

# Influence Of Physical Activity on Risk Factors of Cardiovascular Disease in Young Adults Who Work from Home During The Covid-19 Pandemic

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## ABSTRACT

In order to break the chain of the spread of Covid-19 disease, the Government has implemented a Large-Scale Social Restriction program in various regions in Indonesia, which are recorded in the Minister of Health Regulation so that the program works from Home. During WFH, a person will be more passive in doing all activities at home, causing a person to become slothful, reducing physical activity. These factors can affect the risk of chronic diseases such as cardiovascular disease. This type of research uses an experimental study of One group pre-test and post-test design for two months. This research aims to find out the influence of physical activity levels on Body Mass Index, Waist Circumference, and Blood Pressure values during Covid-19 pandemic era in young adults who work from home. Measurements were carried out in 2 measurements (pre and post-test) in the morning. Then the respondents carried out daily physical activities during Work From Home, which were recorded using Bouchard's questionnaire, followed up for two months. Clinically, it shows that respondents with good Physical Activity tend to experience a decrease in Body Mass Index, as evidenced by the results of respondents who experience a decrease (53.3%) in men and (37.5%) in women more than those who experience an increase. This result is supported by the fact that Physical Activity respondents are less likely to experience increased Body mass index (75%). The percentage decrease in Waist circumference was higher in respondents with good Physical Activity, and there was an increase in Waist circumference in respondents with less Physical Activity. The systolic and diastolic Blood Pressure percentage in male and female respondents tends to decrease and stabilize in good Physical Activity. Clinically, it was found that the tendency of good physical activity can prevent risk factors for cardiovascular disease by reducing body mass index, waist circumference, and blood pressure.

**Keywords:** physical activity, Covid-19 pandemic, cardiovascular disease

## 1. INTRODUCTION

The Coronavirus Disease pandemic or known as Covid-19, has had many impacts from various sectors in various parts of the world. This report originated from Wuhan, Hubei Province, China which then expanded to various provinces in China regarding Covid-19 cases since the end of 2019[1]. Indonesia reported the first Covid-19 case on March 2, 2020,

as many as 2 cases[2]. Transmission from human to human is The main spread of this disease and progresses very quickly. Therefore, to break the chain of transmission of the spread of the Covid-19 disease, the Government has implemented the LSSR (Large-Scale Social Restrictions) program in various regions in Indonesia listed in the Minister of Health Regulation Number 9 of 2020.

These social restrictions have forced various sectors, especially companies and educational institutions, to implement a work from a home program known as Work From Home. Physical Activity (PA) during work from home is undoubtedly different from PA when activities outside the home increase due to the many activities carried out [3]. In addition, the LSSR system has also temporarily closed various businesses, including fitness centers. According to WHO (World Health Organization), the definition of PA is a body movement produced by skeletal muscles that require energy expenditure, including activities carried out while working, playing, doing household, traveling, and doing recreational activities. provide health benefits should be done 30 minutes per day or 150 minutes per week in moderate-intensity or 75 minutes per week in heavy intensity [4,5]. Physical activity carried out regularly has a beneficial effect on health, prevents non communicable diseases (e.g. hypertension, stroke, osteoporosis, cancer, type 2 Diabetes Mellitus), improves cognitive abilities, prevents anxiety disorders, depression, and drug addiction [4,6-8] According to data taken from WHO, individuals with high levels of PA, are less likely to have a 20 - 30% risk of death than individuals video with a lower PA level[4].

During WFH, a person will be more passive in doing all the activities at home, causing a person to become slothful, reducing PA. However, this factor can affect the risk of chronic metabolic diseases such as CVD, characterized by an increase in BP, one of the most significant diseases experienced by most people [9]. This certainly affects PA in young adults who do WFH activities. Meanwhile, various pieces of literature explain that the lack of PA is closely related to an increase in Body Mass Index (BMI) and Waist Circumference (WC)[3], which is a sign

of obesity, and an increase in BP which is a sign of hypertension. This sign is one of the factors. This study aims to determine the effect of PA levels on risk factors for CVD, such as obesity and HT during the LSSR period in the Covid-19 pandemic era in young adults who work from home.

## 2. METHOD

### 2.1. Research Design and Respondents

This type of research uses an experimental study of One group pre-test and post-test design for two months. This research aims to determine how PA levels influence BMI, WC, and PA values during the LSSR period in the Covid-19 pandemic era in young adults who work from home. The determination of the respondents in this study was carried out using a purposive sampling method with a total of 50 young adult respondents who were working from home during the LSSR period in the Covid-19 pandemic era who were domiciled in Greater Jakarta (Jakarta, Bogor, Depok, Tangerang, and Bekasi). Based on WHO information, the age is said to be an adult is 20 to 60 years old. Meanwhile, the age of young adults according to WHO is the age of 15 to 25 years. So the researchers determined that the age of the respondents in this study was 21 to 25 years. Respondents were selected based on inclusion criteria with an online questionnaire using Google Forms, namely respondents who work from home, are not on a diet, sleep less than 8 hours, and have more than 8 hours of sitting time. This research has passed the ethical review of the Research Ethics Committee of the YARSI University Research Institute with letter number No: 055/KEP-UY/BIA/II/2021.

