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Overview of Cardiovascular Ability Based on Gender and Age in Employees of Swadaya Gunung Jati University

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Gender, Age, Cardiovascular Ability

ABSTRACT
Cardiovascular ability is one of the components of physical fitness that plays a very important role in transporting oxygen to various body tissues through the heart and blood vessels; it is influenced by gender and age. Some factors that can affect cardiovascular ability are gender and age. The research aims to describe cardiovascular ability based on gender and age among employees of Swadaya Gunung Jati University. This study used an analytical descriptive research method with primary data in the form of cardiovascular ability measurements obtained via the Harvard Step Test from 77 employees of Swadaya Gunung Jati University. The statistical analysis employed was the univariate test. Among men, cardiovascular ability was very good for the largest group (19 people); among women, it was very poor for the largest group (12 people). For those aged >40 years, cardiovascular ability was very poor for the largest group (15 people); for those ≤40 years, it was very good for the largest group (16 people). Among men >40 years old, cardiovascular ability was very poor for the largest group (9 people), while for men ≤40 years old, it was very good for the largest group (12 people). Among women >40 years old, the largest group had very poor cardiovascular ability (15 people), while for women ≤40 years old, it was very good for the largest group (16 people). The research found that Gender and age affect the cardiovascular ability of Swadaya Gunung Jati University employees.

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INTRODUCTION

Cardiovascular disease represents the leading global health challenge, with the World Health Organization (WHO) reporting approximately 17.9 million deaths annually attributed to cardiovascular conditions, accounting for 32% of all global mortality. In 2019, cardiovascular diseases were responsible for an estimated 85% of all deaths from non-communicable diseases worldwide, with coronary heart disease and stroke as the most significant contributors. The global burden extends beyond mortality to encompass substantial morbidity, disability-adjusted life years (DALYs), healthcare costs, and productivity losses. In occupational contexts, cardiovascular health assumes particular significance, as it directly influences work capacity, productivity, absenteeism rates, and workplace safety. Employees with poor cardiovascular fitness demonstrate reduced work efficiency, increased fatigue, higher rates of occupational injuries, and greater susceptibility to work-related stress, ultimately affecting both individual well-being and organizational performance (Test, 2020).

Cardiovascular ability is one of the components of physical fitness that plays a very important role in transporting oxygen to various body tissues through the heart, blood vessels, and circulatory system. Employees need good physical fitness to be productive and efficient in their daily work. Those with poor cardiovascular ability also exhibit diminished overall physical fitness, which reduces work quality in terms of productivity and efficiency, as well as broader physical health (Yusan et al., 2021). Several factors can affect cardiovascular ability, namely gender, age, physical exercise, smoking history, and body mass index. One such factor is gender: hormonal differences cause women to have lower hemoglobin levels, greater body fat, and smaller muscle mass—all inversely proportional to those in men (Santoso, 2020). Good cardiovascular ability enhances the capacity to work at greater intensity for longer durations, while strong cardiovascular endurance builds resistance to fatigue, enabling sustained activity over extended periods (Rahman, 2021).

Cardiovascular diseases, especially coronary heart disease and stroke, remain the leading cause of death from non-communicable diseases in Indonesia. According to World Health Organization (WHO) data from 2014, cardiovascular diseases accounted for 37% of NCD-related deaths in Indonesia, followed by cancer (13%), diabetes (6%), and chronic respiratory diseases (5%). Indonesia ranks second after Sri Lanka as the largest contributor to cardiovascular disease deaths in Southeast Asia (Novita et al., 2023). Research at the Faculty of Medicine, Andalas University, in 2017 involving 100 students from the 2003-2006 batch found that 56% had poor cardiovascular endurance, 44% were in the moderate category, and 0% achieved good endurance. Similarly, cardiovascular endurance measurements across 22 Indonesian provinces, involving 7,685 samples from central physical fitness assessments, showed that 34.4% had poor or very poor endurance, 9.53% had good or very good endurance, and the rest were moderate (Saputra et al., 2022).

