**Research Article**

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**Area of Expertise:** Cardiovascular Medicine and Haematology

**Title:** Empowering self-management: exploring self-care practices in heart failure patients.

**Short title:** Self-care in heart failure patients.

**Abstract**

**Background and Aim:** Heart failure is a complex clinical syndrome in which ventricular filling and beating functions are impaired. HF also causes psychosocial and economic problems and is a significant public health problem affecting the quality of life. Effective self-care is a non-pharmacological method that contributes to treatment, improves the patient's quality of life, and reduces repeated hospitalizations and economic burdens. Our study aimed to evaluate self-care in heart failure patients and to determine the factors affecting self-care.

**Materials and methods:** A total of 100 patients with heart failure, including 36 women and 64 men, were included in the study. Data were collected by using the Descriptive Information Form and the European Heart Failure Self-Care Behavior Scale in one-on-one interviews with patients under appropriate physical conditions.

**Results:** Our findings indicate that a range of factors, including age, hypertension, educational status, the total number of comorbid diseases, and the use of certain medications such as SGLT-2 inhibitors, differently impact self-care behaviors. Self-care behaviors were found to be adequate in the study population

**Conclusion:** We identified essential factors that affect self-care in heart failure patients. We have identified critical factors such as age, educational status, hypertension, comorbidity, and particularly the use of SGLT2 inhibitors, as key influencers of self-care practices. For this reason patient-centered healthcare models should be developed and considered by medical practitioners.

**Keywords:** Heart failure, self-care behavior, patient education, SGLT2 inhibitors.

**Makale başlığı:** Öz bakım yönetimini güçlendirme: kalp yetersizliği hastalarında öz bakımı etkileyen faktörlerin incelenmesi.

**Öz**

**Amaç:** Kalp yetersizliği, ventriküler dolum ve atım fonksiyonlarının bozulduğu kompleks bir klinik sendromdur. Kalp yetersizliği aynı zamanda psikososyal ve ekonomik sorunlara da yol açarak yaşam kalitesini etkileyen önemli bir halk sağlığı sorunudur. Etkili kişisel bakım, tedaviye katkı sağlayan, hastanın yaşam kalitesini artıran, tekrarlayan hastaneye yatışları ve ekonomik yükleri azaltan, farmakolojik olmayan bir yöntemdir. Çalışmamızda kalp yetersizliği hastalarında öz bakımın değerlendirilmesi ve öz bakımı etkileyen faktörlerin belirlenmesi amaçlanmaktadır.

**Gereç ve yöntem:** Çalışmaya 36'sı kadın, 64'ü erkek olmak üzere toplam 100 kalp yetersizliği olan hasta dahil edildi. Veriler, uygun fiziksel koşullar altında hastalarla yapılan birebir görüşmelerde Tanımlayıcı Bilgi Formu ve Avrupa Kalp Yetersizliği Öz Bakım Davranış Ölçeği kullanılarak toplanmıştır.

**Bulgular:** Bulgularımız, yaş, hipertansiyon, eğitim durumu, komorbid hastalıkların toplam sayısı ve SGLT-2 inhibitörleri gibi bazı ilaçların kullanımının öz bakım davranışlarını farklı şekillerde etkilediğini göstermektedir. Öz bakım davranışları, çalışma popülasyonunda yeterli düzeyde bulunmuştur.

**Sonuç:** KY hastalarında öz bakımı etkileyen temel faktörleri belirledik. Yaş, eğitim durumu, hipertansiyon, komorbidite ve özellikle SGLT2 inhibitörlerinin kullanımı gibi kritik faktörleri, öz bakım uygulamalarının önemli etkileyicileri olarak belirledik. Bu nedenle, hasta merkezli sağlık bakım modelleri geliştirilmeli ve tıp uzmanları tarafından dikkate alınmalıdır.

**Anahtar kelimeler:** Kalp yetersizliği, öz bakım davranışı, hasta eğitimi, SGLT2 inhibitörleri.

## Introduction

Heart failure (HF), characterized as a complex clinical syndrome, manifests through signs and symptoms arising from either structural or functional impairments in ventricular filling or the effective pumping of blood. This condition notably escalates with advancing age. For instance, in 2012, the prevalence of HF was reported to be approximately 4.3% among individuals aged 65-70. Moreover, projections indicate a steady increase in this prevalence, with expectations of it reaching around 8.5% by the year 2030 [1, 2].

