

BENEFITS OF PHYSICAL ACTIVITY IN PATIENTS WITH DIABETES MELLITUS

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Abstract: Diabetes mellitus (DM) is a genetically determined disease in which the subject presents alterations in the metabolism of carbohydrates, proteins and fats, and a relative or absolute deficiency of insulin secretion with variable degrees of resistance to it. Between 85 and 90% of patients with DM correspond to type 2. The objective of this research was to evaluate the best available evidence on the benefits of physical activity in patients with diabetes mellitus. Methodology theoretical article where conclusions can be drawn, decisions made according to the most reliable results of the study. Research articles and headquarters of international organizations and clinical practice guidelines were taken, searches will be carried out in the following electronic databases: Virtual Health Library (VHL), National Library of Medicine of the USA, National Institutes of Health (PubMed), Scientific Electronic Library Online (SciELO), Google Scholar, Elsevier. According to the central question of this investigation, it was found that physical activity does have satisfactory results in these patients from the decrease in glycemic indexes, helps in their quality of life and improvement of their body image.

Keywords: Adults, Aerobic Exercise, Resistance Exercise, Patient, Glycated Hemoglobin, Metabolic Control.

INTRODUCTION

The World Health Organization [WHO], (2017) and the projections of the National Health and Nutrition Survey (ENSANUT, 2018) since 2006 diabetes has increased the prevalence was 7.2%; for 2012 it increased to 9.2%, in 2016 it was reported 9.4%, and in 2018 it was 10.3%. Mexico doubles the countries of the Organization for Economic Cooperation and Development (OECD, 2017) in the prevalence of diabetes, with 15.8% of the population between the ages of 20 and 79 with

this disease, when the average among member countries is At 7% according to the biannual Health at a Glance 2017 report, the prevalence of diabetes in the country is a mortality alert, compared to Estonia, Ireland, Luxembourg, Sweden and the United Kingdom, where only 5% of the population adult suffers from this disease. For this reason, health education, where physical activity stands out as one of the capacities and self-care actions in diabetes as a whole, becomes an indispensable tool for the promotion and recovery of the health of these users. This research article aims to answer a series of questions based on the review of various studies that have been carried out on the benefits of physical activity in patients with diabetes, taking their results and comparing them with other authors.

THEORETICAL FRAMEWORK

The International Diabetes Federation (IDF) in its ninth edition of the Diabetes Atlas (2019) defines diabetes as a non-transmissible chronic degenerative disease. This occurs when the production of insulin is very little or null, causing elevations of glucose in blood; or simply this hormone is not used correctly in the body. Insulin is a primary hormone that is produced by the pancreas, allows glucose to enter cells and be converted into energy, as well as helps in the metabolism of fats and proteins, the World Health Organization (WHO) in its World Report on Diabetes (2016), defined it as one of the four non-communicable chronic diseases that must be urgently treated, because it is a health problem; due to the increase in the prevalence and incidence of new cases.

Type 2 diabetes mellitus is due to the fact that the body does not efficiently process insulin, this is related to the obesity, overweight, mature age, family genetic inheritance, ethnic origin and no physical activity; It is the most frequent around 90% have this type, scientific research mentions that it can be treated and

prevented in a timely manner through health education, changes in lifestyle and adherence to drug treatment (WHO, 2020).

Worldwide in 2019 there are 463 million people between the ages of 20 and 79 diagnosed with diabetes, an increase of 9.6% since the year 2000, by 2030 an increase of 10.2% is expected, which will be 578 million diagnosed and if the guidelines are not followed recommendations and interventions to reduce the incidence in the year 2045 will increase to 10.9% that will be evidenced in 700 million people with this disease (IDF, 2019, WHO, 2016).

In the countries of North America and the Caribbean, 48 million people are currently diagnosed, by 2030 56 million are expected and in 2045 it will increase to 63 million people living with diabetes.

