The Physical Fitness Measurement Tests During the Covid-19 Pandemic

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***Abstract*—This study aims to analyze the various physical fitness measurement tests that exist in order to determine the effective and efficient physical fitness measurement tests to assess the physical fitness during the COVID-19 pandemic. This research is a literature study. The data obtained was compiled and analyzed to obtain conclusions. The results showed that VO2max is an indicator of physical fitness that can be measured using three variables, namely age, weight, and heart rate. These three variables significantly (p = 0,000) can predict VO2max as a measure of one's physical fitness. The conclusion of this study is that the effective and efficient physical fitness tests which can be carried out independently during the Covid-19 pandemic is using the formula VO2 max = 3,542+ (-0,014 x Age {Year}) + (0.015 x Body Mass [kg]) + (- 0.011x Resting Heart Rate/Sec).**

Keywords: Physical Fitness, Measurement Tests, Covid-19

I. INTRODUCTION

Physical fitness is important for everyone in carrying out their daily lives, even for the life of the nation and state. Good physical fitness is the main foundation for enhancing the character and nation building of a nation. People who have good physical fitness will be able to carry out daily activities longer than people who have low physical fitness.

Physical fitness is an important aspect that a human needs to carry out their daily activities. Physical fitness can be obtained by getting used to a healthy lifestyle, for example, by doing regular physical activity. Fitness is important in order not to experience excessive fatigue when doing physical activities or daily work. Physical fitness is a physical ability in which the functions of the organs can adapt to certain physical tasks and / or to environmental conditions that must be handled in an efficient manner, without excessive fatigue and has fully recovered before the same task arrives the next day (Rachman & Nasution, 2017; Giriwijoyo and Zafar, 2012).

Fitness can be measured using various forms of physical fitness tests, including measuring the volume of oxygen consumed when exercising at maximum capacity. Maximum Oxygen Consumption (VO2max) is the maximum amount of oxygen in milliliters that can be used in one minute per kilogram of body weight. Those who are fit have higher VO2max values and can exercise more intensely than those who are not well conditioned. A number of studies have shown that VO2 max can be increased by exercising at an intensity that increases the heart rate up to 65% -85% of the maximum, minimum duration 20 minutes, frequency 3-5 times a week (French & Long, 2012). The average VO2max value for male athletes is about 3.5 liters / minute, and for female athletes, about 2.7 liters / minute. There are several ways to find out VO2Max capacity, including: a. 2.4 km test run; b. Astrand 6 minute cycle test; c. Balke VO2Max test; d. Cooper Vo2 Max test; e. Rockport test; f. Multistage fitness test and so on.

During the Covid-19 pandemic that almost all countries in the world have experienced, it becomes important for everyone to maintain and improve physical fitness. With a healthy and fit body, we can boost our immune system, so we can minimize our exposure to Covid-19. Coronavirus is a group of viruses from the Orthocronavirinae subfamily in the Coronaviridae family and the order Nidovirales. This group of viruses can cause disease in birds and mammals, including humans. In humans, the coronavirus causes generally mild respiratory infections, such as the common cold, although some forms of the disease include; SARS, MERS, and COVID-19 are more deadly in nature (Yunus et al., 2020). Corona virus disease 2019 (corona virus disease / COVID-19) is a new name given by the World Health Organization (WHO) for patients with the 2019 corona virus infection which was first reported from the city of Wuhan, China at the end of 2019. The spread occurs rapidly and makes new pandemic threats (Diah Handayani, Dwi Rendra Hadi, Fathiyah Isbaniah, Erlina Burhan, 2020). The ongoing Covid-19 pandemic has made everyone alert when they have to interact with other people. This is because transmission occurs mainly through droplets and contact with the virus, then the virus can enter the open mucosa. An analysis tries to measure the rate of transmission based on the incubation period, symptoms and duration between symptoms and isolated patients (Diah Handayani, Dwi Rendra Hadi, Fathiyah Isbaniah, Erlina Burhan, 2020).

The Covid-19 outbreak makes everyone keep their distance from other people (Social Distancing). The government suggested Social

Distancing in order to anticipate the spread of Covid-19. It makes the measurement physical fitness difficult to carry out in this pandemic. Therefore, researchers conducted a literature study on physical fitness tests that are safe to use during the Covid-19 pandemic as is happening today.

II. METHODS

The method used in this research is literature study. The research starts with the problem identification, literacy studies, data analysis, building alternative problem solutions, and conclusions. The scientific journals and articles used in this study are national and international journals.

