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PHYSICAL EXERCISE TO IMPROVE IMMUNITY DURING THE PANDEMIC COVID-19

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ABSTRACT

Maintaining body immunity throughout the COVID-19 pandemic is one of the efforts to protect the body in opposition to disease. Adequate physical exercise is very necessary to prevent the body from attacking disease. This literature review objectives to determine the advantages of physical exercise to expand body immunity for the duration of the COVID-19 pandemic. This study uses a literature review. Literature searches were collected using online database such as Science Direct, Springer Link, Wiley online Library, SAGE publication, NCBI and Google Scholar so that 12 articles were used in this literature review that published from 2019-2021. These articles are then analyzed by narrative literature review. Studies exhibit that moderate physical exercise can enhance body immunity and respiratory function. Moderate types of physical exercise such as aerobics can increasing the immunity by using the increasing the degree and function of T-lymphocytes, immunoglobulins, mainly Ig A and Ig G, regulating C-reactive protein levels to prevent limit lung feature and extend the vital capacity of the lungs. Regular physical workout of moderate intensity has been proven to extensively affect the immune system and reduce the threat of infection disease.

Keywords: covid-19; immunity; physical exercise

INTRODUCTION

Pandemic COVID-19 has spread throughout the world and is the cause of health problems and global threats (Xiang & Zhang, 2020; Yuksel & Ozgor, 2020). COVID-19 has spread and affects all sides of people's lives in the world and is considered a major health threat and danger to the global economy (Buzzi et al., 2020; Corbett et al., 2020). COVID-19 attacks the human body by damaging the respiratory system and attacking the immune system which can worsen physical conditions which eventually lead to systemic failure which can lead to death (Mousavizadeh & Ghasemi, 2020).

Increasing the immunity during the current pandemic is very important as an effort to defend the body against a desease. One of the efforts to be able to maintain and increase immunity is by doing physical exercise according to the recommendations. Physical exercise is a subcomponent of physical activity carried out with the aim improving physical fitness (Kahl & D.Cook, 2013). Physical exercise that can be done includes moderate to high intensity. Research shows that scheduled physical exercise throughout adolescence consists of over into adulthood (CDC, 2012). Adolescence is a time when a person is in good health. Health in adolescence is an important aspect of a person life cycle. Adolescence is a period to form lifelong health habits including the habit of doing regular physical exercise (Nies & McEwen, 2019).

Adequate physical exercise at some stage in adolescence is very essential to maintain health. In addition, applying physical exercise during adolescence will be useful for maintaining physical fitness, bone development and prevention of excess adiposity, because adolescence is an important development period for the body's skeleton and adipose tissue (Kahl & D.Cook, 2013). Physical exercise can increase blood flow, improve cerebrovascular health and provide benefits on glucose and fat metabolism that carry vitamins to the brain (Mandolesi et al., 2017). In fact, study results show that physical exercise improves cognitive feature in young and old adults, improves memory skills, and the efficiency of attention processes (Chieffi et al., 2017; Fernandes et al., 2017). Therefore, physical exercise from adolescence to adulthood is very necessary to do.

Physical exercise interventions during a pandemic have been proven to have a positive impact and reduce symptoms of stress, depression, anxiety, frustration, boredom and other mental health disorders. Physical exercise is a key factor in helping individuals to be more resilient to the pandemic period both mentally and physically (Amatriain-Fernández et al., 2020). COVID-19 is an infection that can heal itself, where the host's immune system plays an necessary position in battle the virus (Cascella et al., 2020). Increased capability in physical exercise can have a direct effect on the activity of the immune system in the body. Studies have proven that physical exercise significantly improves immune system function (Mohamed & Alawna, 2020). Based on the explanation above, the writing of this article is expected to describe the significance of physical exercise as an effort to increase body immunity for the duration of pandemic COVID-19.

METHOD

This study uses a literature review method through an online database. The online database used are Science Direct, Springer Link, Wiley online library, SAGE publication, NCBI and Google Shcoolar. The keywords used in the search for the article were "Physical Exercise" AND "Immunity" AND "COVID-19". The filter used is the type of research article published from 2019-2021. Based on the keywords entered into each online database, 1,070 articles were obtained. The first step is to read the title and abstract at a glance and then select 128 articles according to the topic. The next step was to read the full text screen and found 41 suitable articles. The final step is screening according to the inclusion criteria. The inclusion criteria used were articles that explained the advantages of physical exercise which have an effect on increasing immunity and COVID-19 infection. The final results obtained 12 articles. These articles are then analyzed by narrative literature review.