### 2.2. Procedure

Measurements were made in 2 measurements (pre and post-test) in the morning. The measurements were carried out at the

homes of each respondent, considering the LSSR period in the Covid-19 pandemic era. Therefore, researchers will visit the respondent's residences one by one while still paying attention to protocols and health standards during the Covid-19 pandemic. Then the measurements of BMI, WC, and BP pre-test values will be carried out in the first week, followed by the respondent doing daily PA during work from home, which is data in the Bouchard questionnaire, which will be followed up for two months. After that, the post-test BMI, WC, and BP values were measured to see if PA during work from home for two months, from April 2021 to the end of May 2021, affected BMI, WC, and BP values.

Physical Activity measurement using the Bouchard questionnaire method was divided into Good PA, namely, energy expended 150 minutes/week or more in moderate-intensity or 3.5-7 kcal/day and PA less, namely energy expended <150 minutes/week in moderate-intensity or 3.5 kcal/day. Measurement of BMI is carried out using the formula for the weight (BW) in Kilograms (Kg) divided by height (BH) in meters squared (m<sup>2</sup>). Bodyweight measurement uses a digital weight measurement tool, while BH is measured using a stadiometer where the measurement results in women obtained healthy BMI between 18 - 22,9 Kg/m<sup>2</sup>, while in men 18 - 24.9 Kg/m<sup>2</sup>. Measurement of WC using a tape measure by measuring the midpoint of the distance between the top of the iliac crest and the bottom of the last rib (costae 12) in a horizontal plane parallel to the umbilicus. Where it is said that the average WC in Asian women is <80 cm, while in men <95 cm. BP measurement is done by placing a cuff on the right upper arm with the arrow pointing to the brachial artery using a digital sphygmomanometer with average measurement results <120/ 80 mm Hg.

### 3. RESULTS

It is the primary data for measuring BMI, WC, and BP variables measured twice (pre and post-test) used SPSS version 24 with paired T-test statistical analysis the following results were obtained, Frequency distribution of respondent characteristics In Table 1, it is found that most of the respondents are women, as many as 28 respondents (56%), and most of the respondents aged 22 years as many as 19 respondents (38%). On the other hand, most male respondents were aged 22 years, namely as many as ten respondents (45.5%) and most female respondents aged 22 years and 23 years, namely as many as nine respondents (32.1%), as shown in Table 2.

The description of physical activity during the period of large-scale social restrictions (LSSR) in young adults who work from home is shown in table 3. It is found that most of the respondents have good physical activity, as many as 15 male respondents (68.2%) and 24 female respondents. (85.7%). The relationship of physical activity to changes in body mass index (BMI) during the large-scale social restriction (LSSR) in young adults who work from home is shown in table 4 and table 5.

Based on the results obtained in table 4, it was found that in male respondents, there were eight respondents (53.3%) with good PA and experienced a decrease in BMI. There were also three respondents (42.9%) with less PA and an increase in BMI. In respondents who did not experience changes in body mass index (BMI), there were four respondents (26.7%) who had good PA and two respondents (28.6%) who had less PA. The statistical test used the Kolmogorov-Smirnov test because it did not meet the requirements for the chi-square test. After statistical testing, the p-value of 1,000 (p > 0.05) was obtained. This value indicates no

significant meaning between the level of PA in BMI of young male adults who work from home. However, clinically the table shows that respondents with good PA tend to experience a decrease in BMI, as evidenced by the results of respondents who have decreased (53.3%) more than the increase. This result is supported by the fact that PA respondents are less likely to experience increased BMI (42.9%).

Based on the results obtained in table 5, it was found that in female respondents, there were nine respondents (37.5%) with good PA and experienced a decrease in BMI. Also found three respondents (75%) with less PA and experienced BMI. Of respondents who did not experience changes in BMI, there were nine respondents (37.5%) who had good PA and 0 respondents (0%) who had less PA. The statistical test used the Kolmogorov–Smirnov test because it did not meet the requirements for the chi-square test. After the statistical test, the p-value was 0.721 ( $p > 0.05$ ). This value shows no significant meaning between the level of PA in BMI of young adult women who work from home. However, clinically the table shows that respondents with good PA tend to experience a decrease in BMI, as evidenced by the results of respondents who experienced a decrease (37.5%). Many of which have increased. This result is supported by the fact that PA respondents are less likely to experience increased BMI (75%).