International journals used include the journal by Todd A. Astorino, Robert A. Robergs, Farzaneh Ghiasvand, Derek Marks, And Steve Burns published by the Journal of The American Society of Exercise Physiologists (ASEP) Vol. 3 No. 4. Journal by Agron M. Rexhepi and Behlul Brestovci published by the journal Human Movement Vol. 15, No. 1. Journal by Agron M. Rexhepi and Behlul Brestovci published by the journal Human Movement Vol. 13, No. 4. Journal by Nicholas M. Beltz, 1 Ann L. Gibson, Jeffrey M. Janot, Len Kravitz, Christine M. Mermier, and Lance C. Dalleck published by Hindawi Journal of Sports Medicine.

Physical fitness during the Covid-19 pandemic can be measured by VO2 Max, using the formula VO2max = 3.542 + (-0.014 x Age [Years]) + (0.015 x Mass [kg]) + (-0.011 x Resting Heart Rate). The formula is very easy to use, automatic, users only need to enter data, the results will automatically come out. This formula can be accessed via the following link https://www.brianmac.co.uk/vo2max.htm#ref or Rexhepi, A. M. et al. (2014) Prediction of VO2Max Based on Age, Body Mass, and Resting Heart Rate. Journal of Human Movement. 15 (1), p. 56-59.

III. RESULTS AND DISCUSSION

At this time, people realize the importance if doing sports activities because by exercising their physical and spiritual health can be maintained and improved. Physical Fitness can be regarded as Physiological fitness.

Physiologically, physical functional abilities consist of anaerobic abilities and aerobic abilities. Anaerobic ability consists of the anaerobic ability of alactacids and the anaerobic ability of lactacids. People with good physical fitness will be able to appear more dynamic / enthusiastic and create more productivity. In addition, physical fitness is one of the most important factors for every human being in his daily life in order to carry out his duties and activities properly.

At this time, the community have been realizing the benefits of physical fitness. It is proven by the development of fitness centers and sports activities that are widely held. This originates from the search for physical fitness. Physical fitness is relative (related), both anatomically and physiologically, meaning that a person is fit or not always associated with physical tasks that must be performed (Giriwijoyo & Sidik, 2010; Darmawan, 2006; Faqih & Hartati, 2017; Purba, Widowati, & Daya, 2020).

Aerobic endurance is an important component of sports performance, which can be measured by VO2max. Aerobic endurance is the ability of the body's respiratory system to continue prolonged physical activity and resist fatigue. Aerobic endurance can be estimated by measuring the volume of oxygen, cardiorespiratory or cardiovascular endurance, also known as aerobic capacity, which means cardiovascular and respiratory abilities. A system is important to supply fuel and oxygen to the muscles of the body as needed. Aerobic capacity is also used as an important tool or indicator to assess health and fitness.

Aerobic ability can be estimated by the volume of oxygen a person can consume while exercising at maximum capacity (VO2max), which is the maximum oxygen uptake or consumption. The maximum amount of oxygen that can be obtained and used in one minute can also be used as one of the parameters that can measure a person's aerobic capacity (Rexhepi & Brestovci, 2012).

There are many criteria that can be used to determine VO2max, including: a. 2.4 km test run; b. Astrand 6 minute cycle test; c. Balke VO2Max test; d. Cooper VO2 Max test; e. Rockport test; f. Multistage fitness test and so on.

Some were founded with technology that is no longer used today. The Douglas bag and Tissot gasometer have been replaced by a sophisticated metabolic analysis system and a tach and turbine pneumonia measurement device. Furthermore, VO2max is developed using specific models such as ities (treadmill versus cycle) in a relatively small sample in a homogeneous population. Graded Exercise Testing (GXT) is the most widely used assessment for testing the dynamic relationship between exercise and the integrated physiological system. The information from the GXT is applicable across the spectrum of sports performance, safety screening work, research and clinical diagnostics. The suitability of GXT for determining valid maximal oxygen consumption (VO2max) has been investigated for decades (Beltz et al., 2016). However, this test uses a tool that is expensive. Therefore not everyone can use it. Aerobic endurance (VO2max) is an important component and indicator of exercise performance. Direct or indirect VO2max measurements require expensive equipment, take time, and many test takers are motivated to find easier ways to predict VO max.

The results of this study indicated that the newly formulated regression equation, based on non-exercise variables of age, body mass, and resting heart

rate, can significantly predict aerobic endurance (VO2max prediction) (Rexhepi & Brestovci, 2014). The current situation of Covid-19 pandemic makes it impossible to carry out activities involving many people. Therefore, measuring VO2max using exercise variables (maximal or submaximal test) cannot be carried out. However, we can use the non-exercise variable to predict the estimated value of VO2max as a measure of physical fitness.

IV. CONCLUSION

During the Covid-19 pandemic, one can predict aerobic endurance which can significantly determine the level of physical fitness, that is by using non-exercise variables. Those variables consist of age, body mass, and resting heart rate

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