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# IMPORTANT DETERMINANTS OF PHYSICAL ACTIVITY IN INDIVIDUALS WHO ARE SUFFERING FROM HEART FAILURE

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**Abstract**

**Objective:** This study set out to assess the extent to which heart failure (HF) patients engage in physical exercise, to characterize the parameters associated with such activity, and to investigate potential barriers to and motivations for such activity.

**Study Design:** Cross-sectional study

**Place and Duration:** From July 2021 to February 2022, University Hospital Centre «Mother Teresa» in Tirana, Albania.

**Methods:** Total 137 patients of both genders having heart failure disease were included in this study. Patients' age, sex, BMI, education level, duration of heart disease, and presence of co-morbidities were documented after obtaining informed written consent. Patients with HF were given a survey that included questions on their physical activity levels (adapted from the Short Form-International Physical Activity Questionnaire), as well as any obstacles they could have and any positive incentives they might have. Data was analysed using SPSS 25.0.

**Results:** Patients mean age was 67.9±20.96 years and had mean BMI 26.1±4.49 kg/m$^2$. There were majority males 85 (62.04%) and 52 (37.96%) cases were females. Most common comorbidity was HTN found in 67 cases, followed by DM in 42 cases and kidney disease in 31 cases. 82 (59.9%) patients were educated and 55 (40.1%) cases were illiterate. Among all, 40 (29.2%) patients had low level of physical activity, 64 (46.7%) cases had moderate level and 34 (22.6%) cases had high level of physical activity. Mean daily energy expenditure (DEE) of all patients was 7936.67±2613.27 kJ 24 h. There was a strong correlation between increased exercise levels and levels of education, self-efficacy, and motivation among all cases. More than half (59.4%) of respondents cited psychological factors as the primary impetus for regular physical activity, whereas just 31.4% cited physical factors and 23.4% cited social factors. In this study, we identified age, body mass index, and symptom distress as risk factors for PA(intensive) DEE.

**Conclusion:** This study found that 35% of patients with HF did not engage in any form of physical activity on a daily basis. Patient knowledge, exercise self-worth, and motivation are more important than disease or symptom severity when counseling a patient with HF about physical activity. Age, BMI, and distress symptoms all predicted more severe PA(intensive) DEE.

**Keywords:** Heart Failure, Physical Activity, Predictors, Comorbidities, Age

## INTRODUCTION

Low health-related quality of life and increased risk of death are established outcomes of heart failure (HF). Additionally, it's the leading cause of hospitalization among the elderly. Patients with HF who engage in regular physical exercise report increased physical capability, enhanced quality of life, and decreased need for medical treatment. Patients with HF have a worse rate of physical activity adherence than those with dietary modification or medication adherence [2].[4]

Many factors have been identified as predictors of frequent physical activity in healthy persons. Self-efficacy, social support, understanding of the advantages, and a positive outlook on exercise are all favorably correlated with younger ages.[5] Women typically engage in less strenuous physical activity than men. Better education and money, encouragement from a health care provider, and social backing from others in one's local area have also been cited as predictors for subsequent physical activity. Physical activity levels in the elderly have been found to be lower among those who are either single or who are partnered with an inactive person. Physical inactivity has been linked to the development of depression.[6,7]

Weak myocardium and reduced cardiac output, which are hallmarks of heart failure, mean the heart cannot pump enough blood across the body to meet metabolic demands [8,9]. Patients with HF also experience tiredness and dyspnea in addition to a number of functional symptoms, including a decreased aerobic capacity, decreased muscle strength, a lack of regular physical activity, and an intolerance to exercise [10,11]. Patients with HF also have compromised functional skills, a diminished ability to carry out activities of daily living, and a diminished quality of life [12]. Also, people with chronic HF walk more slowly compared to healthy people of the same age [11]. There is a negative relationship between HF severity and maximal aerobic capacity, and a direct relationship between both variables and prognosis and survival. Longevity in HF patients has also been linked to increased muscle mass and strength in the lower extremities.[10-12]

The outcomes of specific functional tests can be used to predict a patient's prognosis in HF. The six-minute walk test (6-MWT) was therefore proposed as a straightforward, cost-effective, safe, and repeatable exercise test to evaluate HF patients' functional ability and perhaps predict their prognosis on the basis of their walking distance [13]. The Short Physiological Activity Battery (SPPB) is useful for indirect assessments of muscle functional capabilities [10].