Distinctively, the epidemiology of HF in Türkiye presents a contrast to that observed in Western countries, particularly in terms of the affected age groups. According to the findings of the HAPPY (Heart Failure Prevalence and Predictors in Türkiye) study, the prevalence of HF in the Turkish population was estimated at 6.9%, with a notably higher occurrence in the younger demographic compared to Western counterparts [3].

HF not only impedes the physical activities of those affected but also profoundly impacts their social and psychological well-being. This multifaceted influence leads to a notable decline in patient productivity and a corresponding deterioration in the quality of life for individuals with HF [4, 5]. Self-care (SC) emerges as a crucial factor in this context, significantly affecting the social, psychological, and economic circumstances of patients.

The effective management of HF encompasses an accurate assessment and treatment regime. This includes the optimization of medical therapy, proactive management of early signs and symptoms of decompensation, thorough identification and handling of comorbid conditions, clear determination of end-of-life demands, and consistent continuous monitoring. These components collectively contribute to facilitating SC behaviors in patients. There is a growing body of evidence suggesting that strategies positively impacting SC can significantly reduce the economic burden associated with HF [6].

The concept of SC, initially introduced by Dorothea Orem in 1959, encompasses the actions an individual undertakes to maintain life, health and well-being. This concept posits that SC is a skill honed over time through communication, cultural influences, education and interaction. SC ability or power, refers to the capacity of an individual to carry out self-related activities, essentially enabling the organization and fulfillment of ongoing personal care needs. For effective SC, an individual must possess certain qualities, including the ability to take care of oneself, efficiently use and control physical energy, make informed SC decisions, stay motivated, organize and maintain consistent

actions towards SC and take responsibility for one's health. Adequate SC power leads to sufficient and appropriate fulfillment of SC needs, fostering independence in health management. Conversely, a lack of SC, stemming from failure to engage in related activities, leads to inadequacies in maintaining and improving health, highlighting the importance of SC in overall well-being [7].

In accordance with the guidelines of the European Society of Cardiology (ESC), SC is recognized as a pivotal element in the successful management of HF, exerting a profound impact on patient symptoms, functional capacity, general health status, morbidity, and overall prognosis [8]. Patients diagnosed with HF are required to engage in a range of self-care activities throughout their lifetime. These activities encompass managing complex treatment protocols, adhering to a low-sodium diet, vigilant monitoring of early symptoms such as fluid retention, dyspnea, and fatigue, and executing appropriate interventions when necessary [9]. However, challenges persist as patients often struggle to recognize these symptoms, with the underlying reasons for this difficulty remaining unclear. Despite the acknowledged significance of SC in yielding positive health outcomes, a substantial number of HF patients exhibit inadequate self-care behaviors [10]. Our study aims to investigate the assessment of SC skills in HF patients using the European Heart Failure Self-Care Behavior (EHFScB) Scale, focusing on identifying the determinants that influence SC practices.

## Materials and methods

This research was approved by the Pamukkale University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee, and adhered to the principles of the Declaration of Helsinki. A cross-sectional study design was employed, involving 100 patients who attended the Cardiology outpatient clinic of Pamukkale University Medical Faculty Hospital.

### Patient selection and administration of the EHFScB scale

The study's inclusion criteria were as follows: a diagnosis of HF; being aged 18 years or older; absence of communication barriers such as visual impairment, decreased hearing, inability to understand or speak Turkish, or psychiatric/congenital disorders that could hinder participation; and willingness to participate after being informed about the research. Patients who later requested to withdraw were excluded from the study.

Data collection was conducted using a Descriptive Information Form and the European Heart Failure Self-care Behavior (EHFScB) scale. The Descriptive Information Form is an 8-item tool designed to capture the demographic characteristics of the patients. It includes age, gender, marital status, educational status, New York Heart

Association (NYHA) functional classification, presence of concomitant diseases, medical treatment, and time since diagnosis.

