The Benefits Of Physical Activity (PA) To Improve Quality Of Life (Qol) For Diabetes Mellitus Patients

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Abstract

Background According to the International Diabetes Federation (IDF) Atlas 2017, epidemic diabetes in Indonesia shows an increasing tendency. Indonesia was the sixth in the world on having diabetes patients aged 20-79 years approximately 10,3 million of people. Diabetes mellitus patients will experience various disturbing symptoms. The American Diabetes Association recommends Physical Activity (PA) as one of the interventions to improve the control of blood sugar, acute and chronic healing and prevent diabetes complications. Objectives. To discover the benefit of Physical Activity as one of the interventions to support the quality of life improvement on diabetes mellitus patients. Methods. Literature Review is used in this study. Database sources taken from CINAHL, Pubmed, Science Direct, Medline, ADA (American Diabetes Association) and Diabetes Research and Clinical Practice. The inclusion criteria include published articles starting from 2010 to 2018 and in full English language literature. The search included the following keywords: physical activity (PA), diabetes mellitus, quality of life (QOL). PICOT (Population, Intervention, Comparation, Outcome and Time) is used to analyze the literatures. Results. Based on the journals analysis 5 themes were found, they are characteristic on quality of life of patients with diabetes mellitus, physical activity as an intervention to improve the control of blood sugar, physical activity as an intervention to prevent complication of diabetes mellitus, physical activity as an acute and chronic healing intervention due to diabetes mellitus. Conclusion. Patients with diabetes mellitus will experience a decrease in quality of life. Recommendation. Physical Activity is an intervention that recommended to support the quality of life improvement of diabetes mellitus patients.

Keywords. Diabetes mellitus; physical activity; quality of life.

Introduction

Non-communicable diseases (NCDs), including diabetes, become a serious threat to global health. WHO 2016 data shows that diabetes mellitus cover 70% of total deaths in the world and more than half of the burden disease. 90 - 95% of cases of diabetes are Type 2 diabetes, which is preventable because it is caused by an unhealthy lifestyle. Data from the International Diabetes Federation (IDF) Atlas 2017 report that the diabetes epidemic in Indonesia still shows an increasing tendency. Indonesia is the sixth-ranked country in the world with diabetic patients aged 20 - 79 years with around 10.3 million people. In line with that, the Basic Health Research (Riskesdas) showed an increasing prevalence rate of 6.9% in 2013 to 8.5% in 2018, so that it increases the estimated number of sufferers in Indonesia who were then at risk of other diseases such as heart attacks, stroke, blindness, and kidney failure, even paralysis, and death (Ministry of Health, 2018).

The American Diabetes Association describes diabetes mellitus as a type of metabolic
disease characterized by chronic hyperglycemia, which is the malfunctioning of the organs, especially the eyes, kidneys, nerves, heart and blood vessels due to damage to insulin secretion, insulin work, or both, accumulate in the body because it cannot be broken down into an energy source. Recommendations for physical activity and preventive interventions can vary based on the type of diabetes. In type 1 diabetes, the autoimmune destruction of beta pancreatic cells causes insulin deficiency. Although it can occur at any age, the level of beta cell damage varies, usually faster in adolescents than in adults. Type 2 diabetes is a result of progressive loss of insulin secretion usually followed with insulin resistance. This situation can be prevented or delayed by physical activity and lifestyle changes (Colberg et al., 2010).

Diabetes mellitus patients who have low physical activity have a 2.7 times higher risk of glucose intolerance than those who have high physical activity. Physical activity and exercise significantly increase nerve speed conduction, peripheral sensory function, and pressure distribution in the legs. In addition, the rate of diabetic ulcer incidence in diabetes mellitus patients who perform physical activity is lower than patients who do not do physical activity. This evidence shows that physical activity and exercise are effective non-pharmacological interventions to improve the quality of life of patients with diabetes (Matos, Mendes, Silva, & Sousa, 2018).