Objective measures of PA in HF patients are rarely used in research. Patients often exaggerate their level of activity while filling out these self-report questionnaires or diaries. Also, subjective PA measures are less responsive to fluctuations in PA levels.[14] Self-reported PA has been demonstrated to overestimate time spent engaging in MVPA and under-report time spent being sedentary in patients with HF. Few studies have used objective measures of physical activity in patients with HF. Accelerometry research[15] indicated that among HF patients, 35% participated in MVPA, 15% engaged in light PA, and 44% were sedentary. Reasons for not engaging in more vigorous physical activity may include heart failure symptoms and low self-efficacy. Patients with HF spent an average of 10 minutes per day engaging in MVPA, according to another study that utilized an accelerometer. The recommended objective of 150 minutes of MVPA per week was only achieved by 13% of the patients. Daily PA was much higher in men in NYHA functional class II and those with stronger physical function, according to the NY Heart Association. No substantial advantage of sacubitril/valsartan over enalapril was identified in terms of daytime PA in the OUTSTEP research, where the mean time spent on non-sedentary daily activity was 8.5 hours.[13-15]

Although it has been reported that people having HF are less energetic in daily life when compared to healthy persons, few research have investigated the level of exercise in HF patients at home. One research of 68 HF patients used an accelerometer to measure activity levels; they found that 44 percent were inactive, 35% were active at a moderate level, but 15% were active at low levels of activity. The patients' symptoms and sense of self-efficacy may have contributed to the observed variation in their day-to-day activities in that study.8 Understanding the level of physical activity among HF patients, as well as the obstacles they face and the factors that motivate them to exercise more, is crucial for

encouraging them to do so. Motivation is a key component in maintaining an exercise routine, since it influences both exercise engagement and persistence.[6-12]
Therefore, the goals of this study were to (i) assess the extent to which HF patients engage in physical activity and (ii) explain the factors connected to physical activity, including potential barriers to and incentives for physical activity, as well as any sex differences related to these aspects.

## MATERIALS AND METHODS

This cross-sectional study was conducted at University Hospital Centre «Mother Teresa» in Tirana, Albania. and comprised of 137 patients of heart failure. Patients over the age of 18 who had been diagnosed with HF (irrespective of their ejection fraction) were welcome to take part. Patients provided written consent for detailed demographics. Patients who were either too young or too sick to offer written consent were not allowed to participate.
Activity that recruits skeletal muscles and causes an increase in metabolic rate is considered physical activity for the purposes of this analysis. Exercise is a type of physical activity with the primary purpose of increasing or maintaining physical fitness through deliberate, systematic, and often repeated movement.
The s-IPAQ, or Short Form-International Physical Activity Questionnaire, was used to quantify the level of exercise that people were getting. The s-IPAQ measures inactivity, moderate activity, vigourous activity, and the total amount of time spent doing these activities during the last week with its seven questions. You'll find questions related to your sitting, standing, walking, and exercising habits throughout the week. There are 10-minute, 30-minute, 60-minute, and 60-minute pursuits, respectively, in each set. The frequency of incidents is counted in days, while their duration is recorded in hours and minutes. The responses were converted into metabolic equivalent of task (MET), or simply metabolic equivalent, a physiological measure indicative of the energy consumed during physical activity. The MET is calculated by dividing a person's resting metabolic rate by their degree of physical activity. Calculate the total score for physical activity by averaging the results for the three levels of intensity: vigorous, moderate, and light. Patients were sorted into three groups, according to how often they exercised: seldom, frequently, and frequently. The typical dependability of an accelerometer when used in conjunction with an s-IPAQ was 0.80.
The Exercise Self-Efficacy Questionnaire was used to gauge a respondent's belief in their own ability to maintain an exercise routine in the face of challenges like lack of motivation, boredom, minor injury, other time commitments, and domestic responsibilities. The survey asks questions on nine potential barriers to exercise. On a scale from 1 (not confident) to 10 (extremely confident), how certain are you that you can exercise for 20 minutes, three times a week? Cronbach's alpha for this sample was 0.931, demonstrating the reliability and validity of the instrument. We also included four additional HF-specific barriers based on the existing research: bad weather, HF symptoms, medication side effects, and fear of exercise-related harm. The participants filled out a questionnaire on their symptoms (such as tiredness and shortness of breath) and their sociodemographics (such as gender, education level, relationship status, smoking status, and alcohol use).
The Exercise Self-Efficacy scale and the anticipated HF-specific hurdles both have fewer possible responses in an effort to keep things straightforward. The options labeled "not confident" (1–5) were classified as a possible roadblock, while those labeled "very confident" (6–10) were deemed extremely improbable. The options available on the Exercise Passion Index were also streamlined in a similar fashion. Those who said "not at all important" or "important" reflected a lack of motivation, while those who responded "extremely important" or "enormously important" reflected a strong desire. Mann-Whitney U-tests were used to compare the demographic features of patients with high and low physical activity levels, including sex, marital status, level of education, NYHA classification, smoking behaviors, consumption of alcohol, and comorbidities. Using independent sample t-tests, we examined the connections between the variables in our study (exercise self-efficacy, exercise motivation, age, time from diagnosis, and body mass index). We used SPSS 25.0 to analyze the data.