At the national level in Mexico, according to the National Health and Nutrition Survey (2018), 8.6 million patients have been diagnosed, with an increase in prevalence of 10.3%, affecting mostly women by 11.4% and men by 9.1 %, on the other hand, the IDF in its court of (2019) is in sixth place worldwide in cases with diabetes with 12.8% million people living with this pathology, by 2030 17.2 million are expected and by 2045 22.3%.

The Ministry of Health of Mexico in its 2019 Closing Epidemiological Report of the Hospital Epidemiological Surveillance System of type 2 diabetes mellitus diagnosed 33,515 new cases, affecting women with 50.4% (16,980) and men 49.6 % (16,626); the most frequent age group was 55 to 64 years with 26.1% (8,761); the state of Tabasco notified 3,596 cases with 10%.

In the second quarter of 2020, the Mexican Ministry of Health with the Hospital Epidemiological Surveillance System of type 2 diabetes mellitus has 8,992 new cases, in the comparison by sex in this report it affected men more with 52.01% (4,677). and 47.98%

(4, 315) to women; The most affected age groups for men were 55 to 59 years and for women 60 to 64; In the comparison by states, Tabasco is in first place in incidence with 952 new cases.

Study diabetes mellitus, which represents a public health problem, with the increase in life expectancy, demographic growth, urbanization, economic growth, what is related to physical inactivity, sedentary lifestyles and the consumption of non-food healthy; Therefore, diabetes research is essential for the health system, since it will allow the identification of lines of action to prevent complications such as diabetic retinopathy, diabetic nephropathy, nerve or vascular injury and diabetic foot complications, which are directly related to cardiovascular diseases, among others, the best prevention tool is the promotion of healthy styles that include a correct diet, regular physical activity, not smoking and maintaining an appropriate weight for their height, which significantly improves the quality of life of these people, the years of life lost due to this disease for men are between 5 and 8 years and for women between 6 and 4 years.

That is why the interest arises to identify through the already available literature the benefits of muscle strength training in the control of glycemic indices in patients with diabetes mellitus, the Ministry of Health in its case reports of diabetes mellitus In 2019, 93.2% of diagnosed patients do not perform any type of physical activity, and only 6.8% do; In 2020, very similar data, only 86.73% do not perform physical activity and 13.27% do.

For this reason, the following research questions are posed:

1. What are the benefits of muscle strength training in the control of glycemic indices in patients with diabetes mellitus?
2. Is there a relationship between physical activity and glycemic control in patients

with diabetes mellitus?

3. What is the best exercise to reduce glycemic indices in patients with diabetes mellitus?

4. Does the type of strength and duration training have a positive effect on the Glycosylated Hemoglobin (HbA1c) values?

These Questions that will be answered based on the available scientific evidence.

Strength training is defined by Hegedüs (2019) as the ability to generate work for a short period of time in the face of resistance, with the aim of having a muscular contraction and increasing anaerobic resistance, improving strength and size of muscles. muscles, the advantages of this type of exercise is that it can be very practical, using only your body weight, practiced anywhere, it can be short-lived, resulting in a metabolic impact, among the benefits are maintenance and increase in mass muscle, reduction of body fat, increase in bone mineral density, protection against muscle injuries, improve self-esteem and prevention of metabolic and cardiovascular diseases.

The World Health Organization defines physical activity as any body and muscle movement that results in energy expenditure, estimates that physical activity can help reduce metabolic and cardiovascular diseases by 30%. Its benefits are prevention of chronic degenerative diseases, improving bone and functional health, helping energy expenditure to have a caloric balance and weight control.

The IDF Clinical Practice Guideline (2017) provides recommendations for the management of type 2 diabetes, for lifestyle modifications on physical activity including walking for at least 150 minutes on two days, engaging in resistance exercise (weight lifting, yoga); or perform 275 minutes per week.

The World Health Organization recommends in the ages of 18 to 64 physical activities such as walks or bicycle rides,

housework, games, sports, programmed exercises, doing at least 150 minutes per week of moderate aerobic activity or 75 minutes of vigorous aerobic activity as well as combination between both. These activities must be carried out in 10-minute sessions. Or you can do 300 minutes of physical activity a week either moderately or vigorously, and twice a week engage in muscle-resistance activity.