Physical activity is energy that is used by muscle to move our skeleton. In recent years, many scientific shreds of evidence confirmed the role and benefit from physical activity as a risk factor that can be modified for many chronic diseases include diabetes mellitus. The physically active patient who was diagnosed with type 1 diabetes mellitus had a lower risk of autonomic neuropathy and cardiovascular disease (Sharif et al., 2018). The physical activity and healthy lifestyle are important things for people with type 1 diabetes mellitus besides insulin therapy. People with type 1 diabetes mellitus are suggested to have more physical activity than non-diabetic people. Regular physical activity can improve blood glucose and reduce postprandial glucose (Boiroux, Jørgensen, Patek, & Breton, 2018).

Based on that phenomenon, as a nurse who has a responsibility to give holistic and comprehensive nursing care plan, must consider choosing intervention to handle the impact of diabetes mellitus that can disturb patient's Quality of Life (QOL). According to The American Diabetes Association, physical activity is one of non-pharmacological therapy (Colberg et al., 2010). Physical activity can improve the strength of cardiovascular and respiratory also control blood glucose in a long time (Yardley, 2014). Purpose of this study is to know the benefit of physical activity to improve the Quality of Life of patients with diabetes mellitus. Some benefit in this literature review can be developed in research.

Methods

The method that is used in this review is a literature review study. The search included the following databases: CINAHL, Pubmed, Science Direct, Medline, ADA (American Diabetes Association) and Diabetes Research and Clinical Practice. The topic of Physical Activity (PA) and Quality of Life (QOL) of diabetes mellitus patients in some publications were used to be reviewed. The inclusion criteria for publications to be reviewed were (1) articles published between 2010 and 2018, (2) written in English and full article. The search included the following keywords: Physical Activity (PA), Quality of Life (QOL), diabetes mellitus. In total, 6 articles were identified in the databases selected.

Author use PICOT (Population, Intervention, Comparison, Outcome, and Time) to analyze articles. Based on that analysis, author found 5 theme such as characteristic Quality of Life in diabetes mellitus patients, Physical Activity (PA) as complementary therapy, Physical Activity (PA) as an intervention to prevent the complication of diabetes mellitus, Physical Activity (PA) as an intervention to control blood glucose, Physical Activity (PA) as an intervention for repairing acute and chronic because of diabetes mellitus.

Results

1. Characteristic Quality of Life (QOL) in diabetes mellitus patients

   Quality of Life (QOL) is one of the main purposes of care. It encourages the need for measuring Quality of Life (QOL), especially on diabetes mellitus patients. Diabetes mellitus is a chronic disease that cannot be cured yet. However, physical complaints caused by acute or chronic complications can be reduced if blood glucose can be controlled. Moreover, low Quality of Life and psychological problems can worsen metabolic disturbance by a complication or hormonal stress reaction (Mandagi, 2010).

   Study about Quality of Life in type 2 diabetes mellitus patients in Abdul Moeloek Hospital in Lampung province, Larasati's

found that 59,6% (53 people) had a moderate level of Quality of Life.

Diabetes mellitus patients are susceptible to have complications caused by increased blood glucose. Increased blood glucose can be prevented by controlling the diet, doing exercise, drug therapy, foot care, and monitoring blood glucose. It can affect Quality of Life (QOL) in diabetes mellitus patients (Chaidir, et al., 2017).

According to Yudianto (2008), quality of life is a happy and satisfied state in diabetes mellitus patients for doing daily activities. There are some aspects that can affect the quality of life, such as special needs of caring in diabetes mellitus patients continuously, symptoms that arise when a blood glucose level is unstable, some complications caused by diabetes mellitus, and sexual dysfunction. Those aspects can be prevented if the patients have a healthy lifestyle continuously, so complications will not happen and the patients can do daily activities properly (Utami et al., 2014).

2. Physical Activity (PA) as a complementary therapy

Controlling diabetes mellitus can be done by implementing 4 pillars, including eating habits, physical activities or exercises, drug consumption, and education. Sri Anani found a correlation among the habit of taking drugs, physical activities or exercises, eating habits, and blood glucose levels in diabetes mellitus patients (Anani et al., 2012).

The main purpose of diabetes mellitus treatment is to prevent and minimize acute and chronic complications (Ayele, K. Et al., 2012). Diabetes mellitus complications can be controlled and prevented by controlling blood glucose in pharmacology and non-pharmacology interventions (Waspadji, S, 2009).

