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ANALYSIS OF THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY LEVEL AND DISEASE DURATION IN HEART FAILURE PATIENTS

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ABSTRACT
Heart failure is a chronic condition that affects patients' quality of life and requires long-term management. Physical activity plays a crucial role in controlling the progression of heart failure. This study aimed to analyze the relationship between physical activity levels and disease duration in heart failure patients. This study used an observational study method with a cross-sectional design in 158 heart failure patients treated at a regional general hospital in Surakarta during August 2023–August 2024. Physical activity levels were measured using the International Physical Activity Questionnaire (IPAQ), and disease duration was obtained from patient medical records. The IPAQ instrument is a standardized instrument that underwent validity and reliability tests by Craig in 2003. The results of the validity test ranged from 0.14 to 0.53, with a median value of 0.30. The reliability test results ranged from 0.34 to 0.89, with a median value of 0.80. Spearman's correlation analysis showed a significant negative relationship between physical activity levels and disease duration ($r = -0.951$, $p < 0.05$), indicating that patients with higher levels of physical activity tended to have shorter disease duration. These results demonstrate the importance of increasing physical activity in the management of heart failure patients to improve prognosis.

Keywords: chronic; disease duration; heart failure; physical activity

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INTRODUCTION

Heart failure is a significant global health problem, characterized by high mortality and morbidity rates in both developed and developing countries, including Indonesia (Haryati et al., 2020; Juliar Adista, 2020). As a chronic, progressive disease, the increasing prevalence of heart failure has a significant impact, affecting the number of deaths, patients, and the overall healthcare system. This burden of disease is particularly felt in Indonesia, where heart failure is a leading cause of Death. According to data from the 2018 Basic Health Research (Riskesdas), the incidence of heart disease diagnosed by doctors reached 1.5% of the total population. More worryingly, this prevalence shows a significant increase with age, particularly in the age group ≥55 years. The increase from 3.9% in those aged 55-64 years to 4.6-4.7% in those aged ≥65 years indicates that the elderly population bears the heaviest burden of heart disease. These findings not only indicate a high prevalence, but also highlight the significant challenges in providing adequate public health services, especially for sustainable long-term management (Kementrian Kesehatan RI, 2019).

Patients with heart failure often exhibit characteristic clinical symptoms, although their manifestations and severity can vary significantly between individuals (Taniguchi et al., 2020). One frequently seen physical sign is edema, which is swelling due to fluid accumulation that can occur in the feet, ankles, or other parts of the body. Other common symptoms that significantly impact a patient's quality of life are shortness of breath (dyspnea), which can occur with activity or even at rest, and chronic fatigue. These symptoms may be accompanied by other physical findings, such as rales in the lungs indicating fluid, increased jugular venous blood flow, and pitting edema (Niklasson et al., 2022). To confirm the diagnosis, doctors rely on a series of diagnostic tests. These include an electrocardiogram (ECG) to detect abnormal heart rhythms, transthoracic

echocardiography to assess heart structure and function, and measurement of serum natriuretic peptide levels, a biomarker that is significantly elevated in heart failure (Lindgren & Börjesson, 2021).

Heart failure is categorized as a progressive disease that not only affects physical health but also significantly reduces the quality of life of sufferers and impacts economic aspects (Haryati et al., 2020; Faisha & Kristinawati, 2025). Patients with heart failure generally report a significantly lower quality of life compared to those with other chronic diseases. This is due to clinical manifestations such as shortness of breath, fatigue, and edema, which directly limit their ability to perform daily activities, work, and socialize. Various complex factors influence this quality of life, including age, gender, education level, disease severity as assessed by the New York Heart Association (NYHA) classification, disease duration, and comorbidities such as hypertension and diabetes mellitus. Furthermore, patient adherence to treatment and economic status also play a vital role. Economic hardship, for example, can be a significant barrier for patients to access necessary medications or treatments, ultimately worsening their condition and quality of life (Haryati et al., 2020).

