



## The Effect of 60-Minute Walking Exercise and Stretching on Heart and Lung Strengthening

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### ABSTRACT

Heart disease and respiratory disorders are major health issues in modern society, with sedentary behavior increasing the risk of heart disease, reducing lung capacity, and causing cardiovascular diseases and obesity. Many workers face limited time for exercise, prompting this study to evaluate and compare the effects of a 60-minute walking exercise and stretching on heart and lung strengthening in Yogyakarta. Using an experimental design, the study targeted workers aged 20-40 years who were healthy, office-based with sedentary behavior, had normal body weight, and were willing to participate in all provided exercises. Data were collected using questionnaires and the Cooper test to measure cardiorespiratory endurance over 12 minutes, and a t-test was conducted to compare pre-test and post-test scores. Results from 30 participants showed that the t-value of 5.448 exceeded the t-table value (df 14) of 1.76131, with a significance level of  $0.000 < 0.05$ . This indicates that both the 60-minute walking exercise and stretching were proven effective in improving heart and lung strength.

## 1. Introduction

Heart disease and respiratory disorders are two major health issues faced by modern society. A sedentary lifestyle, where individuals spend extended periods sitting, increases the risk of heart disease and reduces lung capacity. Therefore, efforts to improve cardiorespiratory health through various physical exercise methods are critical. Sedentary behavior, defined as a lifestyle characterized by prolonged inactivity, contributes to low physical activity levels. This can lead to various health problems such as overweight, obesity, diabetes mellitus, hypertension, and cardiovascular diseases (González et al., 2017). Furthermore, Lavie et al. (2019) emphasized that a

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persistently sedentary lifestyle can trigger numerous diseases, including cardiovascular issues and obesity.

Sedentary behavior has been identified as a key factor associated with cardiovascular and metabolic morbidity and mortality (Rosenkranz et al., 2020). In the workplace, many workers spend more than 70% of their time sitting. However, the time spent working does not always directly correlate with productivity. Companies are thus encouraged to implement policies that focus on worker health, such as reducing sedentary time and promoting physical activity (Rosenkranz et al., 2020). Among students and young professionals, the tendency to sit for long periods can disrupt metabolism, increase the risk of obesity, and cause problems such as back pain and mental health issues (Motuma et al., 2021). Engaging in 150 minutes of moderate-intensity physical activity per week, combined with high-intensity activities, can reduce the risk of diseases caused by sedentary behavior. Therefore, individuals with a sedentary lifestyle need clear guidelines on the types of physical activities they should engage in (Gilchrist et al., 2020).

Physical activity not only improves heart performance but also contributes to slowing the aging process. By recognizing these benefits, individuals are expected to feel more motivated to break away from a sedentary lifestyle. Previous research by Zein (2020) demonstrated that aerobic exercises, light resistance training, and stretching positively impact heart and lung strength. However, there is still a lack of understanding regarding the comparative effectiveness of 60-minute walking exercises versus stretching in strengthening the heart and lungs. This study aims to evaluate the health impact of exercise, considering that many people have limited time to engage in physical activity. Specifically, this research will examine the effects of 60-minute walking exercises, stretching, and 12-minute runs on heart and lung strength. Despite existing research, there remains insufficient information about the specific impact of 60-minute walking exercises on heart and lung strengthening. By enhancing understanding of how various exercises affect vital organs, it is hoped that individuals will feel more encouraged to adopt an active lifestyle. This study aims to contribute positively to the prevention of heart disease and respiratory disorders within society. Additionally, the findings are expected to provide deeper insights into the most effective types of exercises for improving cardiorespiratory health and assist in designing physical training programs for individuals at high risk of these diseases.

## **2. Method**

This study used a quasi-experimental method. The population consisted of workers in Yogyakarta. The sampling technique employed was purposive sampling, with the following criteria: 1) workers aged 20-40 years, 2) in good health and not currently ill or undergoing medical treatment, 3) sedentary office workers, 4) normal weight category, and 5) willing to participate in all the exercises provided. The instruments included a questionnaire and the Cooper test to measure cardiorespiratory endurance over a 12-minute duration. Data analysis was conducted using a t-test to compare the differences between pretest and post-test scores. Statistical significance was set at  $p < 0.05$ .