One of the non-pharmacology therapies is physical activity. The principle of physical activity for diabetes mellitus patients is the same as regular physical activity, such as frequency, duration, and type. In diabetics, physical activity that is chosen should be preferred physical activity, in addition, to improve health, it can also improve fitness. Physical activity should be done by involving large muscles and in accordance with the desire so that the benefit of physical activity can be felt continuously.

The frequency of physical activity for diabetic patients should be done in 3 until 5 times a week regularly, and the duration of physical activity is carried out for 30 - 60 minutes. The chosen physical activity should have a mild to moderate intensity of 60% - 70% of maximum heart rate (MHR). The type of the chosen physical activity is endurance physical activity, such as jogging, swimming, and cycling (Dewi Marfu'ah Kurniawati, 2012).

3. Physical Activity (PA) as an intervention to control blood glucose

The chronic improvement of blood glucose can cause fatigue and depression. Hypoglycemia can cause fatigue, pessimist, and discourage, this situation has the potential to cause diabetic patients to experience fear. Chronic complications, both microvascular and macrovascular complications, have a negative impact on the quality of life. However, this causes changes in the body, impaired physical mobility, and physical pain. It could be a burden for diabetics in doing their daily activities (Rantung, Yetti, & Herawati, 2015).

The HbA1c examination is an examination to describe the long-term glycemic status as a cumulative indicator of excess blood glucose over a period of 3 - 4 months. The examination can be taken in the laboratory. The

controlled blood glucose level in the HbA1C examination is less than 8,5%. Otherwise, the uncontrolled blood glucose level in the HbA1C examination is the same as or more than 8,5% (Horton, 2010).

When someone doing physical activity, the need for body fuel is improved for doing metabolism, circulation, and for the nervous system. The glucose is stored in muscles, and the glycogen is stored in the liver. The glycogen quickly becomes the source of energy at the beginning of the physical activity. The need for glucose will increase 15 times than regular need after 10 minutes of physical activity. Also, it will increase 35 times after 60 minutes of physical activity. A study (Rahmawati, 2010) shows the association blood glucose level in type 2 diabetics between before and after doing physical activity. Furthermore, that study is related to another study (Indriyani, Supriyatno, & Santoso, 2010), they found that aerobic exercise has the impact to reduce blood glucose in type 2 diabetics with an average decrease of 30,14mg %.

4. Physical Activity (PA) as an intervention to prevent complications related to diabetes mellitus

Patients with diabetes mellitus, who are not well-managed, are vulnerable to increased complications due to insulin deficiency or inadequate insulin work. The complications caused are acute and chronic. Acute complications that occur are associated with a sudden increase in blood sugar levels, while chronic complications often occur due to increased blood sugar for a long time (Yudianto, 2008). When people with diabetes mellitus experience complications, it will impact on the decrease life expectancy, decrease quality of life, and increase morbidity rates (Nwankwo et al., 2010).

According to Permana (2009), diabetes mellitus is a chronic disease that will be suffered by diabetic patients for life and has a continuous progression that will lead to complications. The duration of diabetes mellitus is related to the complications of diabetes mellitus experienced by patients. Complications cause patient self-efficacy to be low and refer to a decrease in quality of life (Hussein, et al., 2010).

The lack of control of diabetes mellitus can lead to long-term hyperglycemia, which triggers serious complications, both macrovascular and microvascular, such as heart disease, peripheral vascular disease, kidney failure, nerve damage, and blindness. The many complications that accompany diabetes mellitus have contributed to physical, psychological, and social changes (Anani et al., 2012).

Given the high prevalence and cost of care for people with diabetes mellitus, efforts to prevent and control the disease include increased education, anti-diabetes medication consumptive behavior, physical exercise (physical activity), food regulation and periodic checks of blood glucose.

5. Physical Activity (PA) as an acute and chronic improvement intervention due to diabetes mellitus

Although diabetes mellitus is a chronic disease that cannot cause direct death, it can be fatal if the management is not correct. Management of diabetes mellitus requires multidisciplinary treatment that includes non-drug therapy and drug therapy. Diabetes mellitus requires medical care and counseling for sustainable self-management to prevent acute and chronic complications (Utomo, Julianti, & Pramono, 2011).

Self-care management is the appropriate fundamental treatment for someone who suffers from chronic diseases such as diabetes mellitus. Self-care in DM patients focuses on four

aspects, namely monitoring glucose levels, variations in nutrients consumed every day, regulating insulin, and regular physical exercise.

