



Literature Review: Exercise for Patients with Type 2 Diabetes Mellitus Era Society 5.0

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Abstract

Diabetes mellitus is one of the comorbid factors for respiratory infections due to Era Society 5.0. High blood sugar levels cause disturbances in the immune system, thereby exacerbating the infection. This study aims to discuss safe exercise for people with type 2 diabetes mellitus. This research is a type of literature study. The data collected was compiled using the literature study method. The approach used is analytic observational. Search articles using the base science, Elsevier, proquest, ol, and google scholarsite with the keywords sports, diabetes mellitus, and Era Society 5.0. The results in this study are the recommended exercise for people with diabetes mellitus is light to moderate intensity exercise. It is necessary to consult with a doctor first regarding exercise options. Exercise at home is more recommended. As much as possible, physical activity should still be done by people with diabetes mellitus to stabilize blood sugar levels and improve the immune system. The conclusion of this study is that exercise in people with diabetes mellitus is very necessary during a pandemic. The exercise carried out must still comply with health protocols and in accordance with the conditions of each individual's body.

Keywords: sport, diabetes, era society 5.0

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INTRODUCTION

Society 5.0 or can interpreted *society 5.0* is a concept introduced by the government Japan. Draft *society 5.0* does not only limited for factor manufacture but also solving problem social with help integration room physical and virtual (Skobelev&Borovik, 2017). *Society 5.0* is a concept developed for the sake of its formation Super smart communities that have pattern behavior optimizing utilization *Internet Of things*, *Big Data*, and *Artificial Intelligence* as

solution for life more society good (Setiawan & Lenawati, 2020). In the era of *society 5.0* society faced with enabling technology access in felt virtual space like room physical. In technology *society 5.0* AI based on big data and robots for To do or support profession man (Nastiti & Ni'mal'Abdu, 2020). Society 5.0 aims for create human centered society in which development economics and settlement challenge Public achieved, and people can enjoy quality full high life active and comfortable (Handayani & Muliastri, 2020). *Society 5.0* will impact on all aspect life start from education, urban planning, transportation, agriculture, industry and health. circumstances this especially on health relate with function immune disturbed body so that cause Diabetes Mellitus sufferers more susceptible caught disease infection (Alisa, Amelia, Literature, & Depitasari, 2020).

In control power stand body diabetes mellitus patients, blood sugar levels is factor main determinant. High sugar content cause happening system disturbance immune body systemic so that body will more susceptible caught infection. Exercise is highly recommended for sufferer diabetes mellitus because could guard blood sugar levels body. Patient with more diabetes mellitus susceptible caught viral infection should more be careful in guard self from risk infection (Chodijah, Nugroho, & Pandelaki, 2013). Research by Chodijah et al (2015) shows exists comparable relationship backwards Among blood sugar levels and counts leukocytes. Other research shows that in the United States, more of 20 million soul suffers from diabetes mellitus and is accompanied by with sepsis. In developing countries, awareness will infection still very lacking and for reasons that disease infection still is reason main necessary disease take care stay (Chodijah et al., 2013).

one fatal complications of diabetes mellitus are infection systemic heavy or sepsis. In sepsis, toxins produced by pathogens spread through blood and in diabetes mellitus system disturbance immune cause response inflammation in the body disturbed cells should be inflammation localized to location inflammation will disturbed function so that resulted the more increasing sepsis mortality in patients with diabetes mellitus (Chodijah et al., 2013). Based on Thing this then one management of diabetes mellitus is with lower blood sugar levels.

Though with To do sport have many benefits, but in the era of *society 5.0* a lot role health and workers with digital technology has change globalization system and happened substitution profession from man to a robot that has challenge change *skills*, change type work and character profession as well as change pattern life society, besides that there is challenge power work

from increasingly outside open broad. So that challenge transformation Public (*society transformation*) for increase competencies and *skills* in order to be able to compete and stay exist . Through Society 5.0, intelligence artificial intelligence will transform the collected big data via the internet on everything field life (the Internet of Things) to be something wisdom new , which will dedicated for increase ability man open opportunities for humanity(Son, 2019) . because it , government has Secrete a number related policies with regulation safe exercise for society , especially those who have factor comorbid form of diabetes mellitus . Sport must conducted with right intensity for reduce impact negative consequence excessive exercise (Setyaningrum, 2020) . Policy about protap safe exercise in the challenges of the era *of society* 5.0 are still find problem . Among other things obedience less society caused error perception , also some point policy still becomes debate . As example related with current use of masks exercising . WHO itself no recommend use of face masks exercising because of the mask that became wet and damp During exercising can push growth microorganisms opportunist (Setyaningrum, 2020) . Based on background back above then on the article this will discussed about safe sport for people with diabetes mellitus type 2.