**EHFScB scale description and usage**

The European Heart Failure Self-care Behaviour scale (EHFScB) was initially developed by in 2003 as a 12-item instrument. Subsequently, its validity, reliability, and consistency were established in Turkish through adaptation by Baydemir et al. [11] Jaarsma et al. [12] later streamlined the scale into a more concise 9-item version. For scoring, a Likert-type scale ranging from 1 to 5 was utilized, where each item is rated from 1 (strongly disagree) to 5 (strongly agree) [13].

Given its simplicity and ease of administration, the 9-item version of the EHFScB was chosen for this study. This version comprises 9 items, divided into 2 sub-factors: compliance with treatment and seeking help [14].

The categorization of the scale into these two sub-factors in its Turkish version is based on a principal components analysis, a statistical method employed to ascertain the underlying sub-factor structure of the scale. This analysis elucidates the stronger associations between variables and respective sub-factors following rotation within the dataset, ensuring a balanced distribution of variables.

In the Turkish adaptation of the scale, the principal components analysis led to the distribution of items under these two sub-factors. This categorization was integral to the process of contextualizing the scale for Turkish patients, aiding in a more nuanced understanding and evaluation of SC behaviors in heart failure [14].

The two sub-factors delineated in the 9-Item EHFScB (EHFScB-9) are as follows:

Sub-factor-1: Monitoring/Counseling Behaviors: Encompasses items 2, 3, 4, and 6 of the scale.

Sub-factor-2: Adherence to Regimen such as Food and Liquid: Includes items 1, 5, 7, 8, and 9 of the scale.

**Data collection and statistical analyses**

Prior to the commencement of data collection, all participating patients were assured that their information would be used solely for the purposes of this study, ensuring confidentiality and adherence to ethical standards. Data were gathered through one-on-one interviews conducted under appropriate physical conditions. These interviews utilized the Descriptive Information Form and the European Heart Failure Self-Care Behavior scale. The responses to the questionnaire and scale were recorded based on the patients' answers.

The statistical analysis of the collected data was performed using SPSS version 22.0 (Statistical Package for Windows, Chicago, Illinois, USA). To further understand the

relationships between the variables and the scale scores, the Spearman Correlation Coefficient was utilized. This statistical tool helped in deciphering the associations and dependencies between the variables. Additionally, the Mann-Whitney U Test was applied to assess the effects of variables such as gender, marital status, hypertension, diabetes, COPD, and medication usage on the scale scores.

**Results**

The study's patient cohort comprised 100 individuals, characterized by notable demographic and clinical diversity. A significant proportion, 33%, were within the 61-70 age range. The cohort predominantly consisted of males (64%) and married individuals (81%), with 55% having completed primary school education.

From a clinical perspective, a majority of the patients, 53.6%, were diagnosed with primary hypertension, while 38.4% had diabetes mellitus (DM). Regarding medication usage, 34.1% of the patients were on beta-blocker treatment. The use of loop diuretics and SGLT2 inhibitors was noted in 18.2% of the patients, and the rate of angiotensin-converting enzyme inhibitors / angiotensin receptor blockers (ACE/ARB) usage stood at 17.3%. Additionally, 10.9% of patients were on Ca channel blockers, and a small fraction, 1.4%, used spironolactone.

The sociodemographic characteristics of the patient population are detailed in Table 1. Table 2 presents the distribution of responses to the European Heart Failure Self-care Behavior scale.

The comparison of SC behavior scores across different demographic and clinical groups, using the Mann-Whitney U test, is displayed in Table 3. Table 4 showcases the correlation analysis of SC behavior scores with demographic and clinical characteristics, employing Spearman correlation coefficients to examine the relationships between SC behavior scores and various factors, including age, total number of diseases, and education level.

To enhance the interpretability of the EHFScBS-9, a reversed and standardized scoring system ranging from 0 to 100 was developed, where a higher score indicates better SC [15]. Additionally, based on prior research, a threshold of ≥19.8 (≥70) has been established as adequate, while a score of <19.8 (<70) is considered indicative of inadequate SC [16]. In our study total patient population, 22% scored below 19.8 points, while 78% scored above this threshold. This suggests that the majority of patients, with scores over 19.8, demonstrate adequate SC, whereas those scoring under 19.8 exhibit inadequate SC.