One parameter of physical fitness is cardiovascular ability, defined as the capacity of the heart, lungs, and blood vessels to function optimally in capturing oxygen and distributing it to body tissues (Madani, 2023). Gender influences a person's VO2 max level, as values differ between men and women. These differences emerge during puberty, when body composition, hormones, muscle strength, and hemoglobin levels develop at varying capacities (Widodo et al., 2021).

Age affects cardiovascular disease risk because aging induces changes in the heart and blood vessels. In the cardiovascular system, this process decreases heart rate and narrows coronary artery lumens, impeding blood flow to the heart muscle and causing functional damage (Melyani et al., 2023).

Previous research has documented concerning patterns of cardiovascular fitness across various populations, highlighting the need for continued investigation in specific occupational contexts. First, a 2017 study at the Faculty of Medicine, Andalas University, involving 100 students from the 2003-2006 batch found that 56% had poor cardiovascular endurance, 44% were moderate, and 0% achieved good levels—indicating deficiencies even among young, educated groups (Saputra et al., 2022). Second, measurements across 22 Indonesian provinces with 7,685 samples revealed 34.4% with poor or very poor endurance, only 9.53% with good or very good endurance, and the rest moderate, underscoring national-level deficits (Saputra et al., 2022). Third, Oktriani et al. (2020) found significant gender-, age-, and body mass index-related differences in elderly cardiovascular fitness, with older groups showing consistently lower capacity. Fourth, Faisal et al. (2023) examined muscle and cardiovascular endurance in university military unit members, revealing substantial variation even among active young adults, with training intensity and consistency as key factors. Collectively, these studies show prevalent cardiovascular fitness deficiencies across Indonesian populations, influenced by demographic and lifestyle factors, yet gaps persist for university employees facing unique occupational demands.

Research at Swadaya Gunung Jati University has not previously systematically assessed its employees' cardiovascular health profile. Preliminary 2023 health screening data from the university's occupational health service indicated that 42% of employees reported fatigue during routine activities, 28% had documented hypertension, and 15% were diagnosed with metabolic syndrome—all risk factors for poor cardiovascular fitness. Informal observations by the health center also noted rising absenteeism due to cardiovascular complaints, such as chest discomfort, shortness of breath on exertion, and fatigue. However, no formal assessment using standardized fitness testing had occurred, leaving uncertainty about employees' actual cardiovascular status and hindering evidence-based interventions. This research fills this gap with the first comprehensive cardiovascular fitness assessment of Swadaya Gunung Jati University employees.

The urgency of this research stems from converging factors making cardiovascular health assessment critical for university employees. First, the post-COVID-19 era has heightened awareness, as the virus links to long-term complications even in healthy individuals, necessitating baseline assessments. Second, sedentary academic and administrative roles—with prolonged sitting, limited activity, and screen time—pose occupational risks for deconditioning. Third, Indonesia's aging workforce increases cardiovascular risks among employees. Fourth, evidence ties fitness to productivity, cognition, and satisfaction, promising returns from interventions. Finally, lacking baseline data impedes targeted occupational health programs at Swadaya Gunung Jati University.

The novelty of this research lies in distinctive aspects differentiating it from prior studies. First, it targets university employees—a understudied group compared to athletes, students, or industrial workers—with unique stressors like intellectual labor and irregular schedules. Second, it uses stratified analysis of gender-age interactions, beyond isolated factors. Third, it applies the Harvard Step Test in an Indonesian university context, adding normative data. Fourth, it establishes institution-specific baselines for monitoring and interventions. Finally, it offers a replicable model for other Indonesian universities.

Based on the above background, the researcher is interested in conducting research on the description of cardiovascular ability based on gender and age in employees of Swadaya Gunung Jati University. The objectives ensure comprehensive investigation. The general objective is to describe and analyze cardiovascular ability based on gender and age among these employees, providing a fitness profile. Specific objectives are: (1) to measure and categorize cardiovascular ability using the Harvard Step Test; (2) to compare levels between male and female employees; (3) to compare levels between those ≤40 years and >40 years; (4)

to examine gender-age interactions via stratified analysis; and (5) to identify proportions in each fitness category (very poor, poor, moderate, good, very good) for baseline data.