Some of the acute effects of physical exercise in diabetics patients are increasing insulin sensitivity, facilitating glucose absorption, and controlling blood glucose. With the increased intensity of physical activity, the body will use more carbohydrates as muscle work fuel, so that it will increase the glucose absorption into the working muscles, which will be followed by the hepatic glucose production (Tan B, et al., 2015).

Some of the long-term effects of physical exercise are it can increase skeletal muscle mass. Observational studies show that greater physical activity and fitness are associated with lower mortality due to complications. The recommended level of physical activity can lose weight. Increased physical activity and physical fitness can reduce symptoms of depression and improve the quality of health for people with diabetes mellitus (Tan B, et al., 2015).

No	Title	Researcher	Population	Intervention	Comparation	Outcome/significant findings	Time	Conclusion
1	Physical activity patterns and gestational diabetes outcomes-The wings project	Ranjit Mohan Anjana, et al 2016	795 pregnant women, 189 women with and 606 women without GDM.	The Women in India with Gestational Diabetes Strategy-Model of Care (WINGS-MOC)	None	After the MOC was implemented in women with GDM, there was a significant improvement in PA and a decrease in sedentary behaviour amongst women (before MOC, moderate activity: 15.2%, sedentary: 84.8% vs. after MOC-moderate: 26.5%, sedentary: 73.5%; $p < 0.001$), and an increase in their daily step count from 2206/day to 2476/day ($p < 0.001$). Fasting 1 and 2-h postprandial glucose values significantly decreased ($p < 0.001$ for all).	The ‘‘Before MOC” visit was the baseline visit at which questionnaires were administered and anthropometric and biochemical data collected.It was provided by trained nutritionists and health care professionals for a mean duration of 12 weeks. At the ‘‘After MOC” visit (between 30 and 35 weeks), the questionnaires, anthropometry and biochemical investigations were repeated.	PA levels are inadequate amongst this group of pregnant women studied i.e. those with and without GDM. However, a low-cost, culturally appropriate MOC can bring about significant improvements in PA in women with GDM. These changes are associated with improved glycemic control and reduction in adverse neonatal outcomes.
2	Physical activity level and exercise in patients with diabetes melitus	Camila Kümmel Duarte, et al 2011	Two hundred twenty-five patients with DM were assessed, with 107 patients having DM1 (47.6%), and 118 having DM2 (52.4%).	the International Physical Activity Questionnaire (IPAQ) was used to evaluate the physical activity level (PAL)	None	107 (47.6%) had type 2 diabetes mellitus (DM2) and 118 (52.4%) had type 1 diabetes mellitus (DM1), with a larger percentage of patients with DM2 being classified as poorly active [33 (30.7%) versus 12 (10.3%)] and a lower percentage being classified as highly active [9 (8.7%) versus 29 (25%)], compared with patients having DM1.	Not mentioned	Patients with DM2 have different PAL and behavior related to exercise than those seen in DM1 patients.

3	Physical activity behavior in people with diabetes residing in india: A cross – sectional analysis	G.F. López Sánchez, et al 2018	A total of 190 consecutive (110 men and 80 women) adults with type 1 or type 2 diabetes attending a diabetic eye clinic in Sankara Nethralya Eye Hospital in Chennai, India, were recruited into the study.	A detailed questionnaire was administered by two qualified optometrists.	none	In all, 78.9% of participants thought that physical activity was important in the control of diabetes. In all, 54.7% of respondents did regular physical activity every week, and physical activity was more frequent in men (63.6%), and in those with an intermediate (60%) or advanced (65.2%) level of English. Barriers that discouraged participants from physical activity were lack of time (31.6%), lack of knowledge (23.2%) and health limitations (17.4%). Potential identified facilitators included more information about physical activity (39%) and group exercise with people of the same sex or speaking the same language.	Not mentioned	Most ofthe sample thoughtthat physical activity is importantto control diabetes, although few participated in regular physical activity. Findings also suggest that physical activity had a higher importance for men, for those with an advanced level of English and those under 60 years of age. Men, those with intermediate or advance level of English, and people under 60 years were significantly more active.
4	Dietary program and physical activity impact on biochemical markers in patients with type 2 diabetes: A systematic review	Eduarda Barreira, et al 2017	A total of 30 randomised controlled trials, focused on physical activity and dietary interventions in patients with type 2 diabetes mellitus and include participants aged 60 years and over	Dietary program and physical activity	Control program	The selected articles have shown that the implementation of physical activity programs (aerobic, resistance, flexibility and combined exercises), and programs based on a higher intake of vegetables, grains, legumes, fruits, unsaturated fatty acids, as well as	Not mentioned	Physical activity, dietary programs and health educa-tion sessions regarding the importance of changing lifestylesacco rding to scientifically valid information are revealed as complementa ry therapeutic strategies in treatment andmetabolic

