

the effect of the adapted sports program to adjust the glycated hemoglobin in women with diabetes type 2

مدى تأثير برنامج رياضي مكيف لتعديل نسبة السكر التراكمي في الدم لدى فئة النساء المصابات بداء السكري-النوع الثاني-

PhD student Ghouissem Abd Elhamid ¹, Cheriat Abdelkader Hakim ²

(جامعة زيان عاشور ، مخبر المنظومة الرياضية في الجزائر)

¹ Ziane Achour Djelfa, Laboratory of the sports system in Algeria , A.gouissem@univ-djelfa.dz

² Ziane Achour Djelfa, hakimostoubib72@gmail.com

Received: 20/06/2020

Accepted: 22/09/2020

Published:17/12/2020

Abstract : The objective of the study was to determine the effect of the adapted sports program to adjust the glycated hemoglobin in women with diabetes. The researchers adopted the empirical research by preparing a sports program adapted to the needs of this target group in order to measure the glycated hemoglobin after application of the program. The sample of the study was 18 women who were chosen by the intentional method and were divided into two groups. The first was a empirical and the second was a reference who had the tribal measurement tests. Then the adapted sports program was implemented into the empirical groupe divided in 36 sessions. The same ex-post tests were repeated into the tows groups. The researcher adopted the appropriate statistical tools for processing the data through the SPSS.

Keywords: Adapte sport, type II diabetes, glycated hemoglobin.

الملخص: هدفت الدراسة الكشف على مدى تأثير برنامج رياضي مكيف لتعديل نسبة السكر التراكمي في الدم لدى النساء المصابات بداء السكري اعتمد الباحثان على المنهج التجريبي وذلك من خلال اعداد برنامج رياضي معدل حسب حاجيات هذه الفئة المستهدفة قصد القيام بقياس نسبة السكر التراكمي في الدم بعد تطبيق البرنامج، وقد بلغت عينة البحث 18 امرأة تم اختيارها بالطريقة العمدية وتم تقسيمهم الى مجموعتين الأولى تجريبية والثانية ضابطة أجريت عليهم اختبارات القياس القبلي ثم تم تطبيق البرنامج الرياضي المعدل والذي تكون من (36) حصة ، ثم أعيدت نفس اختبارات القياس البعدي وقد اعتمد الباحث على الأدوات الإحصائية المناسبة لمعالجة البيانات عن طريق الحزمة الإحصائية وتم التحقق من صحة الدراسة والخروج باستنتاجات واقتراحات

- الكلمات المفتاحية: الرياضة المكيفة، داء السكري النوع الثاني، السكر التراكمي

- **Theoretical chapter:**

Introduction:

The psychological and social study that relied on a laboratory study don't seek not to achieve a scientific hypothesis or an already proved fact. Actually, this study is an endeavour to persuade women to exercise (diabetic ones) without changing their customs, traditions and religion. The researcher used the scientific way to convince them.

The modern and codified sport activities contribute to improve both performance and health care through applying the program by specialists who precisely study all the important details of the target group. (Leila Al-seid, Hilmi Ibrahim, 1998, p189).

Both of WHO (The World Health Organization) and IDF (the International Diabetes Federation have encouraged the diabetics to exercise, because it is the most efficient way to avoid complications which are caused by this dangerous illness. In fact, it is widely spread in the world (the seventh in the world in terms of death causes). (the official diabetes federation website).

1-The problem Statement:

The various sport activities are considered as educational tools with scientific plans for practitioners with their different levels (Jurgonweineck, 2004, p12)

Despite the advanced medical development in the diffident medical domains, the medical centres remain unable to find out efficient solutions for dangerous illnesses such as diabetes. Far from the Insulin injections and the diet, the different sport activities remain the first choice .

In the past, the diabetes was considered as a fatal illness, but now it is less dangerous thanks to the medical development . Humans can reduce its dangerous symptoms by taking medicines, following the suitable diet and practicing sport .

It is difficult to select the most appropriate sport activity in terms of the customs and the traditions of each society.

The researcher raises the following question :

What is the effect of a sport program on adjusting cumulative glycated hemoglobin level among diabetic women with the second type ?

2 -The premise:

The adapted sports program has an effect on adjusting the cumulative glycated hemoglobin level in women with type 2 diabetes.

3-The Aim of the Study:

This study aims at raising the awareness of the role of practicing sport on reducing the dangerous complications of diabetes (the 2nd type).

The previous studies have shown that sport helps people to reduce Insulin in the body, to lose weight and to protect the heart from different illnesses .

It is found that sport may contribute to reduce the high sugar level in the blood by controlling the Insulin and to reduce the amount of medicines taken by diabetics as well .