When the biochemical parameters of the groups with adequate (n:78) and inadequate self-care (n:22) were compared, no statistically significant difference was observed between the groups in terms of hemoglobin levels, creatinine values, serum electrolytes, and other primary biochemical parameters. Additionally, no significant differences were detected in the economic incomes between the groups. The biochemical parameters are shown in Table 5.

**Discussion**

In the present study, we sought to identify the factors influencing SC behaviors among HF patients. Our findings indicate that a range of factors, including age, hypertension, educational status, the total number of comorbid diseases, and the use of certain medications such as SGLT-2 inhibitors, differently impact SC behaviors. Moreover, we observed that specific sub-factors within SC behaviors vary according to each unique patient condition. Significantly, this research is the first to demonstrate a statistically significant association between the use of SGLT2 inhibitors and improved SC behaviors in HF patients.

HF, declared an epidemic in 1997, remains a major health concern affecting a substantial portion of the population, with its incidence and prevalence steadily rising [17]. Managing this disease, which profoundly impacts the quality of life, involves a lengthy, challenging, and expensive process. Hence, placing patients at the forefront of treatment is crucial. For effective management of HF, practitioners must prioritize evaluating SC behaviors in patients. Effective SC management serves as a non-pharmacological approach that not only enhances treatment but also improves patient quality of life. Additionally, it plays a significant role in reducing recurrent hospitalizations and alleviating the economic burden associated with HF.

In this study focusing on SC behaviors in HF patients, we identified a positive but weak correlation between age and overall SC scores. Notably, an increase in age correlated with improved general SC behaviors. Specifically, a similar positive and weak relationship was observed between age and the scores for sub-factor 1 (Monitoring/Consultation Behaviors), suggesting that older patients are more inclined to engage in monitoring and consultation activities related to heart failure management. However, age did not significantly correlate with sub-factor 2 (Adherence to Diet and Fluid Intake). Contrastingly, Prochota et al. [18] reported an inverse relationship between SC and age in their study. Our results imply that older heart failure patients may demonstrate more effective monitoring and consultation SC behaviors, potentially due to their prolonged experience in managing their condition or a heightened awareness of its

severity. The findings specifically highlight that increased age, along with a greater number of illnesses, could enhance engagement in certain SC behaviors, particularly those involving monitoring and consultation.

In our study, the level of education emerged as the only statistically significant factor affecting sub-factor 2 in the univariate analysis. Sub-factor 2 encompasses behaviors related to "adherence to regimen, such as diet and fluid intake" in heart failure SC. We observed that individuals with higher education levels showed greater adherence to these regimens. This pattern suggests that more educated individuals might possess a better capacity to comprehend and implement health-related information, highlighting the pivotal role of education in fostering effective SC behaviors. Kessing et al. [5] similarly reported that patients with lower education levels demonstrated inadequate SC. Another study assessing the link between patient characteristics and SC behaviors in heart failure patients found that education, along with symptom severity, significantly influenced SC [19]. The correlation between higher education and enhanced health literacy implies that more educated individuals can more readily integrate their daily life patterns with health-related behaviors, compared to those with lower education levels. Consequently, individuals with higher education, who are likely to be open to development and change, tend to be more health-conscious and likely exhibit better SC practices.

In our analysis, we also observed a statistically significant yet weak negative correlation between education level and sub-factor 1 scores. Sub-factor 1 represents the 'monitoring and consultation behaviors' associated with HF SC. This finding suggests that individuals with higher education levels may engage less in monitoring and consultation behaviors related to their heart failure management. A possible explanation for this trend could be that more educated individuals, having easier access to health services, might depend more on professional healthcare support rather than solely on SC practices especially on monitoring and consultation behaviors.

