. Physical activity was assessed using the International Physical Activity Questionnaire–Short Form (IPAQ-SF) [17]. Perceived stress was measured using the 10-item Perceived Stress Scale (PSS-10) [18]. Dietary intake and tobacco use were assessed using selected items from the WHO STEPwise approach to non-communicable-disease risk-factor surveillance (WHO STEPS) [19]. The questionnaire was pilot tested before the main data collection to assess clarity and feasibility. The complete data collection questionnaire is provided as supplementary material.

Scoring of study measures

Medication adherence (MARS-5). The MARS-5 consists of five items assessing medication-taking behaviour. Each item was rated on a five-point scale from 1 (“Always”) to 5 (“Never”). All items were reverse coded before scoring so that higher scores represented better medication adherence. The item scores were then summed to obtain a total score ranging from 5 to 25, with higher scores indicating more favorable medication-taking behaviour.

Perceived stress (PSS-10). The PSS-10 consists of 10 items scored from 0 (“Never”) to 4 (“Very often”), with a possible total score of 0–40. All relevant positively worded items were reverse coded before calculating the total score. Higher total scores indicate greater perceived stress.

Physical activity (IPAQ-SF). The IPAQ-SF assesses vigorous-intensity activity, moderate-intensity activity, walking, and sitting during the previous seven days. Physical activity was

expressed as metabolic equivalent task minutes per week (MET-min/week) according to the standard scoring procedure. Total physical activity was calculated by summing the MET-min/week for walking, moderate, and vigorous activities. Sitting time was reported separately as hours per weekday.

Dietary and tobacco-related measures. Selected WHO STEPS items were used to assess the number of days per week and servings per day of fruit and vegetable consumption, current tobacco use, and the number of cigarettes smoked per day. These variables were analysed separately rather than combined into a composite score.

The internal consistency of the MARS-5 and PSS-10 in the present sample was assessed using Cronbach's alpha, with coefficients of 0.72 and 0.77, respectively. Internal consistency was not assessed for the IPAQ-SF and WHO STEPS items because these measures assess separate behavioural indicators rather than a single underlying construct.

Before the main data collection, the questionnaire was pilot tested among approximately 10% of the target sample to assess clarity and feasibility. Minor wording changes were made following the pilot assessment, and pilot data were not included in the final analysis.

Data were analysed using IBM SPSS Statistics version 27. Categorical variables were presented as frequencies and percentages. Continuous variables were summarized using medians and interquartile ranges (IQR) because the data did not meet the assumption of normality based on the Shapiro–Wilk test. As this was a descriptive cross-sectional analysis, the analysis focused on describing the distribution of the study variables.

Ethical considerations

Ethical approval was obtained from the Institutional Review Committee of Dow University of Health Sciences before the study commenced. Written informed consent was obtained from all participants. Participant information was kept confidential and was used only for research purposes. Participation was voluntary, and participants were informed of their right to withdraw at any time without affecting their medical care.

RESULTS

A total of 50 patients with heart failure were included in the study. Their demographic and baseline clinical characteristics are presented in Table 1. The majority of participants were older adults, with 20 (40.0%) aged 61–70 years, followed by 16 (32.0%) aged 51–60 years. Participants aged 41–50 years accounted for 16.0%, while 12.0% were between 30 and 40 years (Figure 1). The study population was predominantly male, comprising 35 (70.0%) participants, whereas females accounted for 15 (30.0%) (Figure 2).