Specialised doctors have confirmed that:

- 1- The reduction of sugar in the blood
- 2- The reduction of medicines
- 3- The quality of medicines

Increases the life of the organs affected by diabetes such as:

- 1- Renal Failure
- 2- Reproductive system
- 3- Nervous system.

Based on the different observations in this domain, the researcher sought to know the effect of sport centres in our country with its humble capacities to achieve good results on diabetics (the 2nd type).

4-The Significance of the Study:

In fact, the current research is not a totally medical scientific study that seeks to prove a scientific truth, it is a social study that insists on the role of sport among women. Sport is very beneficial for both men and women. Unfortunately, it not widely common among women due to the different customs and traditions in our country.

The researcher in this study shed the light on the importance of exercising sport by women because it helps them to reduce the dangerous complications of diabetes. The researcher suggested to give women the chance to exercise but in special sport places.

Additionally, this study has shown the importance of sport activities on the psychological side of people. As, it delivered some precious pieces of advice that may encourage these people.

5-Causes of choosing this topic:

Studies about this topic are rare and little is known about this important issue, so this fact motivated us more to conduct this research .

As specialists in this domain, we sought to shed the light on the importance of devoting special sport centres for women with diabetes to protect them from its dangerous effects.

6-Defining terms and concepts:

Diabetes:

defined by the World Health Organization in 1979 as a chronic disease that occurs due to hereditary, acquired or other factors. (Bizar Ali Jokel, 2007, p. 30)

Sports and educational activities:

It is the group of operations, pedagogical, scientific, medical and health sports, through which the body acquires health, tenderness, agility, and moderate strength.

The “Sport adapted”:

Contextually: adapted physical activity is known as all moves, exercises, and all the sport which are practiced by people whose physical, sensor, and mental abilities are limited because of some major physical functions damage. (Al-Izza 2009, P194)

Practically: adapted physical activity consist of a group of sports activities that is being adjusted and adapted in line with people with special needs, according to the type and severity of disability.

Diabetes Type II:

Contextually: “middle age diabetes” it affects people over the age of 30 for several reasons that may not be identifiable and which can be hereditary. (Aymen Abdel-Wahid 2013, P9)

Practically: it is the stress of pancreatic islets and its inability to meet the needs of the human body. The pancreas cannot produce enough insulin to control blood sugar level. This type can be treated away from insulin. (Mustafa Mohamed Nour 2005, P21)

Glycated Hemoglobin:

It is a blood test that is done for diabetics, which measures the level of sugar (glucose) in blood for the last three months. (Abid Arraouadjba 2012, p31)

International statistics :

The scientific barometer of diabetes variable conducted in 2012 a study on the prevalence and spread of diabetes in Algerian society, where its final report indicated that there are 1.6 million people with diabetes and this number is expected to rise to reach 2.4 million.

As a report of the World Health Organization in 2011 indicates now Algeria, the death rate due to cardiovascular disease and curative disease in 2008 was 278.6 males, 275 females per 100,000 people, and the report attributed the

most important reasons to physical inactivity by 39.2 percent as a whole, and males by 39.2 percent and females by 47.6 percent

7- Previous studies:

7-1- Study: Nandita B. Sanghani, Deepak N. Parchwani,¹ Kamlesh M. Palandurkar,¹ Amit M. Shah,² and Jatin V. Dhanani³. Departments of Biochemistry, B. J. Medical College, Ahmedabad, ¹ Gujarat Adani Institute of Medical Sciences, Bhuj, ² Departments of Pharmacology, GMERS Medical College, Gandhinagar, ³ GMERS Medical College, Patan, Gujarat, India, 2013.

Impact of lifestyle modification on glycaemic control in patients with type 2 diabetes mellitus

Abstract

Background: Current treatment guidelines support the role of lifestyle modification, in terms of increasing the quantity and quality of physical activity to achieve target glycaemia in patients with type 2 diabetes mellitus.

Objective: To assess the effect of structured exercise training and unstructured physical activity interventions on glycaemic control.

Materials and Methods: This was a randomized six-month exercise intervention study conducted with previously inactive 279 patients of type 2 diabetes mellitus. Before randomization, all enrolled T2DM participants (n: 300; 30 to 60 year old, having diabetes for more than a year with HbA1c levels of 6.5% or higher) entered a one-month run-in phase to reduce dropout and maintain adherence.

Results: A recommendation to increase physical activity was beneficial (0.14% HbA1c reduction; $P = 0.12$), but was not bringing significantly declines in HbA1c, whereas, structured exercise training is associated with a significant HbA1c decline of 0.59%. ($P = 0.030$). In a subgroup analysis limited to participants with a baseline HbA1c value $> 7\%$, both the unstructured (0.48%; $P = 0.04$) and

structured exercise training (0.77%; $P < 0.01$) groups experienced significant decline in HbA1c Vs the control, whereas among participants with baseline haemoglobin A1c values less than 7%, significant reduction occurred only in the structured exercise training group. Changes in blood pressure; total cholesterol, HDL-cholesterol (high-density lipoprotein), LDL-cholesterol (low-density lipoprotein) and the atherogenic index factors did not statistically significantly differ within (baseline to follow-up) and among groups.