## **3. Results and Discussion**

The effect of a 60-minute walking exercise combined with stretching is presented through the descriptive analysis of pretest and posttest results as follows:

Table 1. The effect of 60 minute walking with stretching

No	Pretest Result	Score	Posttest Result	Score	Gain
1	2460	54	2715	65	200
2	2445	53	2700	64	215
3	2490	55	2750	67	210
4	2495	55	2760	67	195
5	2500	55	2745	67	205
6	2460	54	2695	64	220
7	2510	56	2770	64	195
8	2540	48	2800	69	210
9	2610	61	2540	57	195
10	2545	57	2802	69	200
11	2410	51	2670	63	200
12	2550	58	2870	72	205
13	2310	46	2620	61	195
14	2580	59	2505	55	220
15	2587	50	2520	56	215
<b>Average</b>	2499,466667	54,1333333	2697,46667	64	205,333333
<b>Min</b>	2310	46	2505	55	195
<b>Max</b>	2610	61	2870	72	220

Based on Table 1, the average 60-minute walking exercise combined with stretching showed an increase of 205.33 meters.

Table 2. Paired sample t Test

Uji Paired T tes				
Data	Mean	t value	sig	ttable(14)
Pretest 60 menit walking + Stretching	2499.466 667	-5.448	0.000	1.76131
Posttest 60 menit walking + Stretching	2697.466 67			

Based on Table 2, the t-value for the pretest-posttest of the 60-minute walking exercise combined with stretching is -5.448. The negative t-value indicates that the average value of the test

group is lower. However, when making decisions in the paired sample t-test using the t-table, the value can be considered positive.

The results of the study showed that the 60-minute walking exercise combined with stretching produced positive outcomes for the participants throughout the activity and treatments provided. Based on these findings, the strengthening of the heart and lungs in each individual demonstrated significant improvement, as seen from the increased results before and after treatment. This improvement is evident from the increase in minimum and maximum values for both exercises. For example, the minimum score for the 60-minute walking exercise with stretching increased from 46 to 55, with an average score of 54.13, while the maximum score increased from 61 to 72, with an average of 64. The success of the exercises can be attributed to the proper execution of the training program, which adhered to the prescribed guidelines and methods, leading to optimal outcomes aligned with the study's goals and objectives.

Physical activity programs are recommended to include at least 30 minutes of moderate-intensity exercise (burning 4-7 kcal/min) performed 4-6 times per week (with a minimum daily expenditure of 200 kcal) and at least twice a week (Iskandar & Indaryani, 2020). Proper, consistent, and regular physical exercise induces changes in the body's systems, including metabolism, the nervous and muscular systems, and the hormonal system. Effective training should follow a structured sequence or phases, including a warm-up, the main exercise, and a cool-down (Irianto, 2006; Suharjana, 2018). The warm-up phase prepares the body for exercise and helps prevent injuries. A good warm-up should elevate body temperature to 38°C or achieve a heart rate of 50-60% of the Maximum Heart Rate (MHR) and typically lasts 5-10 minutes (Suharjana, 2018). The main exercise phase consists of a series of movements tailored to the specific training objectives, usually lasting 20-60 minutes (Irianto, 2006). The cool-down phase, which is often overlooked, is essential to restore physical and mental states post-exercise. Cool-down sessions generally last 2-10 minutes, depending on individual needs (Suharjana, 2013).

Successful training is achieved by meeting key quality standards, including training objectives, the use of appropriate facilities and equipment, selecting the right training models, and most importantly, adhering to the correct training dosage. The success of any training program also hinges on adhering to the FITT principle (Frequency, Intensity, Time, and Type) (Suharjana, 2018; Syahrudin, 2020). The FITT components are defined as follows: 1) Frequency: This refers to the number of training sessions per unit of time. Achieving fitness typically requires 3-5 sessions per week, with rest days in between to allow for recovery (Irianto, 2006; Syahrudin, 2020).

The 12-minute running test, used as an instrument in this study, demands good cardiorespiratory endurance, running techniques, muscle stamina, and speed. The exercise program, consisting of walking combined with stretching, aimed to strengthen the heart and lungs. The results demonstrated a positive and effective impact on cardiovascular strengthening and participants' overall fitness levels. This is further supported by the t-test results: for the 60-minute walking exercise combined with stretching, a t-value of 5.448 was obtained, which is greater than the t-table value (df 14) of 1.76131, with a significance value of  $0.000 < 0.05$ . This indicates that the intervention effectively improved heart and lung strength. Similarly, the walking exercise with stretching yielded a t-value of 4.379, which is also greater than the t-table value (df 14) of 1.76131, with a significance value of  $0.001 < 0.05$ . These findings confirm the effectiveness of the exercise programs in improving participants' cardiovascular strength and fitness levels.

#### **4. Conclusions**

This study demonstrates that a 60-minute walking exercise combined with stretching is effective in improving the participants' heart and lung strength. This is evidenced by the final average result of the 60-minute walking exercise with stretching, which shows an average increase of 205.33 meters.

### Conflict of interest

The authors declare no conflict of interest.

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