						consumption of foods with low glycaemic index, calorie restriction, intake of probiotics, vitamin D supplementation and educational sessions about diabetes improves blood glucose levels, as well as the lipid profile, in patients with type 2 diabetes.		control of type 2 diabetes.
5	Physical Activity/Exercise and Diabetes : A Position Statements of the American Diabetes Association	Sheri R. Colberg, et al 2016	People with type 1 diabetes, type 2 diabetes, gestational diabetes mellitus, and prediabetes.	Physical activity	none	Exercise improves blood glucose control in type 2 diabetes, reduces cardiovascular risk factors, contributes to weight loss, and improves well-being (1,2). Regular exercise may prevent or delay type 2 diabetes development (3). Regular exercise also has considerable health benefits for people with type 1 diabetes (e.g., improved cardiovascular fitness, muscle strength, insulin sensitivity, etc.) (4). The challenges related to blood glucose management vary with diabetes type, activity type, and presence of diabetes-related complications (5,6).	Not mentioned	Physical activity and exercise should be recommended and prescribed to all individuals with diabetes as part of management of glycemic control and overall health. Specific recommendations and precautions will vary by the type of diabetes, age, activity done, and presence of diabetes-related health complications. Behavior-change strategies can be used to promote the adoption and maintenance of lifetime physical activity.
6	Exercise and Type 2 Diabetes; The American College of Sports Medicine and the American Diabetes Association: joint position statement	Sheri R. Colberg, et al 2010		Physical activity	-	Participation in regular PA improves blood glucose control and can prevent or delay type 2 diabetes, along with positively		Exercise plays a major role in the prevention and control of insulin resistance,

		affecting lipids, blood pressure, cardiovascular events, mortality, and quality of life. Structured interventions combining PA and modest weight loss have been shown to lower type 2 diabetes risk by up to 58% in high-risk populations. Most benefits of PA on diabetes management are realized through acute and chronic improvements in insulin action, accomplished with both aerobic and resistance training.	pre-diabetes, GDM, type 2 diabetes, and diabetes-related health complications. Both aerobic and resistance training improve insulin action, at least acutely, and can assist with the management of BG levels, lipids, BP, CV risk, mortality, and QOL, but exercise must be undertaken regularly to have continued benefits and likely include regular training of varying types.

Discussion

Diabetes mellitus is a disease characterized by impaired glucose metabolism due to the disruption of insulin secretion, insulin work, or both. Diabetes is one of the leading causes of death in the world. The cause of death in patients with diabetes comes from complications related to diabetes, heart disease is the most prominent cause. Management of diabetes mellitus is by setting the diet, physical activity, and treatment. Obedience to treatment programs is very important to prevent complications. Although the management of diabetes mellitus is very complex, patients who are able to optimally perform their self-care management will be able to control their blood glucose, in contrast to those who are unable to control their blood glucose levels then various problems will arise such as gangrene wounds, decreased vision, and neuropathy (Fatehi et al, 2010). Diabetes control is also important to be carried out as early as possible to avoid expensive medical expenses and impaired functions in the family. The family also has an important role in providing motivation, being the support systems, and providing care for their family members who suffer from diabetes mellitus.

Conclusion

Physical activity is important in preventing and controlling insulin resistance and various complications due to diabetes. Physical activity can improve insulin work acutely and can help to control blood sugar levels, blood fat, blood pressure, cardiovascular risk, mortality, and quality of life. Physical activity must be done regularly and includes various types of exercises to provide long-term benefits. Providing an exercise program that can improve overall physical activity is very important for individuals with diabetes mellitus to achieve an optimal state of health.

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