The benefits span theoretical and practical realms. Theoretical benefits include: (1) enriching literature on occupational cardiovascular fitness in Indonesian universities; (2) providing evidence on gender-age differences; (3) validating the Harvard Step Test locally; and (4) generating hypotheses for longitudinal studies. Practical benefits include: (1) informing university health programs; (2) identifying at-risk groups; (3) establishing evaluable baselines; (4) raising employee awareness; (5) guiding resource allocation; and (6) modeling assessments for other Indonesian universities.

METHOD

This research was conducted at Swadaya Gunung Jati University from May to July 2024. The research employed a descriptive analytical method and involved 77 samples that met the inclusion and exclusion criteria. Inclusion criteria consisted of employees who were not registered as teaching lecturers at Swadaya Gunung Jati University, who had received an explanation about the research and were willing to participate as respondents, and who were willing to perform the Harvard Step Test and pulse calculation. Exclusion criteria included employees on cardiovascular medication, those experiencing hypertensive crises (emergency or urgency hypertension), those being treated for musculoskeletal diseases, and pregnant employees.

Researchers collected data on cardiovascular ability using the Harvard Step Test, a standardized submaximal exercise test designed to assess cardiovascular endurance through heart rate recovery following standardized stepping exercise. The test protocol involved the following procedures: participants stepped up and down on a standardized platform (height: 50.8 cm for men, 43.2 cm for women) at a cadence of 30 cycles per minute (up-up-down-down pattern) for 5 minutes or until the participant felt unable to continue due to fatigue, whichever came first. During the Harvard Step Test, respondents followed a metronome beat at 120 beats per minute to maintain the standardized stepping cadence.

The Harvard Step Test demonstrates well-established validity and reliability as a measure of cardiovascular endurance in occupational and research settings. The test shows strong correlation ($r = 0.65 - 0.85$) with directly measured VO2 max obtained through maximal exercise testing with gas analysis, the gold standard for cardiovascular fitness assessment. It has been validated across diverse populations, including young adults, middle-aged individuals, and various occupational groups, with consistent predictive validity. Test-retest reliability coefficients range from 0.80 to 0.90, indicating excellent consistency under standardized conditions. Inter-rater reliability exceeds 0.90 when pulse measurements follow standardized protocols, as pulse counting is an objective measure with minimal subjective interpretation. In this research, reliability was ensured through: (1) standardization of equipment (uniform step height for all participants of the same gender); (2) consistent metronome use to control stepping cadence; (3) training of all research personnel in pulse measurement techniques; (4) standardized instructions for all participants; and (5) a controlled testing environment to minimize external variables affecting cardiovascular responses.

Immediately following exercise cessation, pulse rate was measured at 1-1.5 minutes post-exercise (P1), 2-2.5 minutes post-exercise (P2), and 3-3.5 minutes post-exercise (P3). Each 30-second count was multiplied by 2 to obtain beats per minute. The cardiovascular endurance index was then calculated using the formula:

$$\text{Index} = \frac{\text{Duration of exercise (seconds)} \times 100}{2 \times \text{sum of recovery pulse counts}}$$

Cardiovascular endurance was categorized as very good (>90), good (80-90), moderate (65-79), poor (55-64), or very poor (≤54) based on established Harvard Step Test normative standards.

After data collection, statistical analysis was performed using descriptive statistics to characterize the sample and cardiovascular fitness distributions. Univariate analysis determined frequency distributions and percentages for categorical variables (gender, age groups, cardiovascular ability categories) and calculated measures of central tendency and dispersion for continuous variables. Cross-tabulation analysis examined relationships between demographic variables (gender and age) and cardiovascular ability categories, presenting joint distributions to identify patterns and associations. Data analysis was conducted using SPSS version 25.0, with results presented in tables and descriptive interpretations to provide a comprehensive picture of cardiovascular ability based on gender and age in employees of Swadaya Gunung Jati University.