In this study, we found a statistically significant, positive, but weak correlation between the scores of sub-factor 1 and the total number of diseases among participants. This suggests that an increase in the number of diseases may boost the likelihood of engaging in such SC behaviors. However, contrasting findings were reported by Buck et al. [20] who observed that an excess of comorbidities led to inadequate SC in patients with heart failure, impacting hospitalizations and quality of life. Similarly, another study reported inadequate SC among patients with both diabetes and heart failure [21]. In our research, while the total number of diseases did not affect sub-factor 2 SC behaviors, it had a positive impact on sub-factor 1. This could be attributed to heightened SC awareness driven by awareness of multiple diseases. Given that sub-factor 1

predominantly involves monitoring and consultation behaviors, the ease of access to hospital services for patients with chronic diseases in our region might have influenced this outcome. These findings imply that the presence of multiple health conditions can increase patients' attentiveness and propensity to seek medical advice, thus influencing their engagement in specific SC practices for HF.

We observed that the presence of hypertension significantly influenced both the overall SC scores and the scores for sub-factor 2 among heart failure patients. Remarkably, patients diagnosed with hypertension showed higher scores in these areas. This finding suggests that hypertension as a comorbid condition in HF may affect patients' adherence to specific SC regimens particularly those concerning diet and fluid intake which are encompassed in sub-factor 2. Previous studies showed that patient adherence to SC behavior has an impact on lowering blood pressure [22, 23]. This correlation highlights the critical role of managing hypertension in the comprehensive SC framework for heart failure patients.

In our study, a statistically significant difference was noted in the scores of sub-factor 1 between HF patients using SGLT2 inhibitors and those not using them. Specifically, patients treated with SGLT2 inhibitors exhibited higher scores in sub-factor 1, which is associated with monitoring and consultation behaviors. SGLT inhibitors, increasingly recognized for their role in HF treatment, represent a relatively recent addition to the therapeutic arsenal. The initiation of SGLT inhibitor therapy typically involves providing patients with comprehensive information and detailed guidance, which might contribute to their heightened engagement in SC practices, particularly those relating to sub-factor 1 as observed in our study. This link highlights the influential role of medication management in shaping SC behaviors, especially with the introduction of novel treatments in heart failure management. Notably, our research is one of the first to document a significant association between the use of SGLT2 inhibitors and specific SC behaviors in HF patients. This finding adds a valuable dimension to the growing body of knowledge on how new treatment options such as SGLT2 inhibitors, can impact SC practices among these patients.

We observed that SC behaviors among HF patients were mostly adequate. In other studies, there are conflicting results. There have been some studies involving individuals with HF demonstrating low SC agency [24]. In another study, the rate of inadequate SC was 52%, while in our study, this rate was determined to be 22% [25]. These findings suggest that while there are general trends in SC behaviors among HF patients, the extent and nature of these behaviors can significantly vary across different

populations and studies. This underscores the importance of considering local and cultural contexts when interpreting SC behaviors in heart failure patients.

There are some limitations of our study; designed as a cross-sectional questionnaire-based investigation, depended heavily on the patients' full cooperation. The quality of responses was contingent upon the patients' education and perception levels, factors that could have influenced the accuracy of the data collected. Additionally, the study population was limited to fully cooperative patients, which may not represent the wider HF patient community. Moreover, the research was confined to the Eagen region in Türkiye, potentially limiting the generalizability of our findings to other geographical areas.

In conclusion, our study sheds light on the multifaceted nature of SC behaviors in HF patients. We have identified critical factors such as age, educational status, hypertension, comorbidity, and particularly the use of SGLT2 inhibitors, as key influencers of SC practices. These findings underscore the importance of considering individual patient profiles when developing management strategies for HF. The positive association of SGLT2 inhibitors with SC behaviors is a novel insight, suggesting the need for further exploration in this area. Ultimately, our study calls for a more personalized approach in educating and managing heart failure patients, taking into account their unique circumstances and the varying healthcare resources available in different regions.

**Conflict of interest:** No conflict of interest was declared by the authors.

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**Author contributions**

I.B. was responsible for the medical examination and study planning. Both I.B. and I.T. conducted data collection, analysis, and calculations. I.T. prepared the initial draft, incorporating inputs from all authors. Furthermore, I.T. and I.B. engaged in discussing the results, and jointly reviewed and provided feedback on the manuscript.