RESULTS AND DISCUSSION

Physical exercise is one of the essential aspect of a healthy life. Doing good physical exercise can significantly change the immune system. Studies show that the modulation of the immune response associated with physical exercise depends on the frequency, intensity, period and kind of exercise applied (Laddu et al., 2021). Moderate intensity physical exercise can stimulate cellular immunity, but prolonged or high-intensity physical exercise without rest can trigger a decrease in cellular immunity (da Silveira et al., 2021). Studies conducted by (Jesus, Vanhee, Deramaudt, & Bonay, 2021) explain the same thing that physical exercise if done excessively is associated with an increased risk of disease associated with immune dysfunction. Studies that have been carried out on athletes during the post-race period have seen increased susceptibility

associated with immunoglobulin A output, reduced natural killer cell activity and decreased T and B cell function (Jesus, Vanhee, Deramaudt, & Bonay, 2021). According to Nieman (2020), it also explains that physical exercise that makes fatigue both when infected with a virus such as influenza or COVID-19 can trigger disease severity, because it can cause modification in the immune system in the body where the production of anti-inflammatory cytokines that function to reduce damage tissue, when in strenuous activity can reach the level of immunosuppression, so that it can exacerbate the infection that occurs (Nieman, 2020). Therefore, the recommended physical exercise based on the study is moderate intensity physical exercise.

Moderate physical exercise is able to support the human immune monitoring function against pathogens, because it stimulates the change of white blood cells between the circulatory system and tissues. In addition, it is able to promote protection against infections triggered by intracellular microorganisms (da Silveira et al., 2021). Regular physical exercise can protect against bacterial and viral infections and increase the immune response to pathogens and vaccines (Scheffer & Latini, 2020). This means that physical exercise is one of the prevention of infectious diseases such as COVID-19 and non-communicable diseases such as obesity. Another study also found that regular physical exercise with moderate intensity can reduce respiratory infections in contrast to sedentary behavior (da Silveira et al., 2021). In addition, regular physical exercise (rPE) performed at moderate intensity can also stimulate cellular and humoral immunity, thereby significantly limiting the hazard of infection (Furtado et al., 2021).

Moderate intensity physical exercise such as aerobic has been proven to extend immunity. A study conducted by Mohamed & Alawna (2020) states that physical exercise in the shape of aerobic has an effect on immunity. Aerobic physical exercise can increase the body's immunity by increasing the stage and characteristic of T-lymphocytes, neutrophils, macrophages, and monocytes, which are important elements in the body's protection towards infection, increasing levels of immunoglobulins, especially IgA and IgG, which play a crucial function in fighting lung infections. In addition, through regulation of C-reactive protein levels, through short-term small increases to fight long-term lung viruses, decrease in C-reactive protein to prevent decreased lung function properly trough reducing anxiety and depression to increase immunity by rebalancing the relationship T-helper 1 or T-helper 2 (Mohamed & Alawna, 2020).

A study conducted by Mohamed & Alawna (2020) stated that increasing aerobic capacity has been proven to significantly reduce risk factors for COVID-19 because in general aerobic exercise can prevent and reduce the severity of diseases caused by lung disorders (pneumonia, ARDS, and symptoms such as pneumonia, cough and shortness of breath). Respiratory signs and symptoms dominate the medical manifestations of COVID-19 and some patients show cardiovascular damage (Huang et al., 2020). COVID-19 commonly impact the respiratory system which causes sufferers to develop pneumonia and acute respiratory distress syndrome (ARDS). These manifestations are caused by the ability of the virus to exit the immune system.

Mohamed & Alawna (2020) stated that the impact of increasing aerobic capability on enhancing lung feature and preventing lung injury through four mechanisms. First, increasing aerobic capability as a prophylactic of antibiotics and antimycotics to increase lung and body immunity. Second, it increase aerobic capacity in restoring the elasticity of normal lung tissue and

increasing the power and persistence of the respiratory muscles, which helps improve ventilation, and decrease lung damage. Third, increased aerobic capabilityty as an antioxidant to restriction the production of free radicals and oxidative damage. Fourth, consists of the function of increasing aerobic capacity to reduce cough and clear the respiratory tract, through these two things so as to increase lung immunity. Therefore, doing aerobic physical exercise can improve immune and respiratory function which will help fight COVID-19.

Other physical exercises such as yoga have also been shown to improve health and respiratory immunity, both of which are involved in preventing COVID-19 (Pal, 2020). Yoga is an ancient art related to strengthening the body and calming the mind (Pande, Tendolkar, Suraj, & Anjankar, 2020). Another study also explains that practicing yoga with a duration of at least once a day for four weeks can increase immunity (Tanwar & Rajan, 2020). Scientific research that has been carried out on the effectiveness of yoga practice shows that yoga practice (in the form of Asana, Pranayama, Kriya, Mudra, and Bandha) can improve breathing ability, muscle strength associated with the respiratory organs, and can increase the immune power needed to fight COVID- 19 (Roy & Mukhopadhyay, 2020). It should be noted that yoga practice is not an alternative to medicine, but rather leads to the prevention of a disease.