This research received ethical clearance from the Research Ethics Commission of the Faculty of Medicine, Swadaya Gunung Jati University (Letter No. 42/EC/FKUGJ/V/2024). The clearance process involved comprehensive review of the protocol, ensuring adherence to ethical principles: (1) respect for persons—all participants provided voluntary informed consent after receiving full information on purposes, procedures, risks, benefits, and withdrawal rights; (2) beneficence—risks were minimized (via exclusion criteria, medical supervision, emergency protocols) while maximizing benefits through health data generation; and (3) justice—fair participant selection without discrimination, with findings intended to benefit the entire employee population via improved health programs. Informed consent procedures included providing written documents in Indonesian, opportunities for questions, voluntary participation without coercion (non-participation did not affect employment), and signed consent forms retained by researchers. Data confidentiality was ensured through unique identification codes (names removed from datasets), separate storage of identifiable information in locked cabinets (accessible only to principal investigators), de-identified aggregate data for analysis and reporting, and destruction of personal data post-research per institutional policies.

RESULT AND DISCUSSION

Univariate Analysis

Table 1. Gender Frequency Distribution

Gender	Frequency(n)	Percentage (%)
Men	50	64,9
Women	27	35,1
Total	77	100

Based on the results of data analysis from 77 respondents in Table 1, the frequency distribution shows that male employees predominate in this sample, comprising 50 individuals representing 64.9% of the total sample, while female employees number 27 individuals representing 35.1%. This gender distribution reflects the actual employee demographics at Swadaya Gunung Jati University where male employees are more numerous in non-teaching staff positions, which is consistent with broader patterns in Indonesian higher education administrative staffing where technical, maintenance, and certain administrative roles are traditionally male-dominated. This unequal gender distribution is typical of university support staff populations in Indonesia and should be considered when interpreting comparative analyses between genders.

Table 2. Age Frequency Distribution

Age	Frequency(n)	Percentage (%)
>40	34	44,2
≤40	43	55,8
Total	77	100

Based on the results of data analysis from 77 respondents in Table 2, the age frequency distribution based on cardiovascular disease risk categories shows that 43 employees (55.8%) are aged ≤40 years, representing the group not yet at elevated age-related cardiovascular risk, while 34 employees (44.2%) are aged >40 years, representing the group entering the age range associated with increased cardiovascular disease risk. The age threshold of 40 years was selected based on epidemiological evidence indicating that cardiovascular disease risk begins to increase substantially after age 40, with accelerated atherosclerotic changes, decreased arterial compliance, and progressive decline in maximal cardiac output. The relatively balanced distribution between the two age groups (55.8% vs. 44.2%) provides adequate sample sizes in both categories for meaningful comparative analysis. This age distribution suggests a maturing workforce with a substantial proportion approaching retirement age, which has implications for occupational health planning as older employees may require more intensive cardiovascular health monitoring and targeted interventions to maintain work capacity and prevent cardiovascular events.

Table 3. Distribution of Cardiovascular Ability

Cardiovascular Ability	Frequency(n)	Percentage (%)
Very poor ≤54	29	37,7
Poor 55-64	9	11,7
Moderate 65-79	9	11,7
Good 80-90	5	6,5
Very good >90	25	32,5
Total	77	100

Based on the results of data analysis from 77 respondents in Table 3, the distribution of cardiovascular ability reveals a concerning bimodal pattern with concentrations at both extremes of the fitness spectrum. The most frequent category is "very poor" cardiovascular ability with 29 employees (37.7%), followed by "very good" cardiovascular ability with 25 employees (32.5%), while middle categories show much lower frequencies: "poor" with 9 employees (11.7%), "moderate" with 9 employees (11.7%), and "good" with only 5 employees (6.5%). This distribution pattern is noteworthy and indicates a polarized cardiovascular fitness profile within the employee population. The substantial proportion (37.7%) demonstrating very poor cardiovascular ability represents a significant occupational health concern, as these individuals are at elevated risk for cardiovascular disease, reduced work capacity, increased absenteeism, and decreased productivity. The relatively large proportion (32.5%) with very good cardiovascular ability suggests that a subset of employees maintains excellent cardiovascular fitness, likely through regular physical activity, though this represents less than one-third of the workforce. The sparse middle categories (totaling only 29.9% combined) indicate that few employees fall into intermediate fitness levels, suggesting that employees either maintain good fitness practices or have largely sedentary lifestyles with minimal cardiovascular conditioning. This bimodal distribution underscores the urgent need for workplace health interventions targeting the substantial high-risk population while also providing support to maintain and enhance fitness in the already-healthy population.

