



## **Prevalence and Predictors of Adherence to Self-Care Practices among Heart Failure Patients: A Cross-Sectional Study**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors NEQ, JS, NQ, RK, IS and UZ provided study concept. Authors SB, NEQ, MH, PKR, RK, DK, MAU and AMF helped in data curation. Authors NEQ, SB, AMF, DK, MAU, SAF and JS performed method analysis. Authors NEQ, SB, AMF, SAF and IS performed data acquisition. Authors MH, JS, MAU, IS and NQ performed Methodological analysis. Authors NEQ, SB, MH, JS and MAU helped in project administration. Authors MH, NQ, PKR, DK and RK did study visualization. Original draft: Authors SB, MH, JS and PKR wrote original draft of the manuscript; Authors NEQ, SB, MH, NQ and UZ reviewed and edited the manuscript. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Aims:** Congestive heart failure affects about five million Americans and has become an increasingly frequent reason for hospital admission during the last two decades. It represents a significant health problem. The aim of this study was to enumerate the frequency of self-care and

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to study the factors affecting adherence to self-care in patients with heart failure.

**Study Design:** Cross-sectional study.

**Place and Duration of Study:** Department of Cardiology and Department of Medicine in three public sector hospitals of Karachi, between March 2020 and September 2020.

**Methodology:** In this study, 187 heart failure patients from three hospitals were surveyed with consent. Demographic details of the participants were also collected, which included gender, mean age, BMI, education, living and marital status, smoking history, an ejection fraction <40, cancer, chronic kidney disease, diabetes mellitus, hypertension, dyslipidemia, atrial fibrillation, and coronary artery bypass graft procedure in patients. The data were analyzed through SPSS v. 25.0 using an adherence scale. A cumulative score of  $\geq 32/40$  (80%) was termed as good adherence. In an individual question, a score of four or five and zero to three inclusive was taken as good and poor adherence, respectively.

**Results:** It was found that patients who were not educated (65.8%, n=123), with age > 65years (67.4%, n=126) and with no history of coronary artery bypass grafting surgery (94.1%, n=176) had a significantly bad impact on heart-failure self-care ( $P$ -value<0.05). Good adherence was seen in 16.6% of the patients (n=31). Hence, most of the patients were non-adherent.

**Conclusion:** There is an urgent need to counsel patients regarding heart failure self-care for a better prognosis of the disease. Government and doctors together should take part in enlightening the issue.

*Keywords: Adherence; congestive heart failure; self-care.*

## ABBREVIATIONS

*BMI = Body Mass Index;*

*CHF = Congestive Heart Failure;*

*SD = Standard Deviation;*

*CABG = Coronary Artery Bypass Graft;*

*DM = Diabetes Mellitus*

## 1. INTRODUCTION

Congestive heart failure (CHF) prevalence continues to rise and is expected to worsen as the proportion of the elderly population increases. It is one of the most commonly diagnosed and composite medical condition [1-3]. CHF has become an increasingly frequent reason for hospital admission during the last two decades and represents a significant health problem [4]. Being the leading cause of hospitalization, nearly half of all admitted patients get readmitted within six months of discharge [5]. Despite advances in evidence-based interventions, CHF mortality remains high at 29.6% [6]. According to World Health Organization, heart diseases are the first leading cause of death in both men and women worldwide [7]. Alarming, it has been estimated that about five million Americans suffer from heart failure [8].

This persistent disease demands patients to adhere to a firm, long-lasting regimen to reach an ideal outcome [9]. Adherence to some of these recommendations, however, e.g.,

medications and low salt diet, may reduce readmissions and mortality rates [10]. It has been proven that adverse cardiovascular health; increased obesity, diabetes mellitus, cancer, and early death can be attributed to sedentary lifestyle which can be measured by television viewing time [11]. According to previous literature, prolonged total sedentary time (measured objectively via accelerometer) has shown a deleterious relationship with cardiovascular risk factors, disease, and mortality outcomes [12].

To decrease the costly treatments and hospitalizations, it is necessary to carry out the practice of heart failure self-care. The observed mortality rates could be attributed to risk factors such as hypertension, diabetes mellitus, poor diet, and lack of exercise, smoking, and obesity [13]. Self-care in heart failure requires following the appropriate treatment regimen; a diet low in sodium, regular physical activity, following preventive measures, quitting smoking and also monitoring any changes in the body [10]. The incidence of heart disease in Pakistan is alarming, given that every one in four middle-aged adults is affected by it [14]. Since predictors of adherence to heart failure health care need to be better understood for the better treatment, we conducted this study to assess the factors and predictors leading to heart failure in order to improve self-care measures and find out adherence to self-care as a whole.