**Table 1.** Distribution of patients' sociodemographic characteristics (n=100)

| **Features** | **n=%** | **Features** | **n=%** |
|---|---|---|---|
| **Age** | | **Educational Status** | |
| 42-50 | 2 | Primary school | 55 |
| 51-60 | 13 | Middle school | 17 |
| 61-70 | 33 | High school | 21 |
| 71-80 | 24 | University | 7 |
| 81-91 | 28 | | |
| | | **NYHA** | |
| **Gender** | | Class 1 | 5 |
| Male | 64 | Class 2 | 21 |
| Female | 36 | Class 3 | 28 |
| | | Class 4 | 46 |
| **Concomitant Disease** | | | |
| Hypertension | 81 | **Marital Status** | |
| Diabetes mellitus | 58 | Married | 81 |
| COPD | 10 | Single | 19 |
| Congenital adrenal hyperplasia | 2 | | |
| | | **Time in Diagnosis** | |
| **Medical Treatment** | | 1-10 | 45 |
| ACE inh/ARB | 38 | 11-20 | 40 |
| Diuretic | 40 | 21-31 | 15 |
| Beta-blocker | 75 | | |
| Spironolactone | 3 | | |
| SGLT2 inhibitor | 40 | | |
| Calcium channel blocker | 24 | | |

COPD: Chronic obstructive pulmonary disease ACE inh/ARB: Anjiontensin converting enzyme inhibitor/Anjiotensin receptor blocker SGLT2: Sodium–glucose cotransporter 2 inhibitor

**Table 2.** Distribution of answers given to the European Heart Failure Self-care Behavior scale (EHFScB) questions (n=100)

| **Questions(1-9)** | **Strongly disagree** | | **Disagree** | | **Undecided** | | **Agree** | | **Agree Strongly** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** |
| **I weigh every day (SF-2)** | 50 | 50 | 19 | 19 | 17 | 17 | 7 | 7 | 7 | 7 |
| **I let my doctor or nurse know when my shortness of breath increases (SF-1)** | 42 | 42 | 15 | 15 | 15 | 15 | 14 | 14 | 14 | 14 |
| **I inform my doctor or nurse when I have a lot of edema/swelling in my feet and legs (SF-1)** | 27 | 27 | 8 | 8 | 20 | 20 | 14 | 4 | 31 | 31 |
| **I let my doctor or nurse know when I gain weight (SF-1)** | 76 | 76 | 13 | 13 | 6 | 6 | 5 | 5 | 0 | 0 |
| **I limit the amount of fluids I take (SF-2)** | 58 | 58 | 13 | 13 | 19 | 19 | 8 | 8 | 2 | 2 |
| **I let my doctor or nurse know when I'm tired (SF-1)** | 60 | 60 | 15 | 15 | 15 | 15 | 6 | 6 | 4 | 4 |
| **I eat a diet low in salt (SF-2)** | 12 | 12 | 11 | 11 | 27 | 27 | 14 | 4 | 36 | 36 |
| **I take my medication as prescribed (SF-2)** | 0 | 0 | 0 | 0 | 2 | 2 | 12 | 2 | 86 | 86 |
| **I exercise regularly (SF-2)** | 30 | 30 | 22 | 22 | 28 | 28 | 10 | 0 | 10 | 10 |