To answer question one about the benefits of muscle strength training, it was found that various studies report the same benefits of physical activity in these patients. Carrasco Peña and Díaz (2020) mention the benefits of physical activity are: metabolic control (better blood glucose levels, insulin sensitivity, lipid reduction), it has positive effects on body image, it helps to lose weight, decrease blood pressure values. Like Hernández Rodríguez, Domínguez, and Mendoza (2018) in their research they mention the benefits which are to reduce weight, sensitivity, insulin and lipid control, reduce the risk of presenting gestational diabetes, excessive weight gain in pregnancy, reduce stress levels, incidence of cancers and psychological disorders.

Addisu in 2020 mentions that also to control type 2 diabetes; He recommends that physical activity must be a priority in the treatment of this pathology, since it improves glucose levels, reduces insulin resistance, increases the production of glucose transporters, decreases visceral adipose tissue, and uses glucose for metabolism. required energy of the organism.

In question two that was intended to show whether there is a relationship between physical activity and glycemic control in these patients, which if it was found that there is a significant correlation, exercise will help lower blood glucose levels. Isique (2020) in her research showed that there is a relationship between the level of physical activity and glycemic control ($p = 0.000$). Mendoza in 2018

refers that physical exercise reduces the values of glycosylated hemoglobin in the blood, having a positive effect on metabolic control and improving the perceived quality of life of patients with type II diabetes mellitus.

Farzad et al. (2017) conducted a study to assess the effect of regular physical training on changes in HbA1c. They mention that there is a direct and significant correlation of long-term exercise ($P < 0.05$). This activity is useful in the long term to improve glycemic control, improves mood disorders, body image, cardiovascular fitness and quality of life among patients with DM2.

In question three posed to identify which is the best exercise to reduce glycemic indices in patients with diabetes mellitus, it was shown that aerobic exercise helps a lot, muscle strength to a lesser extent, but if both are combined in a period of 150 minutes a week, or 30 minutes three times a week for three months will positively help these patients as shown in research.

Carrasco et al. (2020) mention performing aerobic and muscular strength physical exercises an average of 2.5 hours a week, Isique in (2020), in his research recommends the level of physical activity to perform an activity on average three or five days a week. vigorous 20 minute daily; or five days of 30-minute walks at a moderate or vigorous intensity, both having an energy expenditure of at least 600 m/min/week. Águila, Vicente, Llaguno, Sánchez, and Costa, carried out a study to measure the effect of physical exercise on metabolic control.

Quílez and Reig carried out a physical training study that included aerobic, strength, combo, and interval exercises in three months duration in patients with diabetes, 64.2% had a reduction in glycemic indexes and 35.7% had little decrease since they only performed exercises on one occasion.

Arias (2015) in an experimental study

states that structured aerobic physical activity is accompanied by decreases in the percentage values of Glycated Hemoglobin A1C (Hb A1C) of -0.77% (90% CI -1.06 to -0.4%); Similarly, the programs that included strengthening activities against resistance also reported significant decreases of -0.57% (90% CI -1.14 to -.01). It is interesting that the programs that included a combination of both types of activity reported smaller decreases for each type separately (-0.51% (90% CI -.79 to -.21).

Junmao-Wen et al. in 2017 conducted a randomized controlled trial study consisting of eight-position standing and sitting exercises for 45 minutes twice a day, five times a week for three months, which showed that glycosylated hemoglobin decreased by a 0.61% and in the four months it dropped to 0.76%

Amaya in 2018 verified the effects of muscular resistance training in patients with type 2 diabetes mellitus, showing that 67% reported significant reductions in HbA1c.

Addisu in 2020 recommends exercising for 30 minutes after eating can provide better glycemic index levels. Aerobic exercise improves glycemic control, improves quality of life, physical capacity, reduces hemoglobin levels, and resistance exercise also improves glycemic control. Both exercises in combination in periods of three months have significant results in glycemic control.