## 2. MATERIALS AND METHODS

A cross sectional study was conducted in three different hospitals of Karachi, Pakistan. After calculating a sample size using OpenEpi at a confidence interval of 95%, a total of 187 patients were interviewed. Convenient sampling technique was employed and complete anonymity was ensured. Patients above 18 years of age who were able to understand and give an informed verbal consent with a history of heart failure and reduced or preserved ejection fraction were included. Whereas advanced heart failure patients requiring inotropes and/or heart transplant or those having congenital heart diseases were excluded.

A medical outcomes study specific adherence scale questionnaire was used [15]. The questionnaire comprised of these eight variables; exercised regularly (at least three times a week), took medication as prescribed (without missing a dose), took one or less alcoholic beverage, cut down on smoking or did not smoke, followed a low salt diet, followed a low fat diet, weighed regularly, monitored symptoms daily. The patients were asked how often they adhered to the variables mentioned above in the previous four weeks.

### 2.1 Scoring

Each of the eight variables had answer choices ranging from zero to five, with zero as “none of the time”, one as “a little of the time”, three as “some of the time”, four as “a good bit of the time” and five as “all of the time”; as shown in Table 1. The score of each question was added for every patient with the maximum score being 40.

**Table 1. Scoring used in the questionnaire for calculating adherence**

Score	Explanation
0	None of the time
1	A little of the time
2	Some of the time
3	A good bit of the time
4	Most of the time
5	All the time

### 2.2 Data Analysis

As there is no accepted standard, the analysis of the data was carried out using an adherence scale. A cumulative score equal to or more than

32 out of 40 (80%) was termed as good adherence. In an individual question, a score of four or five was considered good adherence, while a score ranging from zero to three inclusive was taken as poor adherence. The data were analyzed using Statistical Package for the Social Sciences (SPSS) v. 25.0. Categorical variables were expressed using frequencies and percentages. Continuous variables were presented as a mean and standard deviation. The significance of factors was calculated through the chi-square test for dichotomous variables with  $P$ -value<0.05 holding significance. A 95% confidence level was observed in all cases.

## 3. RESULTS

A total of 187 complete responses were collected from heart failure patients. The baseline demographic characteristics are shown in Table 2. There were more males (62%, n=116) than females (38%, n=71) in the sample. The mean age of the participants was 61±9 years, with an average body mass index (BMI) of 29±5 kg/m<sup>2</sup>.

**Table 2. Baseline demographic characteristics**

Variable	N (187)
Mean age (years)	61 (SD <sup>1</sup> , 9)
Females	71(38.0%)
Lives alone	23(12.3%)
Married	167(89.3%)
Smoking history	44(23.5%)
Ejection fraction < 40%	152(81.3%)
Cancer	9(4.8%)
Chronic kidney disease	34(18.2%)
Diabetes mellitus	88(47.1%)
Hypertension	91(48.7%)
Dyslipidemia	66(35.3%)
Educated	64(34.2%)
Atrial fibrillation	15(8.0%)
CABG <sup>2</sup>	11(5.9%)
Mean BMI <sup>3</sup> (kg/m <sup>2</sup> )	29 (SD <sup>1</sup> , 5)

<sup>1</sup>SD=standard deviation;

<sup>2</sup>CABG=coronary artery bypass graft;

<sup>3</sup>BMI=body mass index

### 3.1 Predictors of Adherence and Outcomes

Among the baseline demographic characteristics, good adherence was positively associated with education (93.6%, n=29/31), no

history of coronary artery bypass grafting surgery (67.7%, n=21/31), and age < 65years (51.6%, n=16/31). Most of the non-adherent patients were uneducated (77.7%, n=121/156), had no history of coronary artery bypass grafting surgery (99.4%, n=155/156), age < 65years (70.5%, n=110/156). In these three characteristics, there was a significant difference in the results with P-value<0.05, as shown in Table 3.

Marital status and a few other factors were not correlated with adherence to heart failure self-care. The majority of the patients with good adherence were educated and did not live alone. Patients of diabetes mellitus (87.5%, n=77/88) and dyslipidemia (86.4%, n=57/66) also had poor adherence to heart failure self-care, albeit there were more patients without diabetes mellitus (52.9%, n=99) or dyslipidemia (64.7%, n=121). In addition, there were no significant differences between the genders (P-value=0.37). However, females (54.8%, n=17/31) were more adherent than males (45.1%, n=14/31). Good adherence (score 32 out of 40) was seen in 16.5% (n=31) of the patients. Good adherence to every single variable (score four or five) was reported in 3.74% (n=7) of the patients. Consequently, most of the patients (83.4%, n=156) were non-adherent (Table 3).