Physical exercise can strengthen the body's organs, thus providing protection from disease. Moreover, if physical exercise is carried out regularly, it perfoms an essential function in protecting the body from external antigens by improving immune function (Jee, 2020). The immunity of the human physique is a very complex network of cells and molecules designed to protect the host from infection and disease (Ranasinghe, Ozemek, & Arena, 2020). Physical exercise during a pandemic is very necessary in increasing the body's immunity. Moderate intensity physical exercise is accountable for offering increased anti-pathogenic undertaking of macrophages, along with increasing circulation of immune cells, immunoglobulins and anti-inflammatory cytokines, thereby reducing the risk of lung damage resulting from the entry of inflammatory cells (da Silveira et al., 2021).

Physical exercise efforts have a heterogeneous effect, which means that on the one hand it’s farassumed that moderate intensity physical exercise can stimulate the formation and extend of body immunity. However, high-intensity physical exercise can weaken an individual's immunity (Kostrzewa-Nowak et al., 2020). Physical exercise that can increase body immunity depends on the interaction of intensity, duration, and frequency of exercise performed (Simpson et al., 2020). Therefore, through regular physical exercise and moderate intensity is one of the most essential factors that can increase the immune system.

Practicing physical exercise during a pandemic is an important strategy to minimize the threat of COVID-19 infection. The strategy included in implementing compliance with health protocols such as wearing masks, maintaining distance and washing hands as well as actions that lead to a healthy lifestyle by minimizing stress factors and strengthening the immune system such as by doing regular physical exercise. In particular, aerobic exercise will increase the anti-pathogenic exercise of tissue macrophages in parallel with increased recirculating immunoglobulins, anti-inflammatory cytokines, neutrophils, immature B cells and the entry of natural killer (NK) cells, CD8 + T cells (Campbell & Turner, 2018). A similar mechanism of immune system modification

that appear all through moderate intensity physical exercise (Ranasinghe, Ozemek, & Arena, 2020).

Recommendations for physical exercise that can be done during a pandemic must pay attention to frequency, intensity, type and duration. Physical exercise that is recommended not to over do it, besides high intensity physical exercise is also not recommended because it can interfere with health conditions (Fauzi et al., 2020). Based on the study of Hoseini (2020) states that the frequency of physical exercise is generally recommended 3 days per week for beginners and 3-5 days per week for athletes in quarantine situations. The recommended intensity is moderate intensity. Exercise intensity was determined by evaluating blood lactate levels, VO2max, and HRmax. Medium intensity with lactate levels around 4 mmol/L, VO2max: 50-70%, and HRmax: 80x / minute (Hoseini, 2020). The type of physical exercise must be adapted to the environmental situation, the most necessary aspect is that both physical exercise that is done at home or around the house, or outside the home environment must meet what the body needs. Before doing physical exercise it is beneficial to do some warm-up, and likewise after physical exercise it is recommended to do relaxation. It is also important to continue to be hydrated by using drinking water 30 minutes before physical exercise and immediately after physical exercise to keep the body hydrated (Fauzi et al., 2020). If physical exercise is carried out outside the home environment it must be ensured that the health condition is in good condition and it is recommended to always maintain physical distance.

The human body basically needs two types of exercise, namely aerobic and anaerobic exercises. Aerobic exercise to maintain or improve cardiovascular ability and anaerobic exercise to maintain muscle and bone strength (Fauzi et al., 2020). Both types of physical exercise can be done at home through a series of simple exercises. Physical exercises that can be done at home or around the house that function to strengthen leg muscles, improve coordination, and improve the cardiovascular system include climbing stairs, jumping jacks, jumping rope, high knees, and push up (Fauzi et al., 2020). Exercise up and down stairs carried out for 10 minutes with rest for 2-3 minutes and repeated 3 times. The jumping jacks exercise can be done for 20x / set, repeated 3-5 times according to ability, with a rest period of 2 minutes. Jump rope is done using a distance of 3-4 meters according to one's height, done for 30-60 seconds / set or according to ability, and can be repeated up to 3-5 sets with a 2 minute rest break between each set. High knee is performed for 15-30 seconds / set with a rest period of 2 minutes, can be repeated 3-4 times. The last thing is that push up are done 15-20 times / set and can be repeated 4-5 times (Fauzi et al., 2020).

Physical exercises that can be done outside the home environment include for beginners by doing physical exercises such as walking (90-100 steps/minute), cycling (12-14 km/hour) with a duration of 20-35 minutes. Meanwhile, for individuals who are used to physical exercise, it is recommended to do physical exercise such as walking (> 120 steps / minute), cycling (15-18 km/hour), jogging or running (at least HR 40 times or more when resting) with duration of 35-60 minutes (Aktug & Demir, 2020). Physical exercise that is carried out outside the home environment throughout the pandemic COVID-19 should still apply health protocols as an effort to prevent the threat of infection that causes disease.

CONCLUSION

Physical exercise that can be done to increase immunity depends on the frequency, intensity, type and duration. Regular physical exercise of moderate intensity has been proven to significantly affect the immune system and restriction the threat of infection and disease. Types of physical exercise that have been shown to significantly increase immunity include moderate intensity physical exercise, both aerobic and anaerobic.

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