Conclusion: Supervised structured training was more efficacious than unstructured activity in achieving declines in HbA1c. Although both structured and unstructured training provide benefits, only the former was associated with significant reductions in HbA1c levels. Therefore, T2DM patients should be stimulated to participate in specifically designed exercise intervention programs.

Keywords: haemoglobin A1c, physical activity, structured exercise, type 2 diabetes mellitus

7-2- Study: Nani Cahyani Sudarsono and others, Sports Medicine Division, Department of Community Medicine, Faculty of Medicine, University Indonesia.

Abstract

Background: As part of type 2 diabetes mellitus (T2DM) lifestyle management, exercise programs must be demonstrably effective and safe.

Objectives: A randomized controlled trial (RCT) was used to evaluate the results of glycemic control and oxidative stress of a new T2DM management exercise program in a training facility setting.

Methods: The study participants were randomly allocated into either an experimental (EXP) group who participated in the new training program or a control (CTR) group who participated in continuous cardiorespiratory exercise. Each participant's glycemic control (glycated hemoglobin A, HbA1c), fitness level (maximum oxygen uptake, VO_{2max}), and oxidative stress (malondialdehyde,

MDA and superoxide dismutase, SOD) were measured before and after the training program. The 12-week training program combined high-intensity interval training (HIIT) three times a week with resistance training (RT) twice a week while gradually increasing the intensity. The HIIT element was comprised of one minute of high-intensity exercise and four minutes of low-intensity exercise. The RT element was comprised of nine exercises for the core, upper extremities, and lower extremities.

Results: The 42 T2DM patients who participated in this RCT were 35 - 64 years old. The HbA1c level of the EXP group decreased ($\Delta = -0.43 \pm 1.01\%$), although not significantly. The VO₂max was higher in the EXP group (38.13 ± 5.93 mL/kg/min) than in the CTR group (32.09 ± 5.24 mL/kg/min, $P = 0.004$). The overall oxidative stress decreased in the EXP group (MDA level $\Delta = -0.14 \pm 0.39$ nm/mL) when compared to the CTR group (MDA level $\Delta = 0.18 \pm 0.26$ nm/mL, $P = 0.011$), and the SOD level significantly increased more in the EXP group [median $\Delta = 0.47$ U/mL (interquartile range = 0.08 - 0.74 U/mL)] when compared to the CTR group ($\Delta = 0.14 \pm 0.35$ U/mL, $P = 0.036$). The EXP group's composite effects score was significantly higher (8.72 ± 1.27) than the CTR group's score (7.20 ± 1.08 , $P = 0.001$).

Conclusions: The combined HIIT and RT exercise program was not significantly improving glycemic control, however it lowered oxidative stress.

Keywords: Oxidative Stress, Resistance Training, Type 2 Diabetes Mellitus, Physical Fitness, High-Intensity Interval Training, Glycated Hemoglobin A.

- **the adapted sports program:**

There are many different points of view in the development of sports activities programs according to each field, which necessitates identifying the best steps for planning the program, which could be extracted from some specialized scientific programs and previous studies, and the researcher has

developed a program for adapted physical activity in the field of sports hall aerobic sports that follows It is compatible with the obedience of the target group, who are women with type 2 diabetes, in which they follow these steps:

1. Steps to implement the program.
2. The objectives of the program.
3. Preliminary steps.
4. The foundations of the program.
5. Program content.
6. Basic study.
7. The way to take the test.

In this regard, we will briefly touch upon the content of the program. The researcher has specified the duration of the sports activity program 03 months 12 weeks. 3 units per week were distributed per unit time for activity 60 minutes distributed over the activities proposed by the researcher in which he took into account the principle of privacy, gradual pregnancy, gradual rise and adaptation when Program setting. And the researcher has mainly relied in his program on 04 activities, Walking on treadmill, Stationary bicycle, strengthening exercises, and stretching exercises.

- **The practical chapter:**

8- Study Procedures:

8.1- Study approach :

Since the subject of this research is related to applying a mathematical program to two samples, the first is experimental and the second is control, therefore the experimental approach is appropriate to the study.

8.2- Research community :

The research community is represented by women with diabetes type II from the city of Djelfa.

8.3- Sample :

The researcher relied on the intentional sample in terms of specialization and in terms of individuals. The study tool was applied to two groups of the studied sample (diabetic women who practise sports in women sports halls) their number was estimated at 18 women, they were divided into two groups, the first group was experimental, while the second was control. The experimental sample size was estimated at 12 women, and the control sample was 12 as well.