More than half of the patients had good adherence towards medication (82.9%, n=155) and smoking (80.2%, n=150). Likewise, there was good adherence in almost all the patients regarding alcohol cessation (97.9%, n=183). On the contrary, most of the participants did not

have good adherence towards the rest of the recommendations. Only 11.8% (n=22) of the patients in the good adherence category weighed regularly, making it the least popular recommendation. Moreover, only 12.3% (n=23) of the patients exercised regularly and only 37.4% (n=70) of the participants monitored their symptoms. Similarly, good adherence was seen in 31.5% (n=59) of the patients following a low salt diet and 25.1% (n=47) of the patients following a low fat diet (Fig. 1).

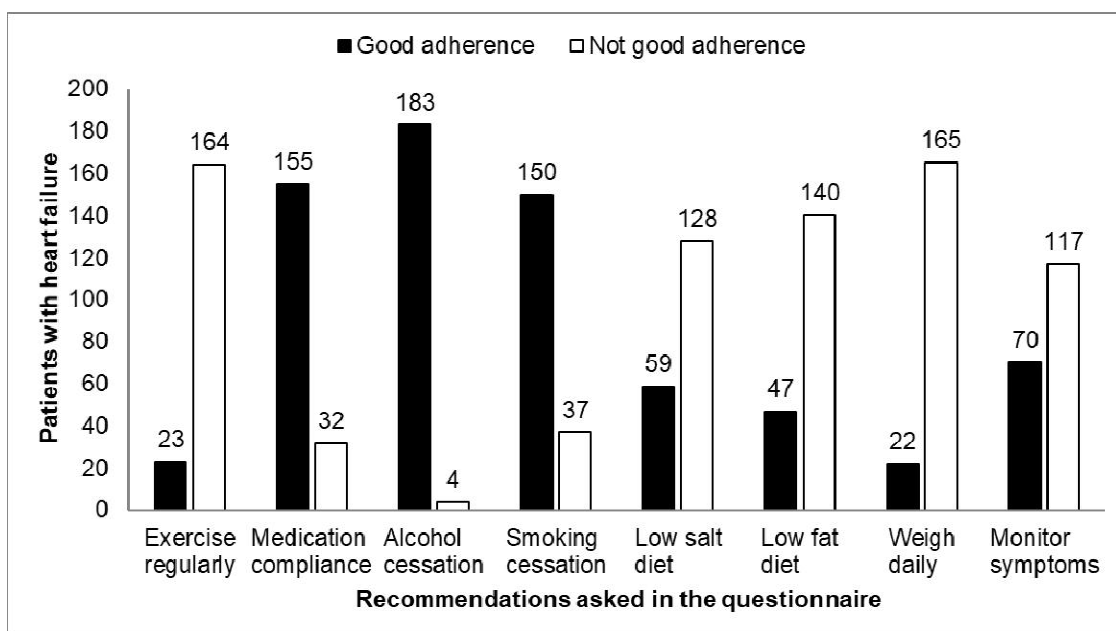
#### 4. DISCUSSION

Our study revealed that more than 80% of the heart failure patients were non-adherent to the recommendations regarding heart failure self-care. This is an alarming situation as poor adherence to lifestyle modifications can pose a threat to overall healthcare efficiency; it can also lead to an increase in the number of hospital readmissions. It is reported that nearly half of heart failure patients are readmitted within six months of discharge and 25% are readmitted within 30 days [16]. Also, it may contribute in developing future complications over the course of the disease. A notable reason for heart failure aggravation was dietary sodium indiscretion leading to fluid overload [17]. To understand the overall pattern of adherence to self-care, a number of predictors were tested to reach a suitable conclusion. They included, education, history of coronary artery bypass grafting surgery, living alone, age (>/< 65 years), diabetes mellitus, dyslipidemia and the female gender.