Understanding the factors that influence the course of heart failure is crucial, as each experiences a different progression. Some patients may remain stable for years, while others experience rapid and recurring declines (Rafid Ramadhan et al., 2024). Disease progression is strongly influenced by age. As a person ages, physiological changes occur that can weaken physical fitness and trigger the development of various other diseases that can affect heart function. Gender also plays a significant role; men are at higher risk due to a higher prevalence of unhealthy lifestyle habits, such as smoking and alcohol consumption (Sherly et al., 2022).

Furthermore, comorbidities are key drivers of disease progression. Conditions such as hypertension and diabetes mellitus are the highest risk factors that can directly damage the structure and function of the heart, accelerating the development of heart failure (Faisha & Kristinawati, 2025). Identifying and managing these triggering factors is key to slowing disease progression and improving patients' quality of life. Physical activity is an integral component of heart failure management. Physical activity is defined as a series of movements produced by skeletal muscles, resulting in increased energy expenditure. The main parameters determining physical activity are the frequency, intensity, duration, and type of exercise performed (Zores et al., 2019). For cardiac patients with suboptimal physical capacity, a cardiac rehabilitation program is an essential first step. However, one of the biggest challenges in managing this disease is the lack of comprehensive cardiac rehabilitation programs and limited patient physical endurance. This creates the need for adaptive strategies to facilitate access and encourage patients to resume adequate and sustainable physical activity after the completion of formal rehabilitation programs (Zores et al., 2019). These limitations in physical activity are often exacerbated by disease symptoms, which can ultimately impact patient prognosis (Shoemaker et al., 2020)

To assess a patient's functional capacity and monitor disease progression, physicians use the New York Heart Association (NYHA) classification. The NYHA is a widely accepted standard tool that categorizes patients based on the degree of physical activity limitation and the severity of their symptoms (Shoemaker et al., 2020). This classification is divided into four functional classes. Patients with NYHA I have no limitations; everyday physical activity does not cause fatigue, palpitations, or shortness of breath. Patients with NYHA II have slight limitations, where they have no symptoms at rest, but ordinary everyday physical activity causes mild symptoms. Patients with NYHA III have significant limitations; they remain asymptomatic at rest, but even light physical activity triggers fatigue, palpitations, or shortness of breath. NYHA IV is the most severe class, where patients are unable to perform any physical activity without symptoms, and symptoms occur even at rest (Niklasson et al., 2022); P. (M. Shoemaker et al., 2020).

The duration of heart failure, measured from the time of initial diagnosis, is a crucial factor associated with patient quality of life and prognosis (Saida et al., 2020). In general, patients with a disease duration of less than five years tend to have a relatively good quality of life. However, over time, their quality of life tends to decline significantly, affecting their ability to fulfill professional, family, and social responsibilities. A decline in self-esteem and self-image often accompanies this decline. Factors influencing disease duration and prognosis include comorbidities such as diabetes mellitus and hypertension, as well as patient adherence to treatment plans, which is often hampered by economic hardship (Saida et al., 2020; Haryati et al., 2020). Given that heart failure symptoms directly interfere with physical activity, which ultimately impacts patients' functional capacity, there is currently limited research specifically examining the relationship between physical activity levels and disease duration. Understanding this relationship is vital for designing more personalized and effective cardiac rehabilitation strategies and for improving overall disease management, which in turn can improve patient quality of life and survival (Niklasson et al., 2022). Therefore, this study aimed to analyze the relationship between physical activity levels and disease duration in patients with heart failure.

METHOD

Study This uses design descriptive correlational design with a cross-sectional approach, which aims to analyze the connection between the degree of ability activity physique with duration of disease in patients fail heart failure. Election design is based on needs. To see a connection between variables at one time, specific, without existence intervention from the researcher.