The relationship of PA to changes in waist circumference during the period of large-scale social restrictions (LSSR) in young adults who work from home is shown in tables 6 and 7. Based on the results obtained in table 6, it was found that in male respondents, there were ten respondents (66.7%) with good PA and experienced a decrease in waist circumference. There were also three respondents (42.9%) with less physical ac-

tivity and increased waist circumference. In respondents who did not experience changes in waist circumference, one respondent (6.7%) had good physical activity, and two respondents (28.6%) had less physical activity. The statistical test used the Kolmogorov–Smirnov test because it did not meet the requirements for the chi-square test. After statistical testing, the p-value was 0.493 ( $p > 0.05$ ). This value indicates no significant difference between the level of PA in young adult WC men who work from home.

However, clinically there is a higher percentage of PA reduction in respondents with good PA, and there is an increase in WC in respondents with less PA. Based on the results obtained in table 7, it was found that in female respondents, there were nine respondents (37.5%) with good PA and experienced a decrease in WC. There were also two respondents (50%) with less PA and an increase in WC. In respondents who did not experience a change in WC, nine respondents (37.5%) had good physical activity, and one respondent (25%) had less physical activity. The statistical test used the Kolmogorov–Smirnov test because it did not meet the requirements for the chi-square test. After statistical testing, the p-value of 1,000 ( $p > 0.05$ ) was obtained. This value indicates no significant difference between the level of PA in young adult WC men who work from home. However, clinically there is a higher percentage of WC reduction in respondents with good PA, and there is an increase in WC in respondents with less PA.

The relationship between physical activity and changes in systolic blood pressure during the period of large-scale social restrictions (LSSR) in young adults working from home is shown in table 8 and table 9.

Based on the results obtained in table 8, it was found that in male respondents, there were two respondents (28.6%) with less

physical activity and experienced a decrease in systolic blood pressure. There were also three respondents (20%) with good physical activity and increased systolic blood pressure. In respondents who did not experience changes in systolic blood pressure, there were eight respondents (53.3%) who had good physical activity and four respondents (57.1%) who had less physical activity. The statistical test used the Kolmogorov–Smirnov test because it did not meet the requirements for the chi-square test. After statistical testing, the p-value of 1,000 ( $p > 0.05$ ) was obtained. This value indicates no significant difference between the level of PA in the systolic BP of young adults working from home. However, clinically there is a higher percentage of decrease in systolic BP in respondents with good PA.

Based on the results obtained in table 9, it was found that in female respondents, there was one respondent (25%) with less physical activity and experienced a decrease in systolic blood pressure. There were also four respondents (16.7%) with good physical activity and increased systolic blood pressure. In respondents who did not experience changes in systolic blood pressure, 15 respondents (62.5%) had good physical activity, and three respondents (75%) had less physical activity. The statistical test used the Kolmogorov–Smirnov test because it did not meet the requirements for the chi-square test. After statistical testing, the p-value of 1,000 ( $p > 0.05$ ) was obtained. This value indicates no significant relationship between the level of PA in the systolic BP of young adult women who work from home. However, clinically there is a higher percentage of stable or stable systolic BP in respondents with good PA. The relationship of PA to changes in diastolic blood pressure during large-scale social restrictions (LSSR) in young adults who work from home is shown in Table 10 and Table

11. Based on the results obtained in table 10, it was found that in male respondents, there were seven respondents (46.7%) with good PA and experienced a decrease in diastolic blood pressure. There were no respondents with less PA and decreased diastolic blood pressure. In respondents who did not experience changes in diastolic blood pressure, six respondents (40%) had good PA, and five respondents (71.4%) had less PA.

The statistical test used the Kolmogorov–Smirnov test because it did not meet the requirements for the chi-square test. After statistical testing, the p-value was 0.998 ( $p > 0.05$ ). This value indicates no significant relationship between PA and diastolic BP in young adult males who work from home. However, clinically, respondents with good PA tend to experience decreased diastolic blood pressure than those with less PA.

Based on the results obtained in Table 11, it was found that there were two respondents (50%) with less PA and an increase in diastolic blood pressure in female respondents. Moreover, obtained eight respondents (33.3%) with good PA experienced a decrease in diastolic BP. In respondents who did not experience changes in diastolic blood pressure, 11 respondents (45.8%) had good physical activity, and one respondent (25%) had less physical activity. The statistical test used the Kolmogorov–Smirnov test because it did not meet the requirements for the chi-square test. After statistical testing, the p-value of 1,000 ( $p > 0.05$ ) was obtained. This value shows no significant difference between PA and diastolic BP in Young Adult Women who work from home. However, clinically, respondents with good PA tend to experience decreased diastolic blood pressure than those with less PA.