**Table 3. Relationship of good and not good adherence to different variables with their p-values**

Patient characteristics	Good adherence (n=31)	Not good adherence (n=156)	Total (n=187)	P-value
Educated	29 (45.3%)	35 (54.7%)	64(34.2%)	<0.005*
Non-educated	2 (1.6%)	121(98.4%)	123(65.8%)	
History of CABG <sup>1</sup>	10(90.9%)	1(9.1%)	11(5.9%)	<0.001*
No history of CABG <sup>1</sup>	21(11.9%)	155(88.1%)	176(94.1%)	
Lives alone	3(13.0%)	20(87.0%)	23(12.3%)	0.62
Does not live alone	28(17.1%)	136(82.9%)	164(87.7%)	
Age > 65 years	15(24.6%)	46(75.4%)	61(32.6%)	0.04*
Age < 65 years	16(12.7%)	110(87.3%)	126(67.4%)	
DM <sup>2</sup>	11(12.5%)	77(87.5%)	88(47.1%)	0.15
Non-DM <sup>2</sup>	20(20.2%)	79(79.8%)	99(52.9%)	
Dyslipidemia	9(13.6%)	57(86.4%)	66(35.3%)	0.42
Non-dyslipidemia	22(18.2%)	99(81.8%)	121(64.7%)	
Females	14(19.7%)	57(80.3%)	71(38.0%)	0.37
Males	17(14.7%)	99(85.3%)	116(62.0%)	

\*Results are statistically significant (P<0.05). <sup>1</sup>CABG=coronary artery bypass graft <sup>2</sup>DM=diabetes mellitus



**Fig. 1. Patient adherence to various self-care practices**

The results demonstrated that the education status was significantly related with adherence ( $P$ -value=0.04), as confirmed by Vellone et al [18]. A majority (98.4%) of the non-educated participants fell under the “Not good adherence” category, probably because people who are not well educated are often insufficiently aware of the adverse consequences of not complying with the standard recommendations. In another study, greater than 50% of the participants were illiterate or had secondary education or lower; and education was presented as a significant predictor of self-care maintenance [19]. Another possible explanation can be that they have trouble reading the recommendations guidelines commonly put up on hospital walls and also understanding the advertisements (TV/Billboard/Pamphlets) specifically designed for heart failure self-care awareness. Therefore, it is the jobs of the respective consultant to either properly explain the guidelines to such patients or to assign them to a medical counselor after every appointment.

Having a history of coronary artery bypass grafting surgery was also found to be significantly related to adherence ( $P$ -value<0.001). 90.9% of the patients who had undergone the procedure had good adherence while 88.1% of the patients with no history of coronary artery bypass grafting surgery were not adherent. A conceivable reasoning for that might be that patients who

have experienced the procedure are more careful of their lifestyle as they often view it as a “warning sign” in the course of their treatment. In a previous study, only 26% of the patients with a history of coronary artery bypass grafting surgery were non-adherent to prescribed medications [20]. On the other hand, patients with no history of coronary artery bypass grafting surgery are less mindful of their diet, exercise routine and medications. Presumably because they are still oblivious to the harmful consequences an unhealthy lifestyle routine can lead to. In simpler words, it has not “hit” them yet. Consequently, nurses and doctors should make sure that these patients are dealt with the same strictness with respect to their lifestyle modifications, as patients with a history of coronary artery bypass surgery.

Furthermore, age was also presented as a significant predictor of adherence ( $P$ -value=0.04), as previously confirmed by several studies [19,21-23]. Participants over the age of 65 were more non-adherent (75.4%) than adherent (24.6%). This is explanatory if age-related memory disturbances are taken into consideration [24]. Patients belonging to the older age group often struggle with remembering their medication schedules and diet limitations. As shown in previous studies [22,23], cognitive impairment is one of the significant issues in heart failure patients. In addition, older

patients avoid regular exercise due to the fear of fatigue and tiredness post exercise. It is therefore important to appropriately counsel their care-givers at home regarding HF lifestyle modifications. Community health-care workers can also visit old patients' homes once a year, and follow-up on their lifestyle practices as part of an annual check-up program. Surprisingly, the bulk of the non-adherent group was formed by participants under the age of 65 (87.3%). A hypothetical interpretation could be that younger patients are not that serious with respect to their medical condition. Additionally, many people under 65 are employed and hence have a busy schedule. A study done on adherence to lifestyle modifications and medication after coronary artery bypass grafting surgery revealed that busy schedule had a significant association with non-adherence to exercise [20]. Moreover, in people below 65 years of age, poor self-care habits can be attributed to anxiety and depression which are further worsened by their workload that leads to a decreased ability and interest in following self-care habits. Accordingly, family and friends can play a role in this and motivate HF patients to follow a healthy lifestyle.

