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<span style="color:orange">**Original article**</span>

# A Cross-Sectional Observational Study on Medication Adherence among Patients with Congestive Heart Failure Visiting Cardiology Outpatient Department

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**ABSTRACT:**
Introduction: Heart failure is defined as the pathophysiological state in which impaired cardiac function cannot maintain adequate circulation for the metabolic needs of the tissues. Studies showed that patients with chronic conditions like CHF discontinue their medical regimens after their discharge from the hospital by the end of the month. Low medication adherence is related to worse health outcomes and death. Treatment adherence is vital to maintain patients' physiological stability.
Objectives: The objective of this study was to assess the level of adherence to medication among patients with congestive heart failure using the Morisky medication adherence scale and to assess the factors affecting adherence.
Materials and Methods: A Questionnaire-based prospective observational study was conducted at a cardiology outpatient department of a tertiary care hospital for six months. Data were collected by patient interviews. The data were subjected to analysis using SPSS software. The P value less than 0.005 was taken to be statistically significant.
Results: The participants included were (59%) Males and (41%) Females. Among 150 participants, 84 (57%) were not adherent to medications, and 64 (43%) were adherent. In terms of the level of education (30.67%) were illiterate. Many participants (59%) take about 5 to 7 drugs daily. Level of education and number of drugs taken per day (polypharmacy) had a positive correlation with medication adherence.
Conclusion: Educating patients about the importance of adherence to the prescribed medications is essential. Healthcare professionals should make competent and convincing strategies to prevail over the negative impacts of non-adherence among heart failure patients

**Keywords:** CHF, Heart failure, Medication adherence, Compliance, Non-adherence.

## 1. INTRODUCTION

Heart failure is defined as the pathophysiological state in which impaired cardiac function can not maintain adequate circulation for the metabolic needs of the tissues. Heart failure may be acute or chronic. Congestive heart failure (CHF) is a term used for heart failure in which there is evidence of congestion of peripheral circulation and congestion of the lungs. It is the final result of various forms of heart disease [1]. The prevalence of heart failure in India in 2016 was estimated at around 8-10 million individuals, or 1% of the total population, and the estimated mortality rate was about 0.1-0.16 million [2].

Women have a lower incidence of HF when compared to men at all ages except less than seventy-four years [3].

Many conditions, such as age or geographical variations, determine the etiology of HF.

Currently, the most common cause of HF in the Western world is hypertension and ischaemic heart disease. Diseases of the myocardium include ischaemic heart disease caused by myocardial scarring and CAD. Conditions that cause high output states, such as severe anaemia, sepsis, and thyrotoxicosis, may lead to HF [4].

Major risk factors include hypertension, high blood cholesterol, diabetes, obesity, smoking, age, and heredity [5].

**Table 1: Symptoms and signs of Heart Failure [6]**

|  | Left-sided heart failure | Right-sided heart failure |
|---|---|---|
| SYMPTOMS | Diastolic dysfunction<br>• Dyspnea<br>• Cardiac asthma<br>• Pulmonary edema<br>• Hemoptysis<br>Systolic dysfunction<br>• Exercise intolerance<br>• Fatigue, Nocturia | • Peripheral edema<br>• Lower extremity edema<br>• Anasarca<br>• Nausea<br>• Vomiting<br>• Abdominal pain<br>• Nocturia |
| SIGNS | Pulmonary congestion<br>• Wheezing<br>• Abnormal sputum cytology<br>• Moist rales<br>Fourth heart sound<br>Third heart sound<br>Cold extremities, Oliguria | Venous congestion<br>• Increased central venous pressure<br>• Positive hepatojugular reflux<br>• Congestive hepatomegaly, cardiac cirrhosis<br>Ascites, proteinuria, fourth heartsound |

Preload, after load, and myocardial contractility are significant predictors of stroke volume. The main pathological reasons for HF are impaired ventricular contractility, an increase in afterload, and impaired ventricular relaxation/ filling (Table 1) [7].

The first step to accurately diagnosing HF is to suspect it by considering the symptoms. The physical examination can detect many symptoms, such as increased jugular venous pressure or oedema—tests such as serumelectrolyte, albumin, and creatinine. Brain natriuretic peptide (BNP) tests are also used. Chest X-rays, electrocardiogram (ECG), and echocardiography (ECHO) are commonly used tests. Other tests, such as Exercise stress tests, MRIs, and radionuclide ventriculography, can determine the state of the heart [8].