SF: Sub-factor

**Table 3.** Comparison of self-care behavior scores by demographic and clinical characteristics

| | | Total Point | | Sub-factor 1 | | Sub-factor 2 | |
|---|---|---|---|---|---|---|---|
| | | **Mean±S.D.** | **Med (IQR)** | **Mean±S.D.** | **Med (IQR)** | **Mean±S.D.** | **Med (IQR)** |
| **Gender** | **male** | 23.08±5.61 | 23 (19.25-25) | 8.63±3.87 | 8 (6-11) | 14.45±3.37 | 15 (12-16) |
| | **female** | 24.08±4.87 | 23.5 (20-27) | 9±3.79 | 8 (6-12) | 15.08±2.32 | 15 (13-16.75) |
| | ***p*** | 0.31 (z=-1.015) | | 0.621 (z=-0.495) | | 0.272 (z=-1.098) | |
| **Marital Status** | **married** | 23.19±5.28 | 23 (20-26) | 8.58±3.9 | 8 (6-12) | 14.6±3.06 | 15 (12.5-16) |
| | **single** | 24.53±5.68 | 25 (21-27) | 9.53±3.47 | 8 (7-12) | 15±3.02 | 15 (13-16) |
| | ***p*** | 0.224 (z=-1.216) | | 0.168 (z=-1.379) | | 0.61 (z=-0.51) | |
| **Hypertension** | **no** | 20.74±4.56 | 21 (17-25) | 7.16±2.54 | 7 (5-8) | 13.58±3.45 | 13 (11-15) |
| | **yes** | 24.07±5.35 | 23 (20-26) | 9.14±3.99 | 8 (6-12.5) | 14.94±2.9 | 15 (13-16) |
| | ***p*** | 0.02* (z=-2.33) | | 0.069 (z=-1.821) | | 0.05* (z=-1.937) | |
| **Diabetes Mellitus** | **no** | 23.19±5.38 | 22.5 (20-26) | 8.43±3.72 | 8 (6-11.25) | 14.76±2.93 | 15 (13-16.25) |
| | **yes** | 23.62±5.37 | 23 (20-26) | 9±3.92 | 8 (6-12.25) | 14.62±3.14 | 15 (12.75-16) |
| | ***p*** | 0.716 (z=-0.364) | | 0.482 (z=-0.703) | | 0.841 (z=-0.201) | |
| **COPD** | **no** | 23.19±5.22 | 23 (20-26) | 8.53±3.76 | 8 (6-12) | 14.66±3.04 | 15 (13-16) |
| | **yes** | 25.7±6.29 | 25 (20.75-30.75) | 10.8±3.99 | 10.5 (7.5-14.25) | 14.9±3.14 | 14.5 (13.25-17 |
| | ***p*** | 0.172 (z=-1.365) | | 0.074 (z=-1.786) | | 0.867 (z=-0.168) | |
| **Congenital Adrenal Hyperplasia** | **no** | 23.44±5.4 | 23 (20-26) | 8.8±3.86 | 8 (6-12) | 14.64±3.05 | 15 (13-16) |
| | **yes** | 23.5±3.54 | 23.5 (21-0) | 7±1.41 | 7 (6-0) | 16.5±2.12 | 16.5 (15-0) |
| | ***p*** | - | | - | | - | |
| **ACE inh/ARB** | **no** | 23.48±5.67 | 23 (19.75-27) | 9.18±3.93 | 8 (6-12) | 14.31±3.12 | 15 (12-16) |
| | **yes** | 23.37±4.87 | 23 (20-25.25) | 8.08±3.6 | 8 (4.75-10.25) | 15.29±2.84 | 15 (14-16.25) |
| | ***p*** | 0.77 (z=-0.292) | | 0.214 (z=-1.243) | | 0.143 (z=-1.465) | |
| **Diuretic** | **no** | 24±5.39 | 23 (21-26) | 9.13±4.03 | 8 (6-13) | 14.87±3.09 | 15 (13-16) |
| | **yes** | 22.6±5.25 | 22.5 (18.25-26) | 8.2±3.48 | 8 (5-11) | 14.4±2.97 | 14 (12-15) |
| | ***p*** | 0.244 (z=-1.164) | | 0.265 (z=-1.115) | | 0.281 (z=-1.079) | |
| **Beta blocker** | **no** | 23.4±5.22 | 25 (19.5-27) | 9.16±3.72 | 8 (6-13) | 14.24±3.36 | 14 (11.5-16.5) |
| | **yes** | 23.45±5.43 | 23 (20-26) | 8.63±3.88 | 8 (6-12) | 14.83±2.93 | 15 (13-16) |
| | ***p*** | 0.649 (z=-0.455) | | 0.452 (z=-0.753) | | 0.354 (z=-0.928) | |
| **Spironolactone** | **no** | 23.55±5.32 | 23 (20-26) | 8.85±3.84 | 8 (6-12) | 14.7±3.01 | 15 (13-16) |
| | **yes** | 20±6.56 | 21 (13-0) | 6±2 | 6 (4-0) | 14±4.58 | 15 (9-0) |
| | ***p*** | - | | - | | - | |
| **SGLT 2 inhibitor** | **no** | 22.77±5.39 | 22 (19-26) | 8.2±3.81 | 7.5 (5-11) | 14.57±2.86 | 14.5 (13-16) |
| | **yes** | 24.45±5.2 | 23.5 (22-26) | 9.6±3.75 | 8 (7-13) | 14.85±3.32 | 15 (13-16) |
| | ***p*** | 0.071 (z=-1.802) | | 0.041* (z=-2.042) | | 0.67 (z=-0.426) | |
| **Calcium channel blocker** | **no** | 23.39±5.71 | 23 (20-26) | 8.68±4.06 | 8 (5-12) | 14.71±3.28 | 15 (12.25-16) |
| | **yes** | 23.58±4.13 | 23.5 (20.25-26.75) | 9±3.04 | 8 (7-11.75) | 14.58±2.15 | 15 (13.25-15.7 |
| | ***p*** | 0.552 (z=-0.595) | | 0.453 (z=-0.751) | | 0.99 (z=-0.012) | |