Table 01.Baseline demographic and clinical characteristics of participants (n = 50)

Variable	n(%)
Age group	
30–40 years	6 (12.0)
41–50 years	8 (16.0)
51–60 years	16 (32.0)
61–70 years	20 (40.0)
Gender	
M	35 (70)
F	15 (30)
Weight (kg)	
Less than 70 kg	34 (68)
71–75 kg	6 (12)

76–80 kg	4 (8)
More than 80 kg	6 (12)
Height (cm)	
150cm	13 (26)
160cm	24 (48)
170cm	12 (24)
180cm	1 (2)
Education Level	
Primary school	32 (64.0)
High school	11 (22.0)
Undergraduate	1 (2.0)
Graduate or higher	6 (12.0)
Marital Status	
Single	1 (2.0)
Married	49 (98.0)
Occupation	
Employed	40 (80)
Self-employed	5 (10)
Retired	5 (10)
History of Hypertension	
Yes	31 (62.0)
No	19 (38.0)
Family History of Cardiac Disease	
Yes	25 (50.0)
No	25 (50.0)
Previous PCI	
Yes	8 (16.0)
No	42 (84.0)
Smoking Status	
Yes	5 (10%)
No	45 (90)

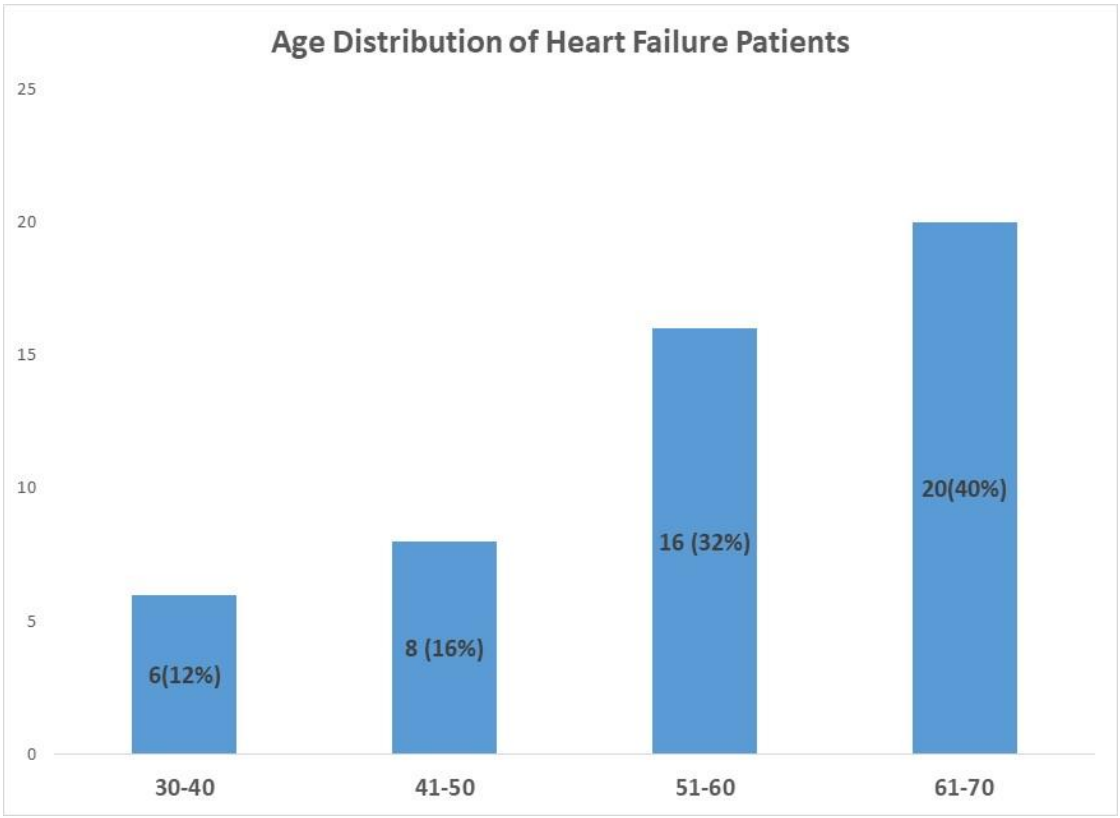


Figure 1 Age Distribution of Heart Failure Patients

Regarding anthropometric characteristics, 34 (68.0%) participants weighed less than 70 kg, while 6 (12.0%) weighed 71–75 kg, 4 (8.0%) weighed 76–80 kg, and 6 (12.0%) weighed more than 80 kg. Nearly half of the participants (48.0%) had a height of 160 cm, followed by 26.0% measuring 150 cm, 24.0% measuring 170 cm, and 2.0% measuring 180 cm.