Therapy goals– to relieve symptoms, improve quality of life, slow disease progression, and reduce the need for hospitalizations to help patients live longer (Table 2) [9, 10].

**Table 2 : Management of Systolic HF according to the stage**

| STAGE | TREATMENT |
|---|---|
| STAGE-A | Treat hypertension, diabetes, and dyslipidemia with ACE inhibitors or ARBs. |
| STAGE-B | Treat with ACE inhibitors or ARBs, Beta-Blockers in selective patients. |
| STAGE-C | Treat with Aldosterone antagonist, ACE inhibitors, and Beta-Blockers. Dietary sodium restriction, diuretics, and digoxin. |
| STAGE-D | Treat with inotropes or ventricular assist device. |

Management of HF also requires patient education strategies, advice, care, and support to achieve the best possible quality of life. These factors lead to improved adherence to medication [11].

Poor medical adherence reduces the health benefits of pharmacotherapy [12]. Studies have found that patients with most chronic conditions discontinue their medical regimens after their discharge from hospitalization by the end of the month. Very few patients report continuing their medications beyond 6-12 months, depending on the class of drug used [13].

Low medication adherence is related to worse health outcomes and a higher rate of hospitalization and death. Better compliance is related to better health-related quality of life and reduces hospitalizations and death [14].

Adherence to heart failure medications remains the mainstay to avoid unwanted health expenses, recurrent hospital admissions, and death. Despite the evidence-based effectiveness of the medication, poor adherence remains a significant barrier to improving clinical outcomes. In several observational studies, the rate of adherence to medication in patients with heart failure was low. Medication non-adherence is the leading cause of rehospitalization and mortality among heart failure patients.

Our study aims to contribute more to the available literature on the assessment of medication adherence in congestive heart failure patients with the help of a self-designed questionnaire. With this study, we can assess medication adherence and non-adherence in the congestive heart failure population.

## 2. MATERIALS AND METHODS

A Questionnaire-based prospective observational study was conducted at a tertiary care hospital. People belonging to every caste, people who willingly gave their consent to participate in the study, subjects of either gender aged at least 18 years and above, patients with a confirmed diagnosis of heart failure and patients with a detailed medical history and prescription were included. Participants under 18, people unwilling to consent to participate, critical patients, and pregnant women were excluded.

**Study Site:** The study was conducted at the cardiology outpatient department of Mahavir Hospital and research centre, Hyderabad, India.

**Study design:** The study was a questionnaire-based prospective observational study.

**Study Duration**: The study was conducted for a period of 6 months, from November 2021- to April 2022.

**Ethical approval:** The study was approved by Mahavir Hospital and research centre ethics committee.

**Study instrument:** A self-designed study instrument was used to assess the level of adherence, which comprised two sections. Section I consisted of the demographic and clinical characteristics of the patient, such as age, gender, place of residence, marital and occupational status, monthly income, educational level, social & medication history, the time when CHF was diagnosed, duration of HF, comorbidities, drugs prescribed for HF, course of treatment, number of hospitalizations. Section II consisted of validated MMAS-4.

The level of medication adherence was assessed using a validated Morisky Medication Adherence Scale (MMAS-4). The tool consists of four questions, and scoring was done,

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with a total score being 4. For each question, there is a score of zero for every "yes" response and one for every "no" answer; the scores are summed to give a total score ranging from 0 to 4. A score of 0 indicates very low adherence, 1 indicates low adherence, 2 indicates mild adherence, 3 indicates moderate adherence, and 4 indicates good adherence.

**Statistical analysis:** The filled-in questionnaire was entered into a Microsoft Excel sheet and analyzed using SPSS. Descriptive statistics were performed to achieve summary tables for study variables (demographic characteristics and their response to questionnaire items). Pearson's chi-square test was applied to find the correlation between age, level of education, number of drugs used per day, comorbidities, with medication adherence.

### 3. RESULTS

Our study included one hundred fifty-three participants, of which three questionnaires were incomplete, making the sample size 150. Verbal and written consent was obtained from the patient before the study. Most participants (28.67%) were between 51 to 60 years. 24.67 % of the participants were between the ages of 41 to 50, 24.67% of the participants were between 61 to 70 years old, 13.33% of the participants were 71 to 80 years old, 4% of the participants were between the ages of 31 to 40 years, the least number of participants (3.33%) were between the ages of 81 to 90 years. The participants included in our study were 59% (89) Males and 41% (61) Females. In terms of the level of education majority of the participants were literate. 3% of the participants were postgraduates, 22% were graduates, 14% had an intermediate level of education, 24% had a high school level, and 7% had a primary level of education. 30% of the participants were illiterate.