*$p$<0.05 Statistically significant difference, z: Mann Whitney U test, IQR: Interquartil range
COPD: Chronic obstructive pulmonary disease, ACE inh/ARB: Anjiontensin converting enzyme inhibitor/Anjiotensin receptor blocker, SGLT2: Sodium–glucose cotransporter 2 inhibitor

**Table 4.** Correlation analysis of self-care behavior scores with demographic and clinical characteristics

| | | Total point | Sub-factor1 | Sub-factor2 |
|---|---|---|---|---|
| **Age** | r | 0.330* | 0.368* | 0.103 |
| | *p* | 0.001 | 0.000 | 0.307 |
| **Heart failure duration** | r | 0.066 | 0.130 | -0.026 |
| | *p* | 0.514 | 0.197 | 0.798 |
| **NYHA Classification** | r | -0.106 | -0.038 | -0.103 |
| | *p* | 0.293 | 0.709 | 0.306 |
| **Education Status** | r | 0.019 | -0.210* | 0.254* |
| | *p* | 0.851 | 0.036 | 0.011 |
| **Number of chronic diseases** | r | 0.251* | 0.264* | 0.114 |
| | *p* | 0.012 | 0.008 | 0.259 |
| **Total number of treatments** | r | 0.012 | -0.044 | 0.099 |
| | *p* | 0.905 | 0.666 | 0.329 |

*$p<0.05$ Statistically significant correlation; r: Spearman correlation coefficent
NYHA: New York Heart Association

**Table 5.** Biochemical parameteres between adequate and inadequate self care groups

| | Inadequate Self Care (n:22) | | Adequate Self Care (n:78) | | *p* value |
|---|---|---|---|---|---|
| | **Mean** | **S.D.** | **Mean** | **S.D.** | |
| **Creatinine (mg/dl)** | 1.25 | 0.52 | 1.27 | 0.39 | 0.42 |
| **Hemoglobin (mmol/L)** | 13.2 | 1.73 | 13 | 1.61 | 0.11 |
| **$Na^+$ (mmol/L)** | 138.40 | 3.32 | 137.6 | 3.82 | 0.57 |
| **$K^+$ (mmol/L)** | 4.30 | 0.47 | 4.23 | 0.46 | 0.16 |
| **AST (IU/L)** | 23.1 | 11.6 | 24 | 8 | 0.23 |
| **ALT (IU/L)** | 22.4 | 13.5 | 23.1 | 14.5 | 0.74 |
| **TSH (mU/L)** | 2.92 | 2.68 | 2.97 | 4.8 | 0.51 |
| **HbA1c (%)** | 6.8 | 1.2 | 6.71 | 1.5 | 0.61 |
| **Fasting glucose (mmol/L)** | 97.3 | 26.2 | 105.9 | 36 | 0.12 |

AST: Aspartate Aminotransferase, ALT: Alanine Aminotransferase

TSH: Thyroid Stimulating Hormone, HbA1c: Hemoglobin A1c

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