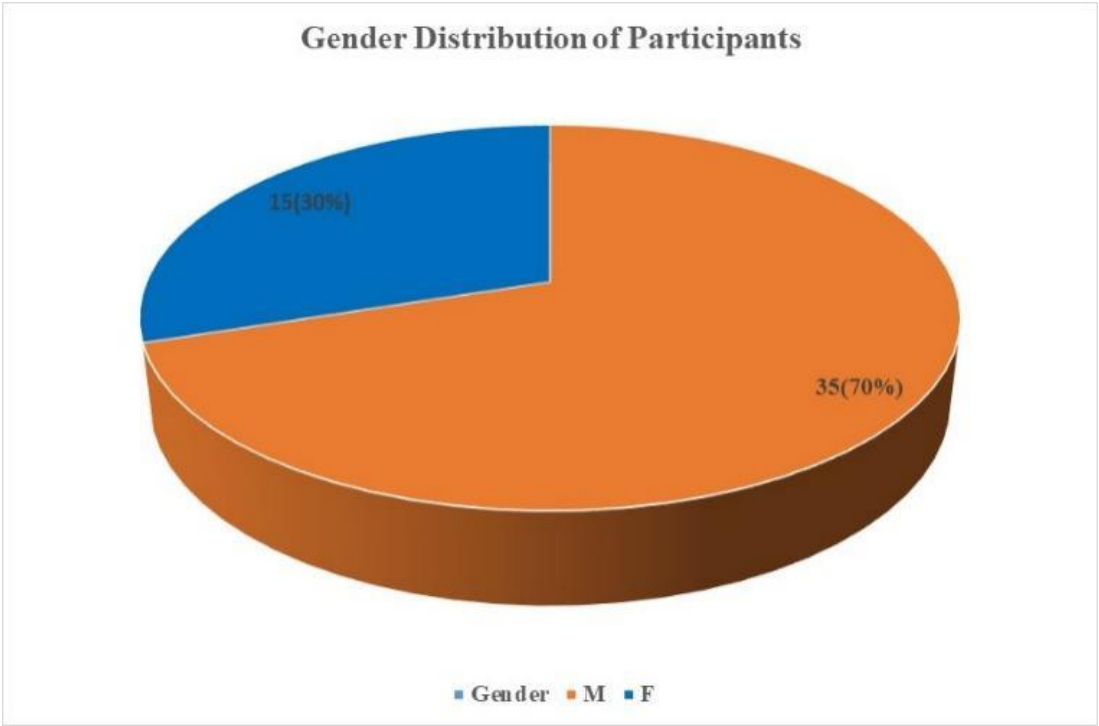
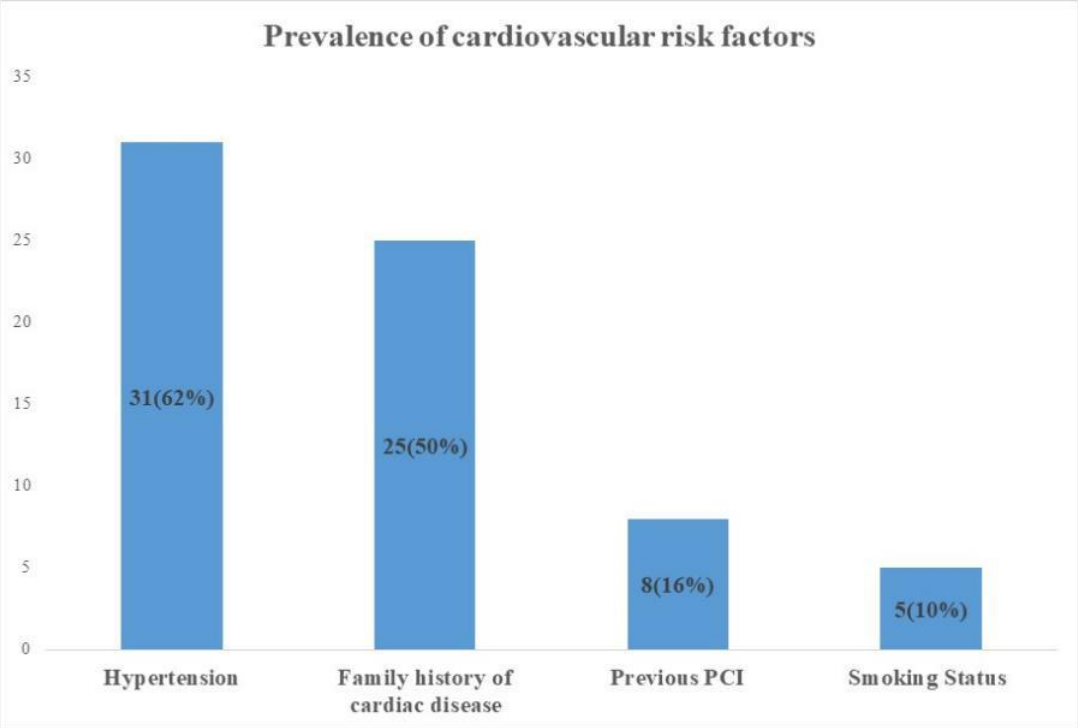