Participants' study is a patient fail heart with a total of 260 patients who undergo treatment at the polyclinic, the heart of Dr. Soetomo Regional Hospital, Moewardi Surakarta. Respondent chosen use purposive sampling technique as many as 158 respondents, with criteria for inclusion covering patients who have been diagnosed fail heart failure, capable of communicating with good, and willing to become respondents. Patients with cognitive or inhibiting conditions , Employee Performance, were excluded from the research. Before being included, respondents were informed of the objective research and the signing sheet agreement.

The instruments used consist of a Questionnaire characteristics patient For obtaining demographic data; the New York Heart Association (NYHA) Classification was used to evaluate the degree of physical activity physique patients. A questionnaire containing seven designed questions was used to measure the total activity physique respondents during seven days. The total activity score is calculated and grouped become three categories: no can do activity, physical activity physique moderate (score ≥600 MET- minutes/week), and activity physique high (score ≥1500 MET-minutes/week); and data record medical patient for a known duration disease, heart, since the first time the diagnosis was made. The charging instrument was done through an interview, directly guided by researchers. The entire process is carried out in the room, Wait polyclinic heart, with notice of comfort and confidentiality for respondents.

Data collection is carried out in December 2024 - February 2025. Before collecting data, respondents were given an explanation about informed consent. Once they agreed, researchers conducted interviews to collect data using a predetermined questionnaire. Data collected, transcribed, and processed through several stages, including editing, coding, entry, and cleaning. Data is analyzed through stages of normality and homogeneity testing, then statistical analysis statistics done using the Spearman Rank test to evaluate the connection between the degree of ability, activity, physique, with duration of disease failure. This test selection is customized with data scale and research objectives of a correlational nature.

Aspect ethics has become attention main in study. Respondent given clear information about objectives, procedures, benefits, and right they For the interesting self, when just without consequences. Confidentiality of identity respondents was guarded with only use numerical code on

the data sheet. Research This has been conducted through ethical testing and obtaining ethics approval from the Commission Ethics Surakarta Regional General Hospital Health Research with Number: 2.452/X/HREC/2024.

RESULT

The majority of respondents were aged 51-65 years (69 respondents (43.7%), male (88 respondents (55.7%), high school (79 respondents (50.0%), unemployed (58 respondents (37.7%), disease duration (152 respondents (96.2%) and NYHA II (108 respondents (68.4%) were the most common. The characteristics of the respondents in this study are described in Table 1.

Table 1.
Respondent Characteristics (n=158)

Respondent Characteristics		f	%
Age			
	20-35 Years	14	8.9
	36-50 Years	43	27.2
	51-65 Years	69	43.7
	66-80 Years	32	20.3
Gender			
	Male	88	55.7
	Female	70	44.3
Education			
	Elementary School	30	19.0
	Middle School	22	13.9
	High School	79	50.0
	Diploma	8	5.1
	Bachelor's Degree	12	7.6
	No Education	7	4.4
Occupation			
	Laborer	5	3.2
	Self-Employed	52	32.9
	Farmer	21	13.3
	Unemployed	58	37.7
	Private Sector	15	9.5
	Civil Servant	7	4.4
Disease Duration			
	<5 Years	152	96.2
	>5 Years	6	3.8
NYHA Classification			
	I	33	20.9
	II	108	68.4
	III	17	10.8

The frequency of respondents based on physical activity ability at the Regional General Hospital in Surakarta was moderate, with 93 respondents (58.9%). Respondents' physical activity ability is described in Table 2.

Table 2.
Physical Activity Ability (n=158)

Physical Activity Ability	f	%
Unable to do physical activity	17	10.8
Medium	93	58.9
High	48	30.4

A total of 152 (96.2%) respondents said that 48 (30.4%) respondents had high physical activity, 93 (58.8%) respondents had moderate activity, 11 (7%) respondents had no physical activity, and the duration of heart failure was less than 5 years.