In a structured exercise training there is a decrease in the HbA1c level of -0.67%, in the structured aerobic exercise the decrease was -0.73%, and in the structured resistance training of -0.57%; both combined show a -0.51% decrease in glycosylated hemoglobin.

Shu-Mei, Feng-Chih, Jung-Fu, Wen-Dien, and Nai-Jen in 2020 measured the effects of resistance exercise on glycated hemoglobin and functional performance in patients with diabetes mellitus, they mention that resistance exercise in a span of three months significantly

improved muscle strength, dynamic balance, and physical function.

Based on the articles found, the average number of minutes that physical activity must be performed was obtained with the support of the SPSS version 22 statistical program and it was obtained that people must perform 150 minutes of exercise a week, these data are verified with the recommendations. WHO and Clinical Practice Guidelines.

Based on the reviewed literature and with the support of the statistical program, it is concluded that strength training, whether aerobic or resistance, influences significantly to reduce HbA1c indices for the control of diabetes mellitus and is verified with statistical data. mean of 0.65% (SD= 0.9) decrease in HbA1c values, the median was 0.67%, a minimum of 0.51% and a maximum of 0.77%.

In order to answer the last question of knowing what is the type of strength training and duration for a positive effect on the values of Glycosylated Hemoglobin (HbA1c), it was evidenced based on the investigations as referred to by Isique in his investigation, he verified that physical activity reduces glycemic indices in 63.5% of patients with type 2 diabetes mellitus with optimal glycemic control of HbA1c < 6.5%. Carrasco et al. mention that cardiovascular aerobic exercise together with resistance exercise has a significant impact of 0.5 to 0.8% on HbA1c.

Dalmazzo, Ponce, Delgado, Carrasco, and Martínez in 2020 report that high-intensity interval training exercise has a positive effect on glycemic control indices, as well as muscular endurance physical activity to improve insulin/glycemia biochemical parameters. in a time of three months; In the same way, Barrile et al. (2015) argues that the longer the time of exercise is greater than three months, the glycemia values will decrease. Quílez and Reig in 2015 argue that the exercise must be long-term to obtain significant results in HbA1c

levels greater than three months of 0.5-0.8%.

CONCLUSIONS

As the population advances, technology increases, life expectancy increases, chronic degenerative diseases are on the rise, among which diabetes stands out due to its high incidence, it affects everyone; then education about their disease is the best tool for the promotion and prevention of the health of these users; Derived from this, the World Health Organization and the FID recommend that physical activity must be essential in them to regulate future complications and have benefits; Since it will help to improve the state of health, it also helps to reduce the burden on health services and therefore on the country's economy.

According to the literature consulted, it is possible to show that strength training helps to reduce glycemic indices in patients with diabetes mellitus and to obtain many satisfactory results, in which it stands out that on average HbA1c values decrease by 0.65%; performing vigorous or moderate physical activity 150 minutes a week or in 30-minute sessions three times a week for three consecutive months. Likewise, several authors recommend that physical activity becomes one of the priority treatments to treat diabetes, because it will be reflected in the decrease in glucose levels, it will help the body in insulin resistance, it will help to lose weight and it will improve your perception of your body image among others. The best exercise that these patients must practice is aerobic such as walking, running, swimming, cycling, among others, followed by resistance exercise very similar to the previous one, but complemented by weight lifting. But likewise, if these two exercises are combined, much better results will be obtained, as mentioned by Addisu (2020), in his study where the patients performed the two exercises and

obtained a decrease of 0.51% in the HbA1c level with a confidence index of 95%.

Based on these data, it is possible to demonstrate with the scientific evidence what type of exercise the personnel who care for this population must recommend so that satisfactory results are obtained and the user does not stop the treatment. Likewise, it will be of great interest for future research that intends to make educational interventions in these patients when addressing this issue since they will have a reference.

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