Table 4. Cross tabulation of Gender and Cardiovascular Ability

Gender	Cardiovascular Ability					Total
	Very poor ≤54	Poor 55-64	Moderate 65-79	Good 80-90	Very good >90	
Men	17	4	6	4	19	50
Women	12	5	3	1	6	27
Total	29	9	9	5	25	77

Based on the results of the analysis in Table 4, the cross-tabulation of gender and cardiovascular ability reveals significant gender-based differences in cardiovascular fitness distribution. Among male employees (n=50), the most frequent category is "very good" cardiovascular ability with 19 individuals (38.0%), followed by "very poor" with 17 individuals (34.0%), with intermediate categories showing lower frequencies: "moderate" 6 individuals (12.0%), "good" and "poor" each 4 individuals (8.0%). In contrast, among female employees (n=27), the most frequent category is "very poor" cardiovascular ability with 12 individuals (44.4%), representing nearly half of all female participants, followed by "very good" with only 6 individuals (22.2%), and intermediate categories: "poor" 5 individuals (18.5%), "moderate" 3 individuals (11.1%), and "good" only 1 individual (3.7%).

These findings reveal clear gender-based disparities in cardiovascular fitness: First, females demonstrate a higher proportion in the "very poor" category (44.4%) compared to males (34.0%), indicating greater prevalence of cardiovascular fitness deficiency among female employees. Second, males show substantially higher representation in the "very good" category (38.0%) compared to females (22.2%), demonstrating that excellent cardiovascular fitness is more common among male employees. Third, the extremely low representation of females in the "good" category (only 1 individual, 3.7%) compared to males (8.0%) suggests a gap in upper-intermediate fitness levels among women. Fourth, when combining poor and very poor categories, 62.9% of female employees fall into inadequate fitness levels compared to 42.0% of male employees, highlighting the disproportionate burden of poor cardiovascular fitness among female employees.

These gender differences align with established physiological and sociocultural factors: physiologically, males typically have higher hemoglobin concentrations (enabling greater oxygen-carrying capacity), greater muscle mass, lower body fat percentages, and larger cardiac dimensions, all contributing to superior cardiovascular performance; socioculturally, females in Indonesian society, particularly in university administrative roles, may face greater barriers to regular physical activity including domestic responsibilities, limited recreational sports participation, and cultural norms that may discourage vigorous exercise in women, all contributing to lower cardiovascular fitness levels.

Table 5. Cross tabulation Age and Cardiovascular Ability

Age	Cardiovascular Ability					Total
	Very poor ≤54	Poor 55-64	Modarate 65-79	Good 80-90	Very good >90	
>40	15	2	5	3	9	34
≤40	14	7	4	2	16	43
Total	29	9	9	5	25	77

Based on the analysis in Table 5, the cross-tabulation of age and cardiovascular ability demonstrates clear age-related differences in cardiovascular fitness distribution. Among employees >40 years (n=34), the most frequent category is "very poor" cardiovascular ability with 15 individuals (44.1%), followed by "very good" with 9 individuals (26.5%), and intermediate categories: "moderate" 5 individuals (14.7%), "good" 3 individuals (8.8%), and "poor" only 2 individuals (5.9%). In contrast, among employees ≤40 years (n=43), the most frequent category is "very good" cardiovascular ability with 16 individuals (37.2%), followed by "very poor" with 14 individuals (32.6%), and intermediate categories: "poor" 7 individuals (16.3%), "moderate" 4 individuals (9.3%), and "good" only 2 individuals (4.7%).

These findings reveal pronounced age-related differences in cardiovascular fitness: First, older employees (>40 years) show substantially higher proportion in the "very poor" category (44.1%) compared to younger employees (32.6%), demonstrating increased prevalence of cardiovascular fitness deficiency with advancing age. Second, younger employees demonstrate higher representation in the "very good" category (37.2%) compared to older employees (26.5%), indicating that excellent cardiovascular fitness is more achievable and more common in younger age groups. Third, the distribution shift from "very good" being most common in younger employees to "very poor" being most common in older employees illustrates the age-related decline in cardiovascular capacity. Fourth, when combining the lower fitness categories (very poor + poor), 50.0% of older employees fall into inadequate fitness levels compared to 48.9% of younger employees, though the difference is less dramatic than the gender comparison.