Table 3.
Relationship between Degree of Physical Activity Ability and Duration of Disease in Heart Failure Patients

Disease Duration	Physical Activity Ability								ρ Spearman
	Unable to Perform Physical Activity		Medium		High		Total		
	f	%	f	%	f	%	f	%	
< 5 Years	11	7%	93	58.8%	48	30.4%	152	96.2%	$\rho = 0.000$
> 5 Years	6	3.8%	0	0.0%	0	0.0%	6	3.8%	

The results of statistical tests using the Spearman test obtained ρ = 0.000 (ρ <0.05). Based on these results, H0 was rejected and Ha was accepted, which means there is a relationship between the degree of physical activity ability and the duration of the disease. The correlation coefficient value shows a result = -0.951. These results indicate a negative value, so that the relationship between the variables is in the opposite direction. The relationship between the degree of physical activity ability and the duration of the disease in heart failure patients is explained in table 3.

DISCUSSION

Physiologically, the aging process triggers a series of natural changes in the body, including decreased organ function and fundamental structural changes. These changes directly impact the cardiovascular system, where blood vessels lose their flexibility and elasticity. This condition can facilitate plaque buildup or atherosclerosis, which can ultimately progress to ischemia or infarction, common precursors to heart failure. Advanced age is a significant risk factor closely associated with the occurrence of heart failure. This phenomenon is supported by various studies showing that the majority of heart failure patients, particularly those with acute cases, are between the ages of 60 and 74 (Sherly et al., 2022). This is also in line with demographic projections, where an aging global population, as analyzed in Japan, is correlated with an increase in the number of heart failure patients, which is expected to reach 1.3 million by 2030 (Taniguchi et al., 2020). Based on these results, it can be concluded that advanced age is a dominant risk factor that significantly influences the occurrence of heart failure. This finding is consistent with existing literature, which confirms that the majority of heart failure sufferers are in the elderly age group (Fadhila & Handayani, 2022); (Risma Anggia et al., 2024).

Our finding of an inverse association between disease duration and physical activity in patients with heart failure is biologically plausible and consistent with the evolving understanding of HF pathophysiology and patient-reported function. As heart failure becomes more chronic, patients frequently progress to worse functional classes (higher NYHA), which is independently associated with lower daily activity and poorer exercise capacity. In a nationwide registry analysis, longer HF duration predicted worsening NYHA class over one year an indicator of declining functional status that would be expected to suppress activity behaviors (Lindberg et al., 2022). Progressive heart failure triggers a cascade of central and peripheral adaptations that cumulatively depress exercise capacity over time. Beyond cardiac pump failure, long-standing HF promotes systemic endothelial dysfunction, autonomic imbalance, and skeletal‐muscle myopathy, each of which constrains oxygen delivery and utilization and thereby lowers peak VO_2 and daily functional capacity (Del Buono et al., 2019; Drera et al., 2024). Peripheral muscle progressively undergoes atrophy, fiber-type shifts, reduced capillary density, and diminished oxidative enzyme content. Capillary rarefaction—demonstrated in HF and related cardiometabolic states—lengthens diffusion distances and restricts convective O_2 transport, lowering anaerobic threshold and precipitating early fatigue. Long-standing HF thus becomes a disorder of both delivery and extraction: even when central hemodynamics are stable, peripheral maladaptations limit performance (Yoshida et al., 2022).

Disease duration is the length of time a person has had the disease, calculated from the time they were diagnosed with heart failure. Heart failure disease duration does not have a significant relationship with patients' quality of life; most respondents with a history of the disease of less than five years still have a good quality of life, presumably due to health insurance support and effective

treatment control (Haryati et al., 2020). This is in line with the results of research by Faiz & Hudiyawati (2023), which states that longer disease duration tends to be associated with increased challenges in physical and social activities. However, psychological factors and social support, such as family and education, are important determinants in maintaining patients' quality of life. Thus, although disease duration is an indicator of chronicity, patients' quality of life is more determined by their ability to adapt, self-manage, and the support they receive. This finding is consistent with research by Haryati et al. (2020) and Faisha & Kristinawati (2025), where the majority of respondents had suffered from heart disease for less than 5 years.