## RESULTS

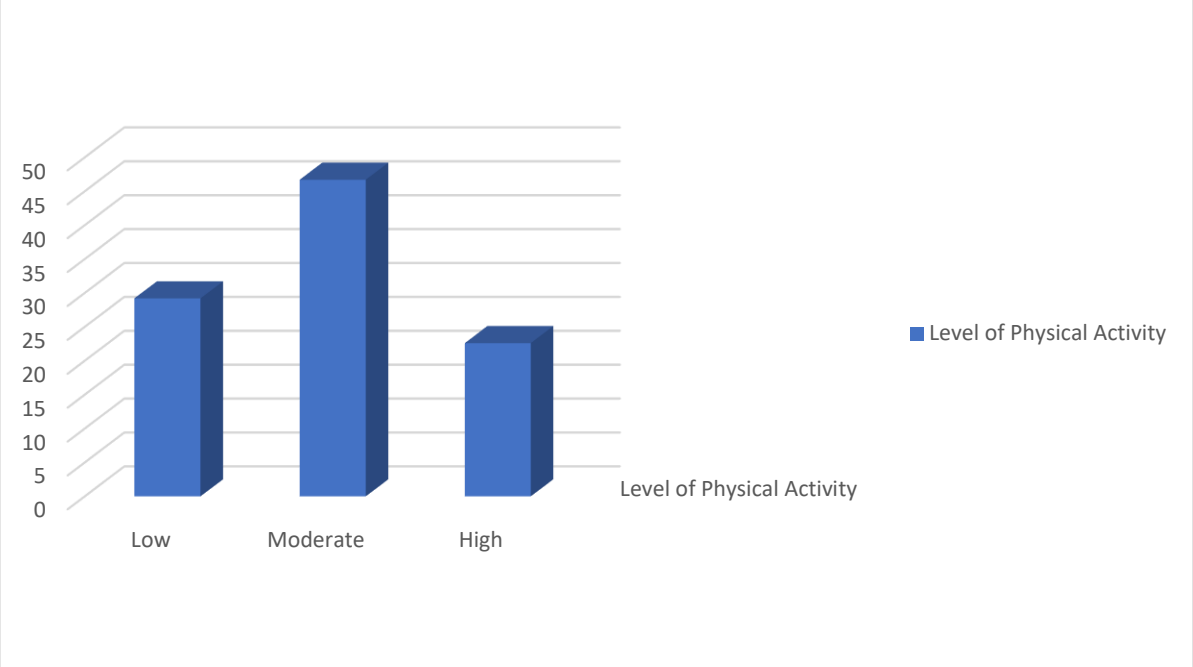
Patients mean age was 67.9±20.96 years and had mean BMI 26.1±4.49 kg/m$^2$. There were majority males 85 (62.04%) and 52 (37.96%) cases were females. Most common comorbidity was HTN found in 67 cases, followed by DM in 42 cases and kidney disease in 31 cases. 82 (59.9%) patients were educated and 55 (40.1%) cases were illiterate.(table 1)

**Table-1:** Demographics of the enrolled cases

| **Variables** | **Frequency (n=137)** | **Percentage** |
|---|---|---|
| Mean age (years) | 67.9±20.96 | |
| Mean BMI (kg/m$^2$) | 26.1±4.49 | |
| **Gender** | | |
| Male | 85 | 62.04 |
| Female | 52 | 37.96 |
| **Comorbidities** | | |
| HTN | 67 | 48.9 |
| DM | 42 | 30.7 |
| Kidney disease | 31 | 22.6 |
| **Education status** | | |
| Literate | 82 | 59.9 |
| Illiterate | 55 | 40.1 |