METHODS

Study this is type study studies literature . Collected data arranged with method studies library . The approach used is observational analytics . technique performed is with data base science, Elsevier, proquest, ol , and google scholar. Featured article is articles compiled by researchers who are domiciled in Indonesia from facet policy government and circumstances environment more in accordance with what happened in the field . Compiled articles with background behind abroad used as comparison and reference. Besides it is also discussed to a number of protap, decision minister health and regulation government. With thus, through article this could clarify point clear on the issues presented .

RESULTS AND DISCUSSION

Diabetes mellitus is something disturbance metabolism caused by insulin action that is not adequate . this Caused by Langerhans beta cells in the pancreas lost ability insulin production or network body no could process insulin. Whatever The reason is an increase blood sugar levels in the body cause people with diabetes mellitus more susceptible caught disease infection (Alisa et

al., 2020) . circumstances this relate with function impaired phagocytes so that occur accumulation cell site inflammation inflammation . Research by Chodijah et al (2015) shows exists comparable relationship backwards Among blood sugar levels and amounts leukocytes (Chodijah et al., 2013) . Inside the challenges of this era of *society* 5.0 , circumstances this cause diabetes mellitus be one factor comorbid viral infection .

There is disturbances in *innate immunity* caused disturbance phagocytosis by cells immune body cause occur enhancement number Dead disease infection in patients with diabetes mellitus . In Guan et al's study (2020), 7% of patient with metabolism caused by insulin action that is not adequate and well factor descendants have comorbid form of diabetes mellitus type 2. Other studies have shown patients who have factor heredity and activity low physique because follow technology work in the era of *society* 5.0 with diabetes mellitus have prevalence reach double compared to those who don't (Simanjuntak, Simamora, & Sinaga, 2020) .

Not only that , patients who have factor hereditary diabetes and also activity low physique because follow technology work in the era of *society* 5.0 with predisposed diabetes will get care in the ICU with ventilation mechanical consequence response severe inflammation. one destination therapy patient the with diabetes is for lower blood sugar levels for prevent happening storm cytokines (release pro- inflammatory cytokines that do not controlled) that can cause the damage endothelium and epithelium lungs as well as ARDS which is reason main Dead patient have factor heredity and activity low physique because follow technology work in the era of *society* 5.0 (Parapasan & Artasya, 2019) .

this raises dilemma about may / may not patient with diabetes mellitus to do sport . With the entry of the era of *society* 5.0 in particular in the world of work , pattern activity greatly reduced physically drastic because various related policies with very limited time due to excessive working hours . Occur decline pattern habits and frequency sports that can performed by patients with diabetes mellitus . Usual facilities and infrastructure Becomes choice like House fitness the more restricted for obey policy government. This is very influential on motivation somebody in exercising (Ashadi, Andriana, & Pramono, 2020) .

Lack of exercise causes happened decline fitness physique as well as enhancement weight during routine work in the era of *society* 5.0. Society is forced apply pattern life sedentary with inactivity actual physique is factor risk contributing global mortality to 5.5% of deaths in the world (Tiskandi, Sylviana, Cahyadi, & Undarsa, 2020) . one method recommended by the

Association Indonesian Endocrinology (2020) for prevention symptom beginning at first because factor work in the era of *society* 5.0 and also there factor descendants or familial genes in patients with diabetes mellitus is with enough exercise (Soelistijo et al., 2019). Sport lower blood sugar levels in patients hyperglycemia mellitus up to 37%. Sport Routine is also related with enhancement sensitivity network body insulin resistance and function metabolism body (Blood et al., 2018).

Sport increase *immunosurveillance* so raises effect preventive and therapeutic. Activity antipathogen from macrophages increases, concurrently with recirculation immunoglobulins, neutrophils, natural killer cells, T cells, B cells and cytokines anti-inflammatory. If sport could conducted in a manner routine so NK cells and CD8 T lymphocytes mobilization. Occur decline *stress hormones* so function cell cytokine proinflammatory and cells immune decrease (Blood et al., 2018).

Research by Simanjuntak et al (2020) describes society in the era of *society* 5.0 with factor comorbid form of diabetes mellitus feel difficulty in control diet as well To do sport. People feel lazy to exercise because dense activity room in environment profession safe for exercise in patients with diabetes mellitus (Simanjuntak et al., 2020). Another study by Alisa et al (2020) explained part diabetes mellitus patient no get information related safe sport for patient with factor comorbid diabetes mellitus, so they permanent doing sport that is walk outside house (Alisa et al., 2020).