#### 4. DISCUSSION

There was a non-significant result between the level of PA in BMI in young women work-

ing from home ( $P=0.72$ ) and in young men ( $P=1.00$ ), but clinically there was a higher percentage of BMI reduction. In respondents with good PA, This is in line with Ekelund's study, which showed no relationship between PA and increased BMI. According to Ekelund, PA is not the main factor influencing changes in body weight, but good PA is consistently more influential on preventing chronic diseases, especially cardiovascular disease [11] Ruegsegger, in his journal, said that lack of PA can have effects such as visceral obesity, hypertension, dyslipidemia, chronic proinflammatory, hyperglycemia, and obesity. Insulin resistance is a risk factor for chronic diseases such as T2DM, CVD, and others [7]. Individuals with obesity have a higher risk of death[8].

According to Xiaochen et al., an increase in PA has more effect on decreasing the incidence of cardiovascular disease compared to changes in body weight status. PA affects several other metabolic factors such as increased insulin sensitivity, decreased blood pressure, improved blood fat levels, body fat mass, and waist circumference, the most common risk factors for cardiovascular disease. The eight studies they found proved that individuals with BMI value  $25 \text{ kg/m}^2$ , but high levels of PA had a lower risk of developing CVD than individuals with normal BMI but low levels of PA[10].

In contrast to Sahbanathul's research, which states a significant relationship between PA and changes in body mass index (BMI), especially during the COVID-19 pandemic. , and more do not do any physical activity that affects the increase in BMI[13]. There was a non-significant result between the level of PA in young adult WC women who worked from home ( $p=0.493$ ) and in young adult men ( $P=1.00$ ). However, clinically, a higher percentage of WC reduction in respondents with PA is good, and there is an increase in

WC in respondents with less PA. This result is in line with research by Chastin, which states that every treatment, both physical activity, and passive activity, can affect health directly or indirectly. These treatments can vary for each individual because there are differences in the composition of each treatment that affects health.18 A research journal by Dyck stated that physical activity treatment with the effect obtained was not in line. This statement was the results of his research which showed that adults who did a moderate-to-heavy physical activity regularly with a duration of 150 minutes/week reduced the risk factors for coronary heart disease by as much as 12%, with a duration of 300 minutes/week can reduce 20% of risk factors for coronary heart disease. However, a higher increase in physical activity does not have any effect [19].

In addition, this is in line with the perspective evidence by Cardenas showing that PA has a positive impact on decreasing WC scores, especially in individuals under 60 years of age [3]. In a study conducted by Ladaum et al., measurement of WC occurs in younger women and men [17]. This study supports the statement made by Ladaum et al., who demonstrated clinical that PA can prevent abdominal obesity, especially in young adults.

Prevention of transmission of the Covid-19 pandemic with the WFH system makes people tend to stay at home for long periods to cause additional stress and disrupt people's mental health [14]. Stress is one of the critical risk factors that can cause an increase in essential BP [15]. Based on the results of this study. There was a decrease in both systolic and diastolic BP in male and female respondents with PA clinically. However, statistically, there was no significant difference between the levels of PA and BP ( $p>0.05$ ). These results align with Hedge's opinion in

his journal, stating that PA is one of the critical components of a lifestyle that can play a role in primary prevention and even management of HT[16]. Physical activity can either lower BP or prevent HT, where HT is one of the occurrences of left heart enlargement (LVH), which results in heart failure. This shows that PA can prevent the occurrence of CVD risk factors.

#### Limitation

In this study, there were many shortcomings due to the limitations of the researcher who played a role in the insignificant results. The number of respondents tends to be small due to time and cost reasons. In addition, in this study, there were several things that the researcher could not control, such as individual variations, and the respondent's calorie intake as well as the duration and hours of sleep of the respondents that might affect the results on the variables. The pandemic situation that limits social activities has resulted in researchers not following up on respondents directly.

#### 5. CONCLUSION

A low level of PA is a significant risk factor for CVD because PA is closely related to BMI, WC, and BP, which are risk factors for CVD. The current Covid-19 pandemic is quite disturbing to the public due to the fast transmission. In order to prevent the transmission of Covid-19, the Government has imposed LSSR, which makes people work from home. This makes the lack of PA in the community. This study showed no significant relationship between PA and risk factors for CVD, such as obesity and BP, which were seen from the statistical increase or decrease in BMI, WC, and BP values. However, clinically, good PA can prevent CVD risk factors by reducing BMI, WC, and BP.

Further research is needed to identify other factors such as sleep duration, calorie intake, hormones, and other things that may play a role and influence PA so that the relationship between PA and CVD risk factors can be seen in depth and optimally.

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