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Analysis of Risk Factors for Heart Failure in Outpatients at The Undata Regional General Hospital, Central Sulawesi Province

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Abstract: Heart failure is one of the highest causes of death from cardiovascular disease, especially in middle and low income countries. This study aims to analyze the risk factors for heart failure in outpatients at Undata Hospital, Central Sulawesi Province. This study uses an approach *case-control* with a total sample of 134 respondents, consisting of 67 cases and 67 controls determined through techniques *purposive sampling*. Primary data was collected through structured questionnaires, while secondary data was obtained from hospital medical records. Data analysis was carried out using univariate and bivariate approaches using tests *Odds Ratio* (OR) to determine the relationship between independent variables (obesity, physical activity, smoking history) and the incidence of heart failure. The results showed that obesity had an OR of 1.149 (95% CI: 0.553–2.385), physical activity had an OR of 3.436 (95% CI: 1.048–11.273), and smoking history had an OR of 1.446 (95% CI: 0.655–3.194). These findings indicate that physical inactivity is a significant risk factor for heart failure, while obesity and smoking also contribute although not statistically significant. This research emphasizes the importance of preventive intervention on lifestyle factors to reduce the incidence of heart failure in society.

Keywords: Heart Failure, Obesity, Physical Activity, Smoking, *Case-Control*

INTRODUCTION

Non-communicable diseases or commonly called PTM are still classified as diseases that contribute to the highest death rate in the world. Global causes of death include

cardiovascular disease, cancer, chronic respiratory diseases, diabetes and other non-communicable diseases (Tiffany & Hudiyawati, 2022). One of the most frequently encountered cardiovascular diseases is heart failure (Iswahyudi & Darma, 2024).

The World Heart Organization (WHO) describes that the increasing number of heart failure diseases in the world is caused by increasing smoking rates, obesity levels, dyslipidemia and diabetes. Heart failure causes around 17.9 million people to die every year (WHO, 2024).

The prevalence of these deaths is 75% in low to middle income countries and many of them affect populations under 70 years of age (Febby et al., 2023). The prevalence of heart failure itself is increasing because patients who experience acute heart damage can progress to chronic heart failure. PP PERKI heart failure working group registry data notes that at least more than 50% of heart failure cases are men aged 50-60 years with the main risk factor being smoking (PERKI, 2023).

Heart failure remains an epidemic with increasing prevalence and is 1 in 9 causes of death in the United States. Death in CHF patients is influenced by several factors, namely 40% of blood pressure tends to be high; 13.7% smoking habit; 13.2% poor diet; 11.9% lack of physical activity; and 8.8% due to abnormal blood glucose (Agnes Putri et al., 2024)

Indonesia faces serious challenges related to the prevalence of heart failure which continues to increase, reaching 5% of the total population (Ministry of Health, 2024a). This prevalence figure is higher than data on the prevalence of heart failure in European and American populations, which ranges from 1-3% (Iqbal, 2022). Data from Basic Health Research regarding the prevalence of heart failure in Indonesia based on doctor's diagnosis is estimated at 1.5% or around 1,017,290 people. Meanwhile, the highest incidence rate was in North Kalimantan province, namely 2.2%, and the lowest was in NTT Province, namely 0.7% (Riskesdas, 2023).

Indonesian health survey data, the prevalence of heart disease based on doctor's diagnosis reached 0.85% or 877,531 people. Based on province, Yogyakarta ranks first with the highest prevalence, namely 1.67%. Meanwhile, Central Sulawasi ranks 22nd at 0.65% or 9,721 people and the lowest is South Papua at 0.38 or 1,684 people (Indonesian Ministry of Health, 2023).

The Framingham Heart Study (FHS) showed that the prevalence of heart failure doubled every 10 years in people over 50 years of age, under 50 years of age increased by 0.8%, and increased by 9.1% in people between 80 and 89 years of age. Meanwhile, gender also influences the prevalence of heart failure in elderly people (Lumi et al., 2021). The number of males is greater than that of females, namely 61.3% (Latifardani & Hudiyawati, 2023).

Men have a higher risk of experiencing heart failure at a younger age because most of them are more likely to have unhealthy lifestyles such as a history of smoking and consuming excessive alcoholic drinks, which can increase the risk of cardiovascular disease compared to women (Utami & Pratiwi, 2021).