Figure 2 Gender Distribution of Participants

Most participants (64.0%) had completed primary education, whereas 22.0% had completed high school. Only 12.0% had attained graduate or higher education, and 2.0% had an undergraduate qualification. Almost all participants were married (98.0%), and the majority (80.0%) were employed. Self-employed and retired participants each represented 10.0% of the study population.

The baseline clinical profile demonstrated a substantial burden of cardiovascular risk factors. A history of hypertension was reported by 31 (62.0%) participants, while 25 (50.0%) had a family history of cardiac disease. Previous percutaneous coronary intervention (PCI) had been performed in 8 (16.0%) participants. At enrolment, 45 (90.0%) participants were non-smokers, whereas 5 (10.0%) reported current tobacco use (Figure 3).



Baseline behavioural characteristics are summarized in Table 2. The median Medication Adherence Report Scale (MARS-5) score was 22 (IQR: 21–24), while the median Perceived Stress Scale (PSS-10) score was 21 (IQR: 18–24). The median total physical activity was 33 MET-min/week (IQR: 0–165), and participants reported a median sitting time of 10 hours/day (IQR: 6.8–14). The median fruit intake was 3 days/week (IQR: 1.8–3.3), and the median vegetable intake was 3 days/week (IQR: 2–3.3). The median combined fruit and vegetable intake was 0.57 servings/day (IQR: 0.43–1). Among the five participants who reported smoking, the median cigarette consumption was 2 cigarettes/day (range: 1–20).

Table 02. Baseline behavioural characteristics of participants (n = 50)

Variable	Median (IQR)
MARS-5	22 (21–24)
PSS-10	21 (18–24)
Physical activity	33 (0–165)
Sitting time	10 (6.8–14)

Fruit intake	3 (1.8–3.3)
Vegetable intake	3 (2–3.3)
Total fruit & vegetable intake	0.57 (0.43–1)
Cigarettes/day (smokers)	2 (1–20)

DISCUSSION

The present hospital-based cross-sectional study assessed medication adherence, lifestyle behaviours, perceived stress, and cardiovascular risk factors among patients with heart failure attending a tertiary care cardiac outpatient department in Karachi. The findings provide an overview of the baseline clinical, behavioural, and psychosocial profile of these patients and identify several potentially modifiable factors requiring attention during routine heart failure management. The coexistence of suboptimal medication adherence, relatively high perceived stress, low physical activity, prolonged sitting time, inadequate fruit and vegetable consumption, and tobacco use among a proportion of participants indicates that heart failure management extends beyond pharmacological treatment alone.