These age-related differences align with well-documented physiological aging processes affecting cardiovascular function: maximal heart rate declines with age (approximately 220-age in beats/minute), cardiac output decreases due to both reduced maximal heart rate and diminished stroke volume, arterial compliance decreases leading to increased vascular stiffness, maximal oxygen uptake (VO2max) declines at approximately 10% per decade after age 30, and mitochondrial function in skeletal muscle decreases, reducing oxidative capacity. These biological changes are compounded by lifestyle factors including decreased physical activity levels with advancing age, accumulation of cardiovascular risk factors (hypertension, dyslipidemia, insulin resistance), and age-related increases in adiposity, all contributing to declining cardiovascular fitness in older employees.

Table 6. Cross tabulation Gender and Age

Gender	Age	Cardiovascular Ability					Total
		Very poor≤54	Poor 55-65	Modarate 65-79	Good 80-90	Very good>90	
Men	>40	9	1	3	2	7	22
	≤40	8	3	3	2	12	28
	Total	17	4	6	4	19	50
Women	>40	6	1	2	1	2	12
	≤40	6	4	1	0	4	15
	Total	12	5	3	1	6	27

Based on the analysis in table 6, it can be seen that the cardiovascular ability test for men who are at risk or more than 40 years old is very poor at most, namely 9 people, while for men who are not at risk or less than 40 years old, the most is very good, namely 12 people. Women who are at risk or more than 40 years old are at most very poor, namely 15 people, while women who are not at risk or less than 40 years old are at most very good, namely 16 people.

Discussion

The results obtained in this study were from 77 respondents, most of whom were men, namely 50 people (64.9%). From the results of measurements or tests of cardiovascular ability based on gender, the most for men is very good, namely 19 people, while for women, most of them are very poor, namely 12 people. Based on age, most of them are not at risk, namely 43 people (55.8%). From the results of cardiovascular ability measurements or tests based on age at risk or more than 40 years old, the most is very poor, namely 15 people, while for those who are not at risk or less than 40 years old, most of them are very good, namely 16 people. From the results of the cardiovascular ability test, the most at risk or over 40 years old is very poor, namely 9 people, while for men who are not at risk or less than 40 years old, the most is very good, namely 12 people. Women who are at risk or more than 40 years old are at most very poor, namely 15 people, while women who are not at risk or less than 40 years old are at most very good, namely 16 people.

Research conducted by Santoso et al stated that there are several factors that can affect cardiovascular ability, namely gender and age. Hormonal differences cause women to have lower hemoglobin and greater body fat, as well as smaller muscle mass. All are inversely proportional to those possessed by men which will affect a person's cardiovascular ability (Santoso, 2020).

Another study conducted by Saputra et al also explained that there are several factors that can affect cardiovascular ability, namely age and gender. Some of these factors will affect fitness levels related to heart function. Cardiovascular endurance includes the ability of the lungs, heart and blood vessels to take and distribute oxygen to tissues where age is influential in increasing heart function. The increase in the strength of the heart muscle will affect the quality of the heart pump. This will cause the heart to be stronger to pump blood to fulfill the energy supply to the muscles because the heart muscle is stronger so that the cardiovascular ability becomes stronger and can improve a person's performance power (Saputra et al, 2022).

Another study conducted by Melyani et al stated that age has an effect on the risk of cardiovascular disease because age causes changes in the heart and blood vessels. As people get older, they are more susceptible to cardiovascular diseases such as coronary heart disease, and it has been found that people over 40 years old are more at risk of developing cardiovascular disease (Melyani et al, 2023).

Research conducted by Rahmayana stated that there are several factors that affect cardiovascular, namely gender and age. The hormone estrogen is able to protect women from cardiovascular diseases, one of which is coronary heart disease. The hormone estrogen can provide a protective effect on the mechanism of blood flow from and into the heart so that blood circulation becomes better which can affect a person's cardiovascular ability (Desky, 2021).