Smoking causes inflammation, thrombosis, and increased myocardial fibrosis which are major predictors of arrhythmic death and mortality in patients with heart failure (Chung, 2022). In various studies, it was found that smokers experienced increased heart wall thickness, decreased systolic function, and increased left ventricular mass, all of which are early indicators of the development of heart failure (Holt et al., 2022). In addition, research by Cho and Shin in 2022 shows that although quitting smoking can reduce cardiovascular risk, the effects of smoking on the heart can last for decades, especially in heavy smokers (Cho & Shin, 2022).

Meanwhile, obesity also causes changes in morphology and function involving the cardiovascular system. It can be a substrate for various cardiovascular diseases, such as atrial fibrillation, coronary artery disease, sudden cardiac death, and heart failure (HF) with preserved ejection fraction (EF) and reduced ejection fraction. Multiple pathogenetic mechanisms may help explain the association between obesity and HF including left ventricular remodeling and epicardial fat accumulation, endothelial dysfunction, and coronary microvascular dysfunction (Lembo et al., 2024).

Zagh Amir's 2022 research shows that lack of physical activity directly increases the risk of heart failure and death. A study in Sweden involving heart failure patients found that those who were less physically active had a higher risk of post-treatment heart failure (Zaghi et al., 2022). In addition, a survey of coronary heart disease patients in Europe found that lack of adequate physical activity remains a common problem. Only 34.4% of patients met minimum recommendations for physical activity, while the remainder remained inactive, increasing the risk of more severe heart failure later in life (Fras et al., 2020).

Based on the profile of the Central Sulawesi Health Service, the number of victims who died from heart disease reached 394 people. The Central Sulawesi Provincial Health Service recorded 386 patients with heart disease, 243 people with coronary heart disease and 143 people with heart failure. The highest number of heart disease cases occurred in Palu City with 56 sufferers. Riskesdas results show that the rate of coronary heart disease and heart failure in the working age group (15-64 years) was higher, namely 3.33% in 2013, but this value increased to 9.1% in 2018 (Riskesdas, 2023).

Medical record data from Undata Palu Hospital shows that the prevalence of heart failure in the 2019-2023 period shows 22 patients diagnosed with heart failure. Meanwhile, in 2024 in the last 2 months of October and November it will increase with the number of 202 patients undergoing outpatient treatment. Factors causing the high prevalence of heart failure are hypertension, diabetes mellitus, obesity/overweight, smoking habits are factors that cause heart failure seen from previous research. Meanwhile, based on a comparison of medical record data at Budi Agung Hospital, Palu, for heart failure cases in the period 2020-2024, only 144 patients were recorded with the same case..

Based on the background above, the researcher chose this title because of initial observations carried out at Undata Hospital, Palu and Budi Agung Hospital, Palu. shows that heart failure remains a serious health problem in the region, with a significant increasing trend. Researchers are interested in examining the analysis of risk factors for heart failure in outpatients at Undata Regional Hospital, Palu City. 2024 will record a drastic increase in the number of outpatients with heart failure cases during the last 2 months, namely October and November, totaling 202 patients. This indicates that heart failure is still one of the main diseases that requires attention at the hospital.

Based on the background above, the problem formulation that can be taken is "What are the risk factors for heart failure in outpatients at Undata Hospital, Central Sulawesi Province". This study aims to determine the analysis of risk factors for heart failure in outpatients at Undata Hospital, Central Sulawesi Province

METHODS

This type of research is a type of research that tries to explore how risk factors occur. The research approach used is approximation *case control*, namely tracing the causes or variables of an event or event backwards (retrospectively). Where in this research the author wants to know the risk factors for heart failure at Undata Regional Hospital, Palu