The study population was predominantly older, with 72% of participants aged above 50 years, while 70% were male. This distribution is broadly consistent with the established epidemiology of cardiovascular disease, in which cardiovascular disease burden increases with advancing age and cumulative exposure to cardiovascular risk factors [1, 4, 8]. The male predominance observed in the present study is also consistent with evidence describing important sex differences in cardiovascular disease, particularly coronary artery disease [11]. However, because the present study was conducted in a hospital setting using convenience sampling, these demographic characteristics should not be interpreted as representative of the wider heart failure population in Pakistan. Recent cardiovascular epidemiological data continue to demonstrate substantial variation in cardiovascular disease burden according to age and sex, supporting the importance of considering demographic characteristics when planning cardiovascular prevention and management strategies [20].

A considerable burden of cardiovascular risk factors was observed at baseline. Hypertension was present in 62% of participants, while 50% reported a family history of cardiac disease and 16% had previously undergone percutaneous coronary intervention (PCI). The high prevalence of hypertension is particularly relevant because hypertension is an established and potentially modifiable contributor to the development of heart failure [9-10]. A recent systematic review and meta-analysis further demonstrated a significant association between elevated blood pressure, hypertension, and subsequent risk of heart failure [20]. The presence of previous PCI in 16% of participants also suggests an important contribution of underlying coronary artery disease to the clinical profile of this population. These findings support the need for continued assessment and management of cardiovascular risk factors as part of routine heart failure follow-up.

Medication adherence at baseline was moderate, with a median MARS-5 score of 22 (IQR 21–24). Although this finding does not indicate uniformly poor adherence, it suggests that medication-taking behaviour was not optimal among all participants. Medication adherence is a critical component of chronic cardiovascular disease management because inconsistent use of prescribed medications may reduce treatment effectiveness and contribute to adverse outcomes [12-15]. Recent evidence has also highlighted medication non-adherence as an ongoing problem among patients with chronic heart failure and identified multiple patient- and treatment-related factors that may contribute to non-adherence [21]. Systematic reviews further indicate that nurse-led interventions incorporating education, counselling, follow-up, and behavioural support can improve medication adherence in chronic diseases [22]. These

findings reinforce the importance of routinely assessing medication-taking behaviour and identifying barriers to adherence during outpatient heart failure care.

Participants also demonstrated relatively high perceived stress, with a median PSS-10 score of 21 (IQR 18–24). Psychological stress is increasingly recognized as an important component of cardiovascular health because persistent psychological distress may influence physiological responses as well as health-related behaviours. Previous research among patients with cardiovascular disease has demonstrated an association between chronic psychological distress and myocardial ischemia induced by mental stress [23]. In addition, the PSS-10 demonstrated satisfactory psychometric characteristics among cardiovascular patients, supporting its use for assessing perceived stress in this population [20]. The relatively high stress levels observed in the present study suggest that psychosocial well-being should be considered alongside physical and pharmacological aspects of heart failure management. Nurse-led psychosocial and peer-support approaches may represent one feasible component of comprehensive cardiovascular care, particularly where access to specialist psychological services is limited [24].

Physical activity was particularly limited at baseline. The median total physical activity was only 33 MET-minutes/week (IQR 0–165), while median sitting time was 10 hours/day (IQR 6.8–14). These findings suggest that participants had predominantly sedentary lifestyles. Physical inactivity is an important modifiable cardiovascular risk factor, while regular physical activity and exercise training are recognized components of cardiovascular prevention and cardiac rehabilitation [25]. Evidence from recent research has also highlighted the association between sedentary behaviour and future cardiovascular disease risk, supporting the importance of addressing prolonged sitting in addition to promoting structured physical activity [26]. For patients with heart failure, however, low activity levels may also reflect disease-related limitations such as fatigue, dyspnea, reduced exercise tolerance, or fear of exertion. Therefore, physical activity recommendations should be individually tailored according to patients' clinical condition and functional capacity.