Regarding monthly income, 38.67% of the participants had an income of more than 20 thousand rupees, 18% had an income of less than 20 thousand rupees, and 43.33% had no source of income.

Out of 150 participants, 105 of them (70%) had no social history, 12 (8%) were smokers, 16 (10.67%) were alcoholics, 8 (5.33%) were tobacco chewers, 9 (6%) were both alcoholics and smokers. According to our data, most hospitalizations were once and twice (44.67). 8% of the participants were hospitalized thrice, 1.33% four times, and 1.33% were never hospitalized.

The number of drugs taken by 88 participants (59%) was about 5 to 7 per day; more than seven drugs were taken by 14 participants (9.33), and up to 4 drugs were taken by 48 participants (32%). Among 150 participants, 84 (57%) were not adherent to medications, whereas 64 (43%) were adherent. The highest level of adherence was found to be present in participants who were 45 to 60 years, then 61 to 75 years, then less than 44 years old, and then more than 75 years.

Our study found that age is not correlated with adherence, as the P-value was insignificant.

In terms of the correlation between education and level of adherence, it was found that the higher the level of education, the better medication adherence, as the P value was significant. Illiteracy was highly associated with poor medication adherence.

Regarding our study, polypharmacy (more than five drugs per day) was highly associated with the level of medication adherence. The P-value was significant.
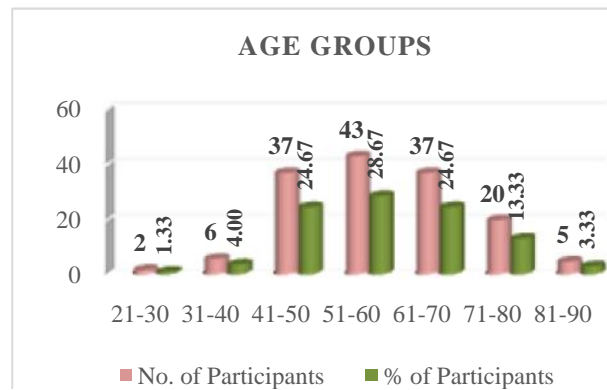

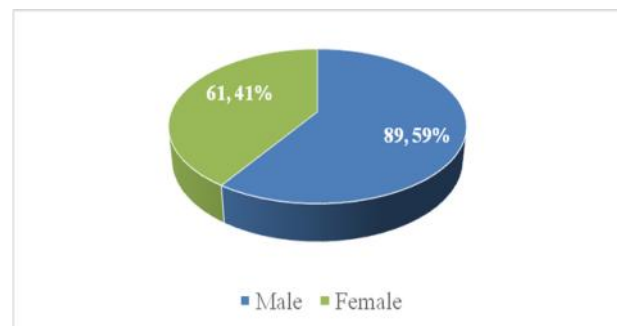Fig 1 : Distribution of participants based on Age groups


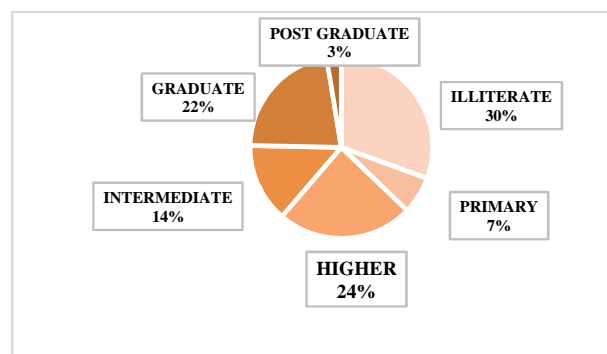Fig 2 : Distribution of participants based on Gender


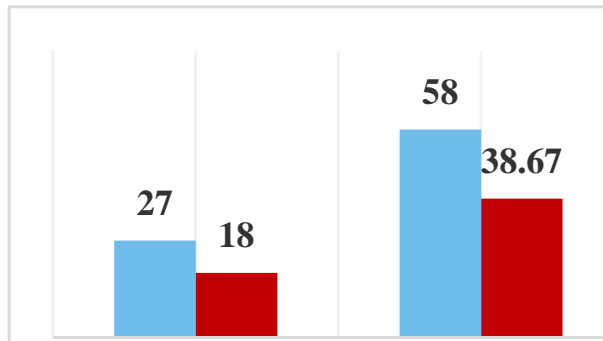Fig 3 : Distribution of participants based on Level of Education