Among all, 40 (29.2%) patients had low level of physical activity, 64 (46.7%) cases had moderate level and 34 (22.6%) cases had high level of physical activity.(figure 1)

**Figure-1**: Level of physical activity among all cases



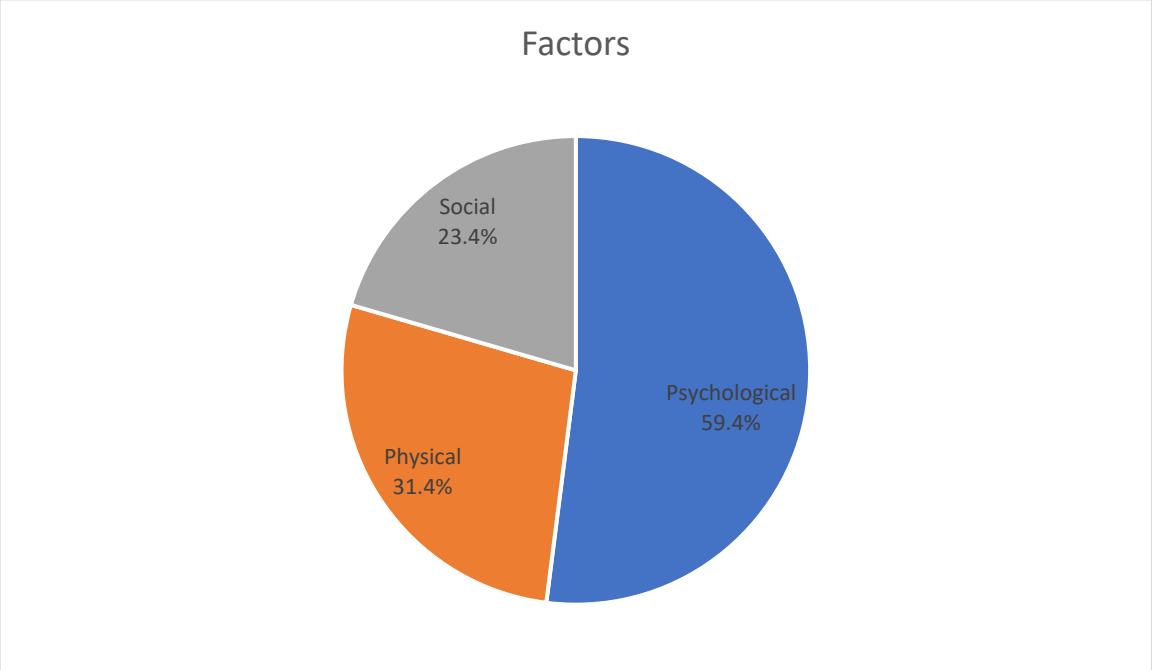

Mean daily energy expenditure (DEE) of all patients was 7936.67±2613.27 kJ 24 h. There was a strong correlation between increased exercise levels and levels of education, self-efficacy, and motivation among all cases.(table 2)

**Table-2**: Differences of physical activity among cases

| Variables | Low Physical activity (40) | Moderate Physical Activity (64) | High Physical Activity (34) |
|---|---|---|---|
| Mean DEE (kJ 24 h) | 7135.11±1285.22 | 7876.28±2613.27 | 8068.45±2597.79 |
| **Education level** | | | |
| High | 12 (30%) | 27 (42.3%) | 25 (73.5%) |
| Low | 28 (70%) | 37 (57.7%) | 9 (26.5%) |
| **Self-efficacy** | | | |
| Yes | 5 (12.5%) | 44 (68.8%) | 22 (64.7%) |
| No | 35 (87.5%) | 30 (31.2%) | 12 (35.3%) |
| **Motivation to Remain Fit** | | | |
| Yes | 10 (25%) | 24 (37.5%) | 20 (58.8%) |
| No | 30 (75%) | 40 (62.55) | 34 (41.2%) |

More than half (59.4%) of respondents cited psychological factors as the primary impetus for regular physical activity, whereas just 31.4% cited physical factors and 23.4% cited social factors.(figure 2)

**Figure-2:** Impetus for physical activity among all cases




In this study, we identified age, body mass index, and symptom distress as risk factors for PA(intensive) DEE.(table 3)