Although the results concerning living alone ( $P$ -value=0.62), diabetes mellitus ( $P$ -value=0.15), and dyslipidemia ( $P$ -value=0.42), as possible predictors, presented them as non-significant, they were in congruence with previous studies. For instance, participants living alone were more non-adherent (87.0%) as they lack the moral support of their families which has proved to be a determining factor in self-care routines [25,26]. Although, the number of people living with the patient is usually correlated with better self-care, 82.9% of the participants who did not live alone, displayed unsatisfactory adherence. Similarly, patients with diabetes mellitus and dyslipidemia showed an overall bad adherence to self-care recommendations. As recognized in other studies, co-morbidities negatively impact on the ability to adhere to heart failure medications [27]. Moreover, gender was also not significantly related to adherence ( $P$ -value=0.37). However, contrary to previous studies [18], the non-adherent group of participants in our study, comprised more of males (85.3%) than females. This can be explained by the fact that in our society, men are usually dependent on their wives to take care of their daily needs. Hence, for example, wives with an already busy schedule might miss or forget their husbands' medication doses.

Adherence to specific recommendations was studied upon in our study. It was seen that, very few (12.3%) participants exercised regularly. A myth that exercise would aggravate cardiac issues can be held responsible for this. Furthermore, there is no apparent gym culture in Pakistan and activities like group exercising programs are not that popular. This makes it difficult for the patients to follow a consistent exercise routine, as reported by previous studies [28]. Hence, doctors should counsel patients about these absurd myths and encourage them to join a nearby gym. The government can also work with healthcare professionals and fund activities like group physical training sessions for HF patients.

Although, majority had good adherence towards medication compliance (82.9%), 17.1% of the participants were still not adherent towards medication compliance. There can be a number of reasons for non-compliance towards medications. However, we believe that since adherence and frequency of dosing are inversely proportional to each other [29], a long complicated prescription can discourage patients to be compliant. Thus, doctors should use combination drugs wherever possible and advise the nurses to properly explain the prescription to the patient.

Exceptionally good adherence was reported towards alcohol cessation (97.9%), most likely because it is forbidden in Islam and Pakistan is a Muslim-majority country. 19.8% of the participants were not adherent towards smoking cessation, which is a major threat to HF patients. Pakistan unfortunately does not have many rehab facilities aiming towards addiction practices. As a result, many people have a difficult time overcoming their smoking addiction and often experience withdrawal symptoms. It is now imperative that the government should invest in such facilities and work with different healthcare professionals to provide a safe platform for patients. Friends and family can also help and motivate HF patients to gradually overcome their addictions, by boosting their morale. Doctors can also take a step and organize support groups for such patients within the hospital premises.

It was also noted that only 31.5% of the patients followed a low salt diet and only 25.1% of the patients followed a low fat diet. Since, Pakistani style cooking includes a variety of foods containing high salt and oil content, this can lead

to over-consumption of fat and salt rich meals. There are also limited options available in restaurants for restricted low fat diets [20]. Therefore, HF patients need to be exclusively counselled about their dietary practices and restaurants should be encouraged to add low fat items to their menus. Our results also demonstrated that only 11.8% of the participants weighed themselves regularly. This can be merely due to the fact that patients do not know the importance of weighing themselves on a regularly basis. Nurses and doctors should make patients aware about the benefits of this practice and how it would encourage them to keep a check and balance on their diet and physical activity.

Moreover, only 37.4% of the participants monitored their symptoms. Which again emphasizes that there is a lack of awareness regarding self-care guidelines amongst HF patients. Doctors should plan awareness sessions along with nurses and medical students and encourage HF patients to follow a healthy lifestyle. As, good adherence to self-care practices can ultimately affect long term prognosis. It was seen in a previous study that; lifestyle measures can reduce the five-year coronary heart disease calculated risk in males by 22% [30].

## 5. CONCLUSION

Adherence to self-care recommendations in heart failure patients is very low. There is an urgent need to educate heart failure patients about self-care management. Specific guidelines should be set up by the government, along with doctors practicing in developing countries. Additionally, heart failure self-care awareness sessions for both the patients and their family members should be arranged.

## 6. LIMITATION

There are a few limitations in this study that need to be considered. First, patients were enrolled from only three hospitals of Karachi; therefore, the sample size was small and localized only to a specific region. Hence, any future studies revolving around the same topic should include a greater number of hospitals to better generalize the data. In addition to this, our study did not highlight the different types of HF in patients. Furthermore, this study was solely based on self-reported data, which may include an information bias factor. Finally, no comparison between the health statuses of those who indicated good

adherence and those who did not could be obtained.

## CONSENT

All authors declare that complete anonymity was ensured, and fully informed and understood verbal consent was obtained from the patients for publication of this study.

## ETHICAL APPROVAL

The study was performed in accordance with the ethical standards laid down in the 1964 declaration of Helsinki.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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