Dietary behaviours were similarly suboptimal. Participants reported a median fruit consumption of 3 days/week and vegetable consumption of 3 days/week, while median combined fruit and vegetable intake was only 0.57 servings/day. This level was substantially below the WHO recommendation of at least five servings per day [1, 7]. Evidence from South Asian populations has identified dietary practices among the important lifestyle-related risk factors in patients with coronary artery disease [27]. More broadly, dietary quality remains an important component of cardiovascular risk reduction, although improvement may be influenced by affordability, cultural dietary patterns, food availability, and nutritional knowledge. The limited dietary intake observed in the present study therefore suggests that nutritional counselling should be culturally appropriate and should consider the socioeconomic context of patients rather than relying solely on general dietary recommendations.

Only five participants (10%) reported current smoking at baseline. Although the prevalence was relatively low, tobacco use remains clinically important because smoking is a major modifiable cardiovascular risk factor [9-10]. Recent evidence from large prospective cohorts has further demonstrated associations between smoking status, smoking intensity, smoking cessation, and long-term cardiovascular and mortality outcomes [28]. Continued identification of tobacco users and provision of smoking cessation counselling should therefore remain part of routine cardiovascular care. However, because only five participants reported current smoking, the present study had limited ability to characterize smoking behaviour or examine its relationship with other baseline characteristics.

The overall pattern of findings demonstrates that patients with heart failure attending this tertiary cardiac outpatient department had several potentially modifiable behavioural and psychosocial factors alongside established cardiovascular risk factors. Moderate medication adherence, relatively high perceived stress, low physical activity, prolonged sitting time,

inadequate fruit and vegetable consumption, and tobacco use among a subset of participants indicate the need for a multidimensional approach to heart failure management. Cardiac rehabilitation provides an appropriate framework for addressing several of these domains through patient education, physical activity counselling, lifestyle modification, and psychosocial support [5, 13-14]. Recent evidence has also supported the role of nurse-led interventions in modifying cardiovascular risk behaviours and supporting chronic disease management [29-30]. However, access to organized cardiac rehabilitation remains an important challenge in Pakistan, and contextual barriers may limit participation in conventional center-based programmes [31]. Therefore, these baseline findings provide a useful basis for developing culturally appropriate, accessible, and contextually feasible educational and rehabilitation strategies for patients with heart failure.

Conclusion:

The present study provides important baseline information on medication adherence, perceived stress, lifestyle behaviours, and cardiovascular risk factors among patients with heart failure attending a tertiary care cardiac outpatient department in Karachi. Although medication adherence was generally moderate, participants demonstrated high levels of perceived stress, low physical activity, prolonged sedentary behaviour, inadequate fruit and vegetable intake, and the presence of several modifiable cardiovascular risk factors, including hypertension and tobacco use. These findings indicate that behavioural and psychosocial factors remain important challenges in the management of heart failure. Routine assessment of these factors in outpatient settings may help healthcare professionals identify patients requiring additional education, counselling, and lifestyle support. The baseline findings also provide a useful foundation for planning and evaluating future nurse-led or multidisciplinary cardiac rehabilitation programmes aimed at improving long-term self-management and cardiovascular outcomes in resource-limited healthcare settings.

Authors' Contribution

Mr. Tariq Aziz contributed to the study conception, data collection, data analysis, manuscript drafting, and overall coordination of the research project. **Ms. Rukhsana M. Haroon, Prof. Dr. Muhammad Nawaz Lashari, and Ms. Madiha Saleem** provided academic supervision, methodological guidance, critical review, and intellectual input throughout the study. **Mr. Fazal Rehman and Mr. Navid Ali** assisted with data management, literature review, and logistical support during the research process. All authors reviewed and approved the final manuscript.

Conflict of Interest

None

Acknowledgment:

The authors would like to sincerely acknowledge Mr. Taimoor, Data Analyst, Dow University of Health Sciences, for his valuable assistance and support with the data analysis of this study. His contribution is greatly appreciated.

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