**Table-3:** Predictors for PA(intensive) DEE

| Risk factors | Frequency (137) | Percentage |
|---|---|---|
| **Age** | | |
| >50years | 87 | 63.5 |
| <50years | 50 | 36.5 |
| **body mass index** | | |
| >25kg/$m^2$ | 79 | 57.7 |
| <25kg/$m^2$ | 58 | 42.3 |
| **symptom distress** | | |
| Yes | 90 | 65.7 |
| No | 47 | 34.3 |

## DISCUSSION

Interventions to decrease inactive time and enhance PA are crucial for HF patients because of the strong association between physical inactivity and an increased risk of death from any cause and from heart disease [16]. Patients with HF are increasingly looking to exergaming as a type of physical

activity (PA) to augment more conventional methods of cardiac rehabilitation.[17] To evaluate clinically important PA outcomes, however, high-quality methodological research are required. Exergaming has shown promise in increasing physical activity (PA) in patients with HF in a pilot study[18] and an interview study, and a recent literature review suggested that it may also increase PA, decrease fatigue perception, reduce pain, and enhance motivation as well as adherence in heart rehabilitation programmes.[19]

It was decided to do this study because of the paradoxical effects that having HF has on older adults' motivation to exercise.[20] In addition, women are typically less active than men and have unique challenges and opportunities when it comes to engaging in physical activity. In order to aid future studies and possibly guide the implementation of therapies targeted at boosting physical activity among HF patients, it is crucial to identify parameters linked with physical activity. Finding and encouraging people's motivations for consistent physical activity throughout time is crucial.[21] 137 heart failure patients were presented in this study. Patients mean age was 67.9±20.96 years and had mean BMI 26.1±4.49 kg/$m^2$. There were majority males 85 (62.04%) and 52 (37.96%) cases were females. Most common comorbidity was HTN found in 67 cases, followed by DM in 42 cases and kidney disease in 31 cases. Our findings were comparable to the previous studies.[22,23]

Most patients fell into NYHA class I or II (56.2%), indicating they experienced no to few symptoms of HF, however one-third of them were not physically active on a daily basis. These results may motivate healthcare professionals to prioritize physical activity for its demonstrated positive impacts on quality of life, morbidity, and hospitalization.[24] Therefore, while counseling an HF patient on how to increase their physical activity, it may be useful to take into account the patient's degree of education, exercise self-efficacy, and motivation. The bulk of study participants had to overcome every conceivable obstacle to starting an exercise routine. Extreme difficulty was indicated in overcoming any and all obstacles, whether they be physical (such as "It is hard to get to the gym") or social (such as "Family is not interested in exercise"). Only 23.4 percent of patients rated social motivation as very important, whereas 31.4 percent rated physical motivation in the same range. No previously observed gender differences in perceived barriers to physical exercise were seen in the present investigation.[25] The majority of patients (59.4%) cited psychological motivation as their primary driver. The statement "I want to be healthier and perhaps live longer" was cited by two-thirds of patients as the single most important factor motivating them to become better. Differential drives between sexes were observed. On all three dimensions of motivation (physical, social, and psychological), women scored higher than males.

Participating in an activity because of the satisfaction and enjoyment it provides is an example of an intrinsic incentive, which is more common than extrinsic motives, as proposed by the self-determination hypothesis. It is important to take into account the importance of intrinsic motivation in maintaining HF patients' activity levels when developing promotion or intervention approaches [27]. In order to keep HF patients physically active, healthcare providers should cater to their unique requirements by lowering barriers and increasing motivation. Healthcare practitioners can better motivate HF patients to exercise if they have an accurate picture of their current fitness level, as well as the challenges they confront and rewards they can expect. Counseling patients on physical exercise is more successful if you are aware of gender differences. This study highlights the need of looking at patients' underlying motivations and gender differences while studying the effects of physical activity in HF.[28]

However, these findings may only be generalizable to a subset of healthy HF patients who live at home. Previous research on the elderly has shown different results, so it's possible that the condition itself has minimal impact on the barriers and motivation.[29] Both the average age and the percentage of women in the cohort were much lower than in prior investigations of the HF population.[30]The study may have found different results if hospitalized HF patients had been included as well.

## CONCLUSION

This study found that 35% of patients with HF did not engage in any form of physical activity on a daily basis. Patient knowledge, exercise self-worth, and motivation are more important than disease

or symptom severity when counseling a patient with HF about physical activity. Age, BMI, and distress symptoms all predicted more severe PA(intensive) DEE.

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