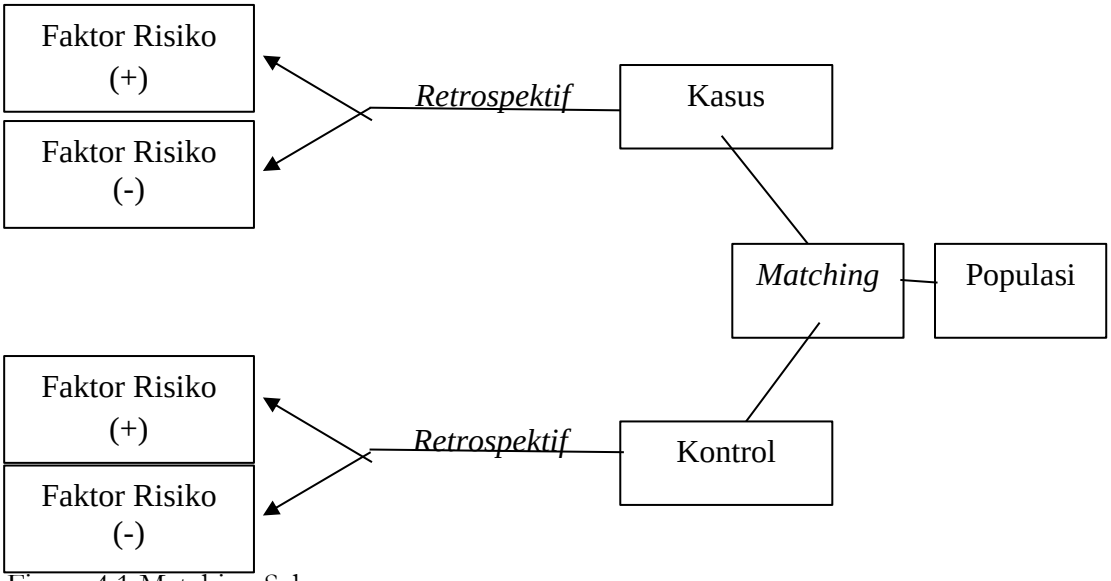

Figure 4.1 Matching Scheme

This study looks for the extent to which risk factors are related to the occurrence of disease by comparing the case group and the control group based on their exposure status.

This research was carried out at Undata Hospital, Central Sulawesi Province and took place from January 2025 until completion. The population in this study included all patients

suffering from heart failure at the Undata Regional Hospital, Palu in the last two months of 2024, namely October and November, totaling 202 people. Population is interpreted as all subjects or objects with certain characteristics that are the target of observation, not only limited to the object or subject itself, but also includes the traits or characteristics they possess (Candra Susanto et al., 2024). Determining the sample in this research uses a purposive sampling technique, namely a sampling technique based on certain criteria that are considered relevant to the research focus. In this technique, sample selection is carried out selectively towards individuals who meet predetermined criteria. To determine the number of samples from the existing population, researchers used the Slovin formula on the basis of a population of 202 heart failure patients at Undata Hospital, Palu City in 2024:

$$n = \frac{N}{1 + N(e)^2}$$

Information:

n = Number of samples

N = Number of population

e = Maximum error limit tolerated in the sample

In this research, the author uses an error tolerance of 10%. Based on the formula above, the sample calculation for this research is:

$$n = \frac{202}{1 + 202\ (0{,}1)^2}$$

$$n = \frac{202}{1 + 202\ (0{,}01)}$$

$$n = \frac{202}{1 + 2{,}02}$$

$$n = \frac{202}{3{,}03}$$

= 66.88 rounded to 67

Thus, the number of samples in this study was determined at 134 respondents, consisting of 67 cases and 67 controls. This amount is considered sufficient to meet the needs of research analysis. To anticipate the possibility of drop out or loss of data during the research process, an addition of 10% was made to the total sample. The case samples in this study were patients who suffered from heart failure and had been recorded in the medical record data at the Undata Hospital, Palu City, while the control samples were individuals who did not suffer from heart failure and were in the environment around heart failure sufferers. The inclusion

criteria used to determine the suitability of respondents as research samples include: patients who have been diagnosed with heart failure, willing to participate in the research, cases must have relevant risk factors, and controls do not experience the same conditions as in the case group. Meanwhile, the exclusion criteria in this study included subjects who were unwilling to participate and those who died during the research period.

Data collection in this research used two types of sources, namely primary data and secondary data. Primary data was obtained directly from heart failure patients at Undata Regional Hospital, Palu through a questionnaire that discussed a number of risk factors such as physical activity, smoking history and obesity. Meanwhile, secondary data was obtained from official documents at Undata Hospital, Central Sulawesi Province in 2024 as well as other relevant sources that support the completeness of the information in this research proposal. To manage data, researchers carry out several stages, starting from data editing to check for errors or deficiencies in the data obtained. Next, data coding is carried out, namely providing codes to facilitate analysis. The data is then tabulated manually and entered (entry) into a computer program. After that, data cleaning is carried out to verify errors and incompleteness, before finally the data is described systematically.