Homogeneity of the research sample :

The researcher has found the equivalence between the experimental and control groups in the variables that may affect the experimental variable, and which was given in the results of previous studies. The researcher also has identified the variables that may affect the experimental variable, which are huge variables, so as not to attribute the differences between the experimental and control groups to these variables, as follows: age, weight, height.

8.4- Research Procedures :

The research procedures are represented in the pre-tests applied to the experimental group and the control group; Then, the application of the mathematical program to the experimental group, and then doing the tests for the experimental and control groups.

8.5- Data collection Tool :

A test by glycogen hemoglobin test device (HbA1c meter) that reflects the blood sugar level during the last 3 months.

Pre-Tests :

The researcher has set all the conditions related to the tests in terms of time, place, tools used, method of implementation, and the assistant team in order to create the same conditions when conducting post-tests. In coordination

with the assistant, individuals conducted the pre-test with the help of a medical laboratory. Calculation of the homogeneity of the research sample was presented in the scale of age, weight, and length variables. The torsional value was less than (± 3), which indicates the homogeneity of the research sample, and this also indicates the equivalence of the experimental and control groups for these variables.

Statistical methods used:

- SMA (Simple Moving Average)
- Standard Deviation
- Student's T-Test
- Process was made using Statistical Package Software SPSS.

9- Presenting and discussing the results:

9.1- Displaying and analyzing the results of the moderate distribution of the experimental and control samples

Table (01): shows a comparison between the arithmetic mean, the standard deviation and the torsional coefficient of the experimental group

	Mean Arithmetic	Standard deviation	coefficient of skewness
weight	63.4	4.01	-0.04
tallness	1.55	2.16	-1.46
age	43	1.56	-1.01

Through the results shown in the above table, it was found that the values of the torsional coefficient are limited to (± 3), which indicates that these measurements are distributed fairly in the experimental group.

Table (02): shows a comparison between the arithmetic mean, the standard deviation, and the torsional coefficient of the control group

	Mean Arithmetic	Standard deviation	coefficient of skewness
weight	61.8	5.05	-1.80
tallness	1.58	3.39	-1.40
age	41	1.39	-1.14

Through the results shown in the above table, it was found that the torsional coefficient values are limited to (± 3), which indicates that these measurements are distributed in a moderate distribution over the control group

9-2 Presentation and analysis of the results of the cumulative blood test :

Table No. (03): shows the difference in the mean, standard deviation, and the calculated and calculated T value between the experimental and control groups for the pre-test.

	sample size	Pre-test		T-test		DF	significance level	Statistical significance
		Mean Arithmetic	Standard deviation	Calculated	Scheduled			
empirical groupe	09	583.64	58.95	2.02	2.21	10	0.05	Is'n statistically significant
Reference groupe	09	573.84	81.25					

Table No. (03) shows the statistical results in the pre-test for the cumulative blood sugar analysis test, and through this it is clear to us that the experimental group obtained in this test a mean average of (583.64) and a standard deviation of (58.95) and the calculated (t) was calculated (2.02) is smaller than the value of (T) scheduled (2.21) and under the degree of freedom (10) at the level of significance 0.05 As for the control group, it reached in this test a mean of (573.84) and a standard deviation of (81.25) and the value of (T) Scheduled is greater than the calculated value of (T) under the degree of freedom (10) and the

significance level is 0.05 From it it becomes clear to us that there are no statistically significant differences at the significance level 0.05 between the experimental and control groups with respect to the cumulative blood analysis test for the pre-measurement. The following diagram shows this:

Figure 1: shows the difference in the mean between the experimental and control groups for the tribal measurement.

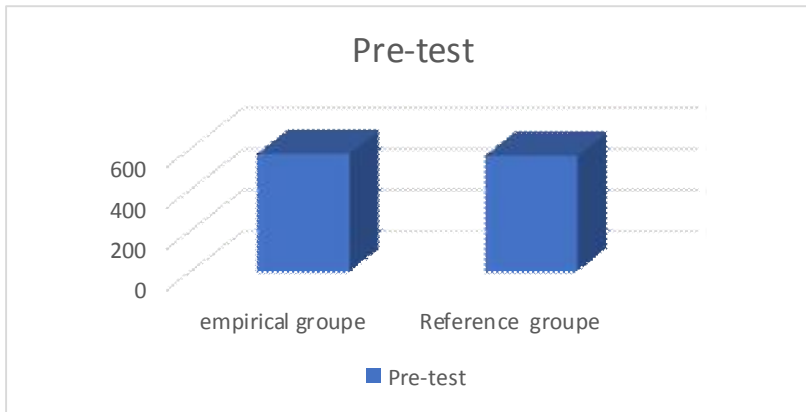