Physical activity is a series of skeletal muscle movements that result in increased energy expenditure. Aspects of physical activity include frequency, intensity, time, and type of activity. Generally, activity intensity is classified as light, moderate, and vigorous (Lindgren & Börjesson, 2021). Limitations in physical activity in heart failure patients are closely related to decreased functional capacity and skeletal muscle adaptation to exercise. Therefore, a structured rehabilitation program can help improve physical activity capacity and reduce the risk of rehospitalization (Shoemaker et al., 2020). These limitations in physical activity also directly impact patients' quality of life. The lower the activity capacity, the worse the patient's perception of their health, although some patients are still able to perform light activities independently (Alfiyah et al., 2024). Activities that heart failure patients can still perform are generally light and adjusted to the severity of the disease. Patients are usually still able to perform self-care activities such as bathing, dressing, and eating independently (Haryati et al., 2020). Furthermore, light activities such as walking around the house, sweeping, or washing dishes are still possible, especially for patients with NYHA classifications I and II (Alfiyah et al., 2024). For patients with more severe physical limitations, passive activities such as sitting, watching television, or reading are the main choices for maintaining comfort (Shoemaker et al., 2020). In line with research by (Haryati et al., 2020), the majority of patients exhibit limitations in light physical activities caused by symptoms such as fatigue and shortness of breath, resulting in many of them being classified as NYHA class II.

Heart failure causes decreased cardiac output and skeletal muscle perfusion, resulting in fatigue even with mild activity. Increased left atrial pressure triggers pulmonary congestion and dyspnea. At the same time, compensatory stimulation of the Sympathetic Nervous System and the Renin-Angiotensin-Aldosterone System leads to fluid retention and peripheral edema, which impede mobility. Dyspnea, fatigue, and peripheral edema are the primary symptoms that limit physical activity in patients with heart failure (Juliar Adista, 2020). Longer disease duration worsens cardiac function through changes in ventricular structure and chronic neurohormonal stimulation, leading to worsening symptoms and a continued decline in physical activity capacity. Furthermore, prolonged limitation of physical activity leads to physical deconditioning, which decreases muscle strength and worsens activity intolerance, creating a cycle of decreased physical function over time and impacting the patient's quality of life (Niklasson et al., 2022). These results indicate that patients with higher levels of physical activity typically have shorter disease durations, while those with low levels of physical activity have the potential to have longer disease durations. Previous research has shown that low levels of physical activity are associated with declining health status. Changes in organ function over time significantly affect health status, with physical activity decreasing as the disease progresses. The longer the duration of the disease, the greater the decrease in physical activity (Waschki et al., 2015).

CONCLUSION

This study demonstrates a significant correlation between physical activity capacity and disease duration in patients with heart failure ($\rho = 0.000$), with a correlation coefficient of -0.951. The negative correlation indicates that a longer duration of living with heart failure is associated with a lower level of physical activity capacity. In other words, prolonged disease duration leads to a progressive decline in the body’s ability to perform daily activities. This finding supports the understanding that chronic heart failure results in diminished cardiac performance and overall physical function. Consequently, it underscores the need for early monitoring and timely

interventions by healthcare providers to preserve and enhance physical activity levels, thereby preventing further deterioration in quality of life.

The implications of these findings for heart failure management are substantial. First, healthcare professionals, particularly nurses and physicians, should adopt a more proactive approach in assessing both disease duration and patients' physical activity levels. Second, early interventions—such as structured cardiac rehabilitation programs and continuous education on safe, appropriately measured physical activity—are crucial to slowing the decline in functional capacity. Third, the results of this study offer an evidence-based rationale for developing clinical guidelines that place greater emphasis on the long-term management of physical activity in heart failure patients. Such measures may help patients sustain their quality of life for a longer period and reduce the risk of functional dependence.

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