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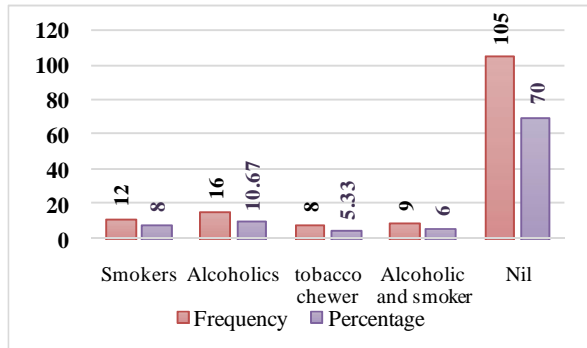**Fig 4 : Distribution of participants based on monthly income**



**Fig 5 : Distribution of participants based on Monthly Income**



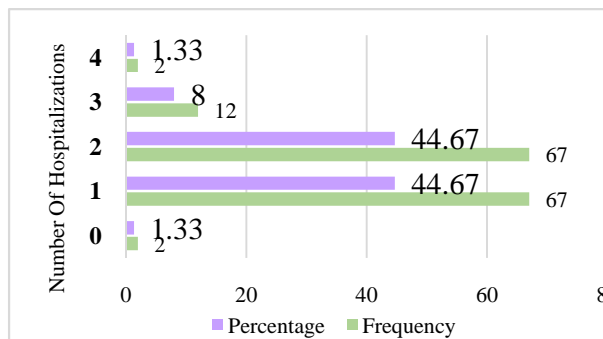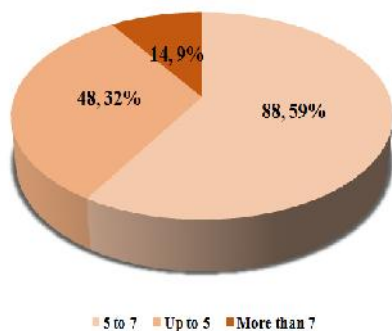**Fig 6: Distribution of participants based on Frequency of Hospitalizations**



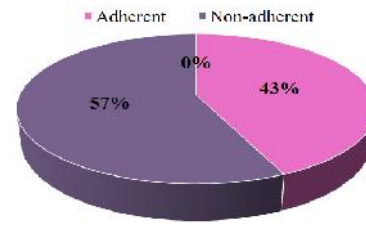**Fig 7 : Distribution of participants based on Number of drugs taken**



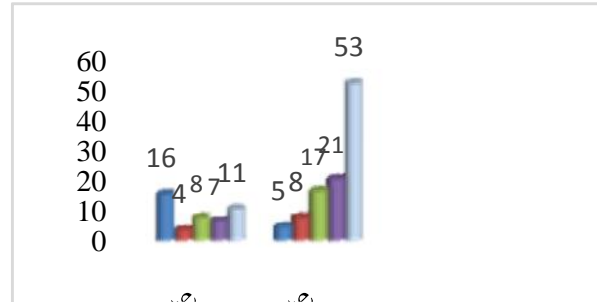**Fig 8 : Distribution of participants based on medication Adherence**



**Fig 9 : Correlation of level of adherence and Education**

**Table 3 : Correlation of level of adherence and Education**

| Education | | Level of Adherence | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | Very low | Low | Mild | Moderate | Good | |
| | Illiterate | 16 | 4 | 8 | 7 | 11 | 46 |
| | Literate | 5 | 8 | 17 | 21 | 53 | 104 |
| Total | | 21 | 12 | 25 | 28 | 64 | 150 |

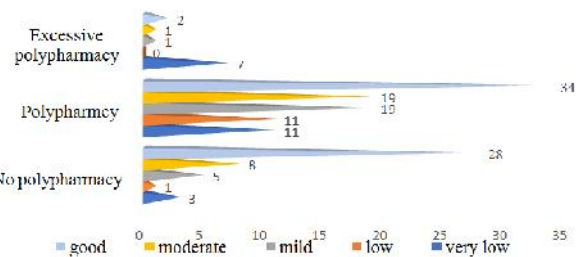2 Value =26.421    df= 4       P value < 0.05