During the era of *society* 5.0, digital technology has change globalization system and happened exercise in patients with diabetes mellitus limited by limitations time consequence solid job. Sport recommended for done in the environment personal with good ventilation. Type sport light until currently recommended for people who are healthy and without symptoms. If want To do sport outside home, then light walk is type recommended exercise. Sports outside house must conducted with activity moderate physique with type sport moderate fitness (Halabchi, Ahmadinejad, & Selk-Ghaffari, 2020). Besides it is recommended for no To do exercise involving HIIT or intensity high. Two must principle obeyed in To do sports in the era of *society* 5.0 is sport light as well as maintain consistency time for To do sport (Wildani & Gazali, 2020). *The World Health Organization* (WHO) has called out campaign 'Be Active' all the time for society. Involving activities activity recommended physical fitness by WHO begins from To do stretching for 3-4 minutes for increase flexibility muscles, circulation blood and

movement muscle . Activity regular physique beneficial for body and mind .Exercise also stabilizes weight, pressure blood as well as lower risk various type disease like cancer or strokes. Sport increase density bones, as well increase fitness, as well increase balance, flexibility , and fitness. For parents , activities that increase balance help prevent fall and injury . Activity physique in a manner regular could help make days our Becomes routine and be method for permanent relate with family and friends . Sport also takes care mental health , prevention depression and dementia (WHO, 2020) .

The Ministry of Health of the Republic of Indonesia has set guide for exercising for people with factor risk . RI Ministry of Health provides guide as following : 1) For get results from activity more physical maximum recommended for do it with BBTT principle ie good , correct , measurable , and regular . 2) Suggestions practice physique for prevent and overcome obesity with BBTT principles translated in four abbreviated aspects to FITT (*Frequency, intensity, type and time*) (Hadi, 2020) . recommendation practice physique is as following :

1. Frequency 3-5 times a week
2. Intensity moderate 50-70% pulse pulse maximum (220-age)
3. Type / type priority exercise aerobic
4. Time / time customized with individual

Education about activity safe sport conducted has promulgated by the government . Although so, in part big Public still often ignore activity solid job with time spare a littlemoment To do sport. WHO itself no recommend tough sport during activity solid job with exercising can push growth microorganisms opportunist (Setyaningrum, 2020) .

considered sports safe for offenders workers in the era of *society* 5.0 include (Hita & Pranata, 2021)

1. Environmental sports house

Environmental sports house that can conducted including walking on the spot in space with adequate ventilation, walk or *jogging* in the yard home, do guided exercise online gymnastics class , using *treadmill* or stationary bike , up and down child stairs , calisthenic or strengthening muscle with heavy body as weights , stretching exercises body , yoga, tai chi, and exercise other .

2. Sports outside house

Sports outside house only can done if no there is prohibition activity in space public by the government local. Sports in space the public should too permanent notice protocol health among others:

- a. Guard distance with other people at least 2 meters.
- b. Take a shower and wash hand before go out house as well as before enter return to house .

Security exercise outside house with without thinking condition physique has Becomes debate . One of them because activity competition sport still abolished until no time determined . Sports in the era of *society* 5.0 when this likened as a ' sword eyed ' two , where in one side sport profitable with increase system immune body especially in populations with factor comorbid such as diabetes mellitus, but on the other hand exercise is also dangerous if activity that sport alone precisely rather Becomes source transmission of infectious viruses (Yuliana, 2020) .

Halabchi et al, (2020) explained that sport during a pandemic permanent must adapt with circumstances health as well as environment the place stay individual. Individual without symptom permanent recommended for exercise in the environment house. If someone show symptom infection respiration top , then allowed exercising light on the outside house about 10 minutes with test *jogging* for see condition resilience body. Patient with symptom systemic like fever, pain muscle or disturbance channel digest no allowed for exercising same very until whole symptom lost. one reason why competition sport no allowed for held there because people without symptom no get rid of possibility of that person bring infection/ *carrier* (Halabchi et al., 2020) .

Besides that sport competition also requires player for practice . Intensity tough training precisely could lower immunity body so that somebody more susceptible terkena infection respiration (Yuliana, 2020) . Excessive exercise could cause happening deficiency immunity clinical (Ashadi et al., 2020) The pathogen found in the droplets is one source main infection channel respiration top . Sport will change pattern breathing , using nose and mouth in a manner alternate so that occur dryness of the airways . Movement cilia on the airways will diminished and muddy the more thicken. this process disturb system defense body on the channel respiration so that channel respiration more susceptible caught infection. circumstances this found in sports intensity heavy like run a 40 -kilometer marathon (Halabchi et al., 2020) .