Data analysis was carried out through two approaches. First, univariate analysis is used to see the frequency distribution of each variable studied. Second, bivariate analysis is used to determine the relationship between independent and dependent variables, with assessment using the Odds Ratio (OR), which is interpreted as follows: OR = 1 indicates there is no relationship, OR < 1 indicates a protective effect, and OR > 1 indicates there is a risk. Data will be presented in the form of tables and narratives to comprehensively describe the research results. This research used a case-control study design with a total sample of 134 respondents, consisting of 67 cases and 67 controls.

To ensure validity and reliability, various quality control efforts are carried out. Bias control was carried out by applying strict inclusion and exclusion criteria, as well as using purposive sampling techniques to ensure the suitability of the sample to the research topic. Instrument validation is carried out on questionnaires that have gone through a previous validity testing process. Data collection was carried out in a standardized manner through structured interviews and direct verification by researchers. All data collected was processed using SPSS software, through editing, coding, tabulation and data entry processes. Bivariate analysis was used to identify the relationship between obesity, physical activity, and smoking history and the incidence of heart failure. To ensure accuracy, data entered into the software was double-checked, and study results were compared with previous studies as part of the data validation and triangulation process.

RESULTS AND DISCUSSION

1. Univariate Analysis

a. Obesity

Table 1. Number of Respondents Based on BMI

IMT	Frequency (f)	Percentage
Obesity	72	53,7 %
Not Obese	62	46,3 %
Total	**134**	**100 %**

Source: Primary Data, 2025

Based on Body Mass Index (BMI), the majority of respondents fell into the obesity category, namely 72 people (53.7%). Meanwhile, 62 people (46.3%) were classified as not obese. This shows that more than half of the population in this study had a BMI that was in the obese range.

b. Obesity Lifestyle

Table 2. Number of Respondents Based on Obesity Lifestyle

Life Pattern	Frequency (f)	Percentage
Obesity	60	44,8 %
Not Obese	74	55,2 %
Total	**134**	**100 %**

Source: Primary Data, 2025

Based on the respondents' lifestyle, 60 people (44.8%) were obese, which could be associated with a diet high in calories and fat and low in fiber. In contrast, 74 people (55.2%) were not obese, who may have had a more balanced diet and more regular physical activity. Lack of physical activity and unhealthy eating habits have the potential.

c. Physical Activity

Table 3. Number of Respondents Based on Physical Activity

Physical Activity	Frequency (f)	Percentage
Not enough	16	11,9 %
Enough	118	88,1 %
Total	**134**	**100 %**

Source: Primary Data, 2025

Based on the physical activity level of respondents with a history of heart failure, 16 people (11.9%) had insufficient physical activity, while 118 people (88.1%) had sufficient physical activity. Although the majority of respondents had sufficient physical activity, the existence of a group with less physical activity could be an additional risk factor for the development of cardiovascular disease, including heart failure. Lack of physical activity can contribute to weight gain, high blood pressure, and metabolic disorders that play a role in the incidence of heart failure.

d. Smoking history

Table 4. Number of Respondents Smoking History

Smoking history	Frequency (f)	Percentage
Light	51	51,5 %
Heavy	48	48,5 %
Have no history of smoking	35	26.1 %
Total	**134**	**100 %**

Source: Primary Data, 2025

Based on the smoking history of respondents with a history of heart failure, 51 people (51.5%) were light smokers, while 48 people (48.5%) were heavy smokers. This shows that almost half of the respondents have a history of high-intensity smoking, which can increase the risk of cardiovascular disease, including heart failure. Meanwhile, only 35 people (26.1%) had no history of smoking, indicating that the majority of respondents had or still have a smoking habit, which can have a negative impact on their heart health.

e. Heart failure

Table 5. Number of Respondents with Heart Failure Symptoms

Heart failure	Frequency (f)	Percentage
There are symptoms	56	41,8 %
No symptoms	78	58,2 %
Total	**134**	**100 %**

Source: Primary Data, 2025

Based on data on symptoms experienced by respondents with a history of heart failure, 56 people (41.8%) reported experiencing symptoms, while 78 people (58.2%) did not experience symptoms. This shows that even though most respondents are not aware of the symptoms, they are still at risk of heart failure.