**Fig 10 : Correlation between number of drugs taken per day and level of medication adherence**

**Table 4 : Correlation between number of drugs taken per day and level of medication adherence**

| Drugs taken per day/ Polypharmacy | | Level of adherence | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | Very low | Low | Mild | Moderate | Good | |
| | No polypharmacy or up to four drugs | 3 | 1 | 5 | 8 | 28 | 45 |
| | Polypharmacy or five to seven drugs | 11 | 11 | 19 | 19 | 34 | 94 |
| | Excessive Polypharmacy or more than seven drugs | 7 | 0 | 1 | 1 | 2 | 11 |
| Total | | 21 | 12 | 25 | 28 | 64 | 150 |

[2] Value=34.919  df= 8      P value<0.005

## 4. DISCUSSION

Medication adherence is a severe issue usually encountered by patients with chronic diseases and complicated prescriptions. Medication non-adherence in patients with congestive heart failure is a situation that should be considered crucial as it can lead to adverse consequences.

Our study included 150 participants, 89 (59%) males and 61 (41%) females. Similarly, a survey conducted by Zahid U. Rehman *et al*. included 200 patients, of which 123 were males (61.5%), and 77 (38.5%) were females.

28.67% of the total participants in our study fell into the age group of 51 to 60 years, 24.67% were 41 to 50, and 24.67% were 71 to 80. The lowest level of adherence was seen in participants aged 45 to 60. In our study, ageing was not correlated to medication adherence, but in contrast to a survey conducted by Hisham B Altuwairqi *et al*., which included 37.1% of participants with ages 60 and above, 16.5% less than 40 years old, reported to have a positive correlation with medication adherence.

The maximum number of participants in our study was literate. 24% pursued higher education, 22% were graduates, and 2.67% were postgraduates. There was a high significance between the level of education and medication adherence. Better medication adherence was seen in educated participants. Similarly, in a study conducted in Yemen by Al-Zaazaai *et al*., education was significantly linked to non-adherence.

The participants in our study were primarily married and living with families. 90% of the participants were married, and 8% were widowed but living with families. 2% of the total were unmarried. 38.67% had a monthly income of more than 20 thousand rupees, 18% had a monthly income of less than 20 thousand rupees, and 43.33% had no source of income. Similarly, a study by Dr Gouranga Santra *et al*. found that more than 5000 rupees were considered high socioeconomic status.

The most common comorbidity was hypertension (55.33%) and diabetes (48.67%). 18% had thyroid issues, and 17.33% had chronic kidney disease. The correlation between comorbidities and level of adherence was found to be insignificant. Seyedeh Somayeh Amininasab *et al*. conducted a study in Iran where medication adherence was significantly correlated with comorbidity. Pill burden, or polypharmacy, or the number of drugs taken per day, is said to have a negative effect on medication adherence. In our study, polypharmacy or the number of drugs taken per day, was significantly associated with adherence. The higher the number of drugs prescribed per day, the lower the medication adherence. But a contradicting study by Olagoke Korede Ale *et al*. showed that the association between pill burden and medication non-adherence was insignificant.

## 5. CONCLUSION

In Conclusion, our study indicates a high incidence of non-adherence to medication. Low adherence rates were associated with illiteracy, whereas literate patients showed good adherence. Polypharmacy was also associated with medication non-adherence in our study.

Our study showed no correlation between medication adherence and gender, occupation, or marital status. Non-adherence was more common due to dementia. Worsening heart failure symptoms were apparent in our study participants due to non-adherence to medication. Therefore, educating heart failure patients about the importance of adherence to the prescribed medications is essential. Healthcare professionals should make competent and convincing strategies to prevail over the negative impacts of non-adherence among heart failure patients.

Maintaining a routine, using a pill organizer, using a medicine calendar or reminders, and taking the medication simultaneously by maintaining punctuality can help overcome barriers to medication adherence.

Interventions like awareness, disease education, drug information, and patient counselling provided by the pharmacist can be of great importance, which can help patients to understand more about the disease and the importance of medications and improve medication adherence.

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**AVAILABILITY OF DATA AND MATERIALS:** The raw data used in this study can be obtained from the corresponding author upon reasonable request.

**CONSENT FOR PUBLICATION**: All authors gave consent for publishing the manuscript.

**ETHICS APPROVAL AND CONSENT TO PARTICIPATE:** NA.