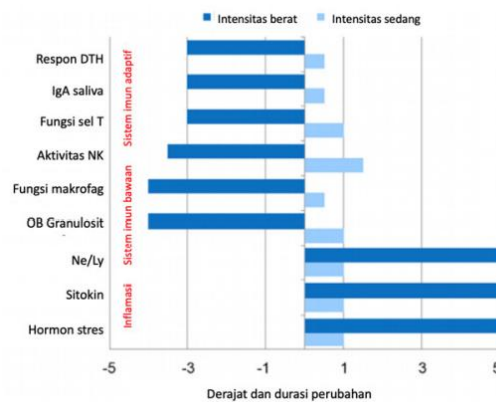


Figure 1. Graph Comparison Response Immune To Density Sport

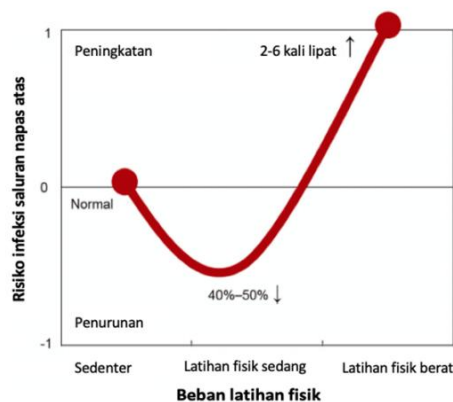


Figure 2. Graph Depicting Training Load and Risk Infection Upper Respiratory Tract

Recommended exercise for society in the era of society 5.0 is sport with intensity light until medium. Recommendation sport according age from WHO is as following (Yuliana, 2020) :

1. Children & youth (6-17 years)

Recommended exercise is sport intensity currently dive 60 minutes a day. Sport intensity tall still allowed , but the frequency only 3 times a week . Recommended exerciseis run and jump for increase density bone. Destination main sport for children and youth done for development nerves, bones and muscles , maintains mental health as well ideal body weight, development social, trust self and abilities learn .

2. Age 18 – 64 years

Sport for age this is sport with intensity being at least 150 minutes a week . Sport intensity tall still allowed , but no more of 75 minutes divided week to 3 times practice .

Destination sport is for increase strength muscle , capacity work aerobics , lowering risk disease metabolic , cancer and fracture bone .

3. Age > 64 years

Recommended exercise for range age this is exercise focused sports strength muscles and balance. Before to do sport need conducted consideration age, genetics, environment and diet. Recommended for to do consultation medical before choose sport.

in population aged continue , necessary monitored burden training , injury and recovery. Population with factor comorbid like hypertension, diabetes or disease lung is highly recommended for to do consultation with doctor before to do sport (Yuliana, 2020) . If condition physique individual with diabetes mellitus very weak , activity light physique permanent recommended for increase immune body and lowered blood sugar levels, because as has exposed Previously , blood sugar played a major role in response immune body diabetes patients (Hita, Kushartanti, Ariestika, Widiyanto, & Nizeyumukiza, 2021) .

Hu et al (2020) explained management multidisciplinary patient consequence activity burden more work with diabetes mellitus . Reported patient woman , 64 years with symptom disease respiration acute . On examination *x-ray thorax* , there is description *pneumonia* in both lungs and presence enlargement heart (cardiomegaly). Patient have history of diabetes mellitus type 2 which is not controlled . Management of patients this involve team consisting of care from expert endocrine disease in and geriatrics . Besides therapy medication and settings pattern eat patient , team care designing activity for included patients (Hu et al., 2020) :

1. Management position body. Patient trained to sit in place sleeping , sitting on the side the place sleep and stand activity this going on for 30 minutes , twice daily and adjusted accordingly with resilience patient .
2. Management activity. Patient trained for to do movement passive and active during not enough more 30 minutes .
3. Breathing exercise use practice respiration belly and exercise blow balloon .

Final result from care patient show blood sugar levels patient controlled until stable . Patient allowed take care Street after 20 days home care sick (Hu et al., 2020) .

CONCLUSION

Recommended exercise for people with diabetes mellitus is sport intensity light until medium. Need conducted consultation with doctor especially formerly related choice sport. Sport inside house more recommended. As much as possible maybe, activity physique permanent must performed by people with diabetes mellitus for stabilize blood sugar levels and improve system immune. Conclusion from study this is exercise in people with diabetes mellitus is very necessary in the era of society 5.0. Sports are done must permanent in accordance with condition physical and fit with activity body someone .

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