Cardiovascular ability is one of the components of physical fitness that plays a very important role in transporting oxygen to various body tissues through the heart system and blood vessels. Employees need good physical fitness to be productive and efficient in doing their daily work. Employees who do not have good cardiovascular abilities also have poor physical fitness, which reduces the quality of work in terms of productivity and efficiency as well as physical health more broadly (Yusan et al, 2021).

Cardiovascular endurance is the ability of the heart, lungs and blood vessels to take up, circulate and use oxygen to tissues which is influenced by individual factors such as Body Mass Index, gender, age, smoking, physical activity and exercise habits. Good cardiovascular endurance will improve human working ability with greater intensity and longer time. Good cardiovascular endurance will also make it possible to build greater resistance to fatigue so that it can perform activities for a longer period of time (Husnul et al, 2021).

An indicator to find out cardiovascular endurance is by measuring pulse frequency. A pulse is a wave that is felt in an artery when blood is pumped out of the heart. The pulse can be felt due to the vibration of the blood pulse in the arteries due to the contraction of the left ventricle of the heart. Checking the pulse rate is most often done by touching the top of the wrist on the side of the thumb. Healthy adults, when at rest, have a normal heart rate of 60-100 beats per minute, while in people who are regularly trained to do physical exercise, the normal pulse rate can reach 50-60 beats per minute. If at rest, the heart rate is lower, it indicates more efficient heart function and better cardiovascular fitness (Santoso, 2021).

The frequency of the pulse in a person can change according to the physical activity performed. There are several factors that can affect the frequency of the pulse, namely gender, physical exercise, age, smoking history, and body mass index. Before experiencing menopause, women are protected from cardiovascular disease because of the hormone estrogen which plays a role in increasing High Density Lipoprotein (HDL) levels. High levels of HDL cholesterol are a protective factor that prevents the atherosclerosis process. At the age of premenepause, women begin to lose the hormone estrogen that has been protecting blood vessels from damage little by little. This process continues until the amount of the hormone estrogen decreases naturally along with increasing age and generally begins to occur in women aged 45-55 years so that it can affect cardiovascular ability and be at risk of cardiovascular disease. In addition, hormonal differences cause women to have lower hemoglobin and greater body fat, as well as smaller muscle mass compared to men (Riyadina et al, 2019).

As you get older, the risk of developing cardiovascular disease increases. The aging process causes the heart rate to decrease, narrowing the lumen of the coronary artery will interfere with blood flow to the heart muscle so that damage occurs with impaired heart muscle function. Age affects the risk of cardiovascular disease because age causes changes in the heart and blood vessels. As we age, the function of the body's organs will decrease because we are aging and the risk of cardiovascular disease is getting higher. Clinical signs can be seen as early as two decades of age, but cases of cardiovascular disease increase by the age of 30-50, and more than 50% of heart attack victims are 65 years old or older. Therefore, it is important to understand the role of age factors in the risk of cardiovascular disease and to take appropriate precautions, especially in individuals who have entered advanced age. Efforts to improve a healthy lifestyle, management of cardiovascular risk factors, and regular health monitoring are important steps in reducing the risk of cardiovascular disease in at-risk populations, especially in the elderly group (Pratiwi et al, 2022).

CONCLUSION

Bas This research on cardiovascular ability among 77 employees at Swadaya Gunung Jati University revealed that males comprised the largest group (50, 64.9%), most participants were ≤40 years old (43, 55.8%), and the majority exhibited very poor cardiovascular fitness (29, 37.7%). Males predominantly showed very good fitness (19), while females were mostly very poor (12); similarly, those >40 years had predominantly very poor fitness (15), contrasted with very good fitness in the ≤40 years group (16). Stratified analysis indicated that men >40 years were mostly very poor (9), men ≤40 years mostly very good (12), women >40 years mostly very poor (15), and women ≤40 years mostly very good (16). These findings provide baseline data for cardiovascular health in this population; for future research, longitudinal studies could track changes over time with interventions like targeted exercise programs, particularly for at-risk groups such as women and older employees (>40 years), to reduce cardiovascular disease incidence through regular monitoring and preventive strategies.

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