2. Bivariate Analysis

a. Risk Factors for Obesity and Heart Failure at Undata Hospital, Central Sulawesi Province

Risk factors related to obesity and heart failure can be seen in the following table:

Table 6. Risk Factors for Obesity and Heart Failure at Undata Hospital, Central Sulawesi Province

Obesity	Group				Amount		OR	95% CI	
	Case		Control						
	n	%	n	%	N	%		LL	UL
Obesity	45	67.2	47	70.1	92	68,7	1,149	,553	2,385
Not Obese	22	32.8	20	29.9	42	31,3			
Total	**67**	**100**	**67**	**100**	**134**	**100**			

Source: Primary Data, 2025

Based on the results of the analysis, of the total 134 respondents consisting of 67 cases and 67 controls, there were 45 people (67.2%) in the case group and 47 people (70.1%) in the control group who were obese. Meanwhile, 22 people (32.8%) in the case group

and 20 people (29.9%) in the control group were not obese. Analysis results *Odds Ratio* (OR) shows that individuals with obesity have a 1.149 times greater chance of experiencing heart failure than individuals who are not obese with *Confidence Interval* (CI) of 95% as well as value *Lower Limit* (LL) and *Upper Limit* (UL)= 0.553-2.385. Based on the OR value showing a number > 1, obesity in sufferers is a risk factor for heart failure.

b. Risk Factors for Physical Activity and Heart Failure at Undata Hospital, Central Sulawesi Province

Risk factors related to physical activity and the incidence of heart failure can be seen in the following table:

Table 7. Risk Factors for Physical Activity and Heart Failure at Undata Hospital, Central Sulawesi Province

Physical Activity	**Group**				**Amount**		**OR**	**95% CI**	
	Case		**Control**						
	n	**%**	**n**	**%**	**N**	**%**		**LL**	**UL**
Not enough	4	6,0	12	17,9	16	11,9	3,436	1,048	11,273
Enough	63	94,0	55	82,1	118	88,1			
Total	**67**	**100**	**67**	**100**	**134**	**100**			

Source: Primary Data, 2025

Table shows that of the total respondents, the majority of individuals in the case group had sufficient physical activity, 63 people (94.0%), while in the control group, this figure was lower, 55 people (82.1%). In contrast, individuals with more or less physical activity were in the control group of 12 people (17.9%) compared to the case group of 4 people (6.0%). The results of the analysis obtained values *Odds Ratio* (OR) or risk = 3.436 with *Confidence Interval* (CI) of 95% as well as value *Lower Limit* (LL) and *Upper Limit* (UL)= 1.048-11.273. Based on the OR value showing a number > 1, physical activity with the patient is a risk factor for heart failure.

c. Risk Factors for Smoking History and Heart Failure at Undata Hospital, Central Sulawesi Province

Risk factors related to smoking history and the incidence of heart failure can be seen in the following table:

Table 8. Risk factors for history of smoking and heart failure at Undata Hospital, Central Sulawesi Province

Smoking history	Group				Amount		OR	95% CI	
	Case		Control						
	n	%	n	%	N	%		LL	UL
Light	24	47,1	27	56,3	51	51,5	1,446	,655	3,194
Heavy	27	52,9	21	43,8	48	48,5			
Total	**51**	**100**	**48**	**100**	**99**	**100**			

Source: Primary Data, 2025

Based on table 5.12 of the analysis results, out of a total of 134 respondents consisting of 67 cases and 67 controls, there were 99 respondents who had a history of smoking. 24 people (47.1%) in the case group and 27 people (56.3%) in the control group had a light history of smoking. Meanwhile, 27 people (52.9%) in the case group and 21 people (43.8%) in the control group had a history of heavy smoking.

The results of the analysis obtained values *Odds Ratio* (OR) or risk = 1.446 with *Confidence Interval* (CI) of 95% as well as value *Lower Limit* (LL) and *Upper Limit* (UL)= 0.655-3.194. Based on the OR value showing a number > 1, the patient's history of smoking is a risk factor for heart failure.

1. Obesity

Based on the results of bivariate analysis, obesity is a risk factor for heart failure. The group with a BMI > 25 kg/m² had a 1.149 or 1.15 times higher risk of experiencing heart failure compared to the group with a BMI < 25 kg/m². Thus, individuals with a BMI < 25 kg/m² have a lower chance of experiencing heart failure.

Based on field results, it was found that the average respondent had a high level of obesity. And in the respondents' answers regarding additional questions regarding lifestyle patterns that support the occurrence of heart failure, it was found that more respondents' answers led to poor lifestyle patterns. Meanwhile, some respondents with eating patterns still consume oily foods and sweet foods and do not do enough physical activity.

Obesity can increase the risk of heart disease, but not everyone who is obese experiences heart failure. On the other hand, someone who is not obese can also experience heart failure due to several other factors found in the field such as genetics, high blood pressure, or

diabetes that are not related to body weight. Thus, this research supports the theory that obesity can be a risk factor for heart failure.

However, in research on BMI in heart failure patients, it was found from 47,531 heart failure patients that 36.3% were classified as overweight, 31% had normal weight, 20% were obese, and 2.3% were underweight. This means that most heart failure patients are overweight and this is the etiology and poor prognosis for heart failure patients. In other studies it has been discussed that obesity is the biggest factor in cardiovascular disease. However, in heart failure patients, there is an "Obesity Paradox" which explains that the more severe a person's heart condition is, the lower the BMI can be seen. In heart failure patients, it was found that people who were underweight had a poor prognosis (Amira Qisthy Nabila, Nurkhalis, 2024).

Research conducted at the Jakarta Cempaka Putih Islamic Hospital in 2023 with a case-control design entitled *"The Relationship between Obesity and the Incidence of Coronary Heart Disease"* showed that obesity increases the risk of coronary heart disease (CHD). The results of this study found that individuals with obesity had a 2.7 times higher chance of experiencing CHD compared to individuals who were not obese (OR = 2.7; CI 1.29–5.72) (Syahryan Gibran & Nurulhuda, 2023).

Research conducted by Muhammad Syahryan Gibran and Uun Nurulhuda in 2023 shows that obesity influences the incidence of coronary heart disease (CHD). The results of the analysis revealed a relationship between obesity and CHD. Individuals with obesity experience an increased workload on the heart, which forces the heart muscle to work harder to pump blood throughout the body. In addition, obesity is associated with increased lipid levels which can trigger atherosclerosis (Syahryan Gibran & Nurulhuda, 2023).

Research conducted shows that obesity factors greatly influence the risk of heart failure. This is due to changes in blood flow that are blocked due to fat accumulated in a person's body. This accumulation of fat also results in more and more bad cholesterol being accumulated and good cholesterol decreasing, where research results showed that most of the risk factors for respondents who were obese were 27 people (56.3%) (Pashar et al., 2025).

2. Physical Activity

Based on the results of bivariate analysis, insufficient physical activity is a risk factor for heart failure. This is indicated by the Odds Ratio (OR) value of 3.4**,** which means that individuals with less physical activity have a 3.4 times higher risk of experiencing heart failure than individuals with sufficient physical activity. In addition, the 95% confidence interval (CI) does not exceed the number 1, with a lower limit **(**Lower Limit/LL**)** more than 1, so this relationship is considered statistically significant. Thus, lack of physical activity contributes to an increased risk of heart failure.

The results of research at the Heart Polyclinic at Rantauprapat Regional Hospital in 2020 with the title "Factors that Influence the Incidence of Coronary Heart Disease at Rantau Prapat Regional Hospital in 2020" show that lack of physical activity is more often found in individuals who experience coronary heart disease (CHD). The chi-square test showed that there was a significant influence between physical activity and the incidence of CHD with grades p = 0,022 **(**p < 0,05**)**, so the relationship is considered statistically significant. In addition, the Odds Ratio (OR) value of 2.91 indicates that individuals with less physical activity have a 2.91 times higher risk of experiencing CHD compared to individuals who have sufficient physical activity, so that lack of physical activity can be considered a risk factor for the incidence of CHD (Rahayu et al., 2021).

This is in line with research conducted at Prof. Dr. who have good physical activity (Tappi et al., 2021).

Meanwhile, research conducted by Iswahyudi, AAZ, et al with the research title "The relationship between physical activity and the incidence of heart failure in patients at Ibnu Sina Hospital, Makassar" suggests that patients with low physical activity have a higher risk of experiencing heart failure, with 35.7% of patients not carrying out sufficient physical activity (Iswahyudi & Darma, 2024).

Several previous research results which are in line with this research prove that physical activity has a positive effect in preventing the occurrence of heart failure in a person. If a person does not do enough physical activity or does not do regular physical activity, the risk of a person suffering from heart failure will be very high, because there are risk factors that play a role in the incidence of heart failure which are interrelated with the influence of a person's physical activity on the incidence of heart failure.

Heart failure patients often experience symptoms such as shortness of breath, getting tired quickly and being unable to carry out physical activities. This has an impact on reducing the ability to carry out activities so that functional capacity does not decrease. Physical activity should be reduced so that the burden on the heart is reduced, so that the heart remains adequate because its oxygen supply is sufficient. Lack of physical activity, such as rarely exercising and not getting enough rest, can trigger a heart attack. On the other hand, physical activity that is too intense can also cause a heart attack because it can increase the workload on an already weak heart, so that the heart has to work harder to pump blood. This can cause an increase in blood pressure and excessive heart rate, which risks triggering heart failure and increases the possibility of serious complications such as heart attack or arrhythmia (Iswahyudi & Darma, 2024).

3. Smoking history

The results of statistical analysis tests show that smoking history is a risk factor for heart failure. The group with a history of smoking proved that smoking history was a factor in the incidence of heart failure at Undata Hospital. Thus, individuals with a history of smoking have a chance of 1.446 or 1.4 times more risk than those who do not consume cigarettes.

Based on the results of interviews, heart failure respondents at Undata Hospital, Central Sulawesi Province showed that the majority of respondents had a history of smoking in the heavy smoker group. Meanwhile, it was found that several respondents were still smoking, but the majority of respondents had stopped smoking when they were diagnosed heart failure. This is due to a lack of understanding about the dangers of smoking and a lack of attention to oneself when diagnosed with heart failure.

This is in line with research conducted at Depati Hamzah Hospital, Pangkalpinang City in 2023, which showed that smoking habits have a significant relationship with the incidence of heart failure (CHF) at Depati Hamzah Regional Hospital, Pangkalpinang City. The results of this analysis also show an OR value of 4.868, which means that patients with smoking habits have a 4.868 times higher risk of suffering from CHF than patients who do not smoke ($p = 0.000$) (Priandani et al., 2022).

Patients who have a history of smoking can affect the quality of heart health or heart failure. This is because cigarettes contain nicotine which triggers the heart to work faster and can increase blood pressure and CO2 takes up more oxygen in the blood. Smoking can cause the occurrence of plaque in the blood vessels which will result in blockage of the blood vessels (Priandani et al., 2022).

According to research conducted at the Seljiran Hospital Inpatient Unit in 2024, after statistical tests were carried out it was found that there was a significant relationship between smoking history and the quality of life of heart failure patients in the Sejiran Setason Hospital inpatient unit, with a p value of $0.043 < \alpha\ 0.05$. The OR value shows that heart failure patients with a light smoking history are 3,043 times more likely to have a good quality of life compared to heart failure patients with a heavy smoking history (Soleha et al., 2025).

However, smoking has many negative impacts on health, including a high risk of various diseases, and not all smokers experience heart failure. Some of the effects of smoking that need to be considered are an increased risk of lung cancer, chronic lung disease, and other cardiovascular disorders. Smoking can cause damage to blood vessels and the heart, and does not always end in heart failure. Smoking can pose a risk to other factors such as diabetes, hypertension and high cholesterol which can increase heart health conditions (Ministry of Health, 2024).

CONCLUSION

Based on the results of research regarding risk factors for heart failure in outpatients at Undata Hospital, Central Sulawesi Province, it can be concluded that there are three main factors analyzed, namely obesity, physical activity and smoking history. The results of bivariate analysis show that lack of physical activity has a significant relationship with the incidence of heart failure, with an Odds Ratio (OR) value of 3.436 and a 95% Confidence Interval (CI) that does not cross the number 1, so it can be concluded that individuals with less physical activity have a 3.4 times higher risk of experiencing heart failure compared to individuals who are quite physically active. Although the results of the analysis show that obesity and smoking history have OR values of 1.149 and 1.446 respectively, they do not show a statistically significant relationship because the CI range includes the number 1. However, these two factors still show a contribution to an increased risk of heart failure, which is supported by field findings and previous literature. Overall, this research confirms that an unhealthy lifestyle, especially lack of physical activity, is a factor that needs serious attention in efforts to prevent heart failure. Community-based promotive and preventive interventions as well as health education need to be encouraged to reduce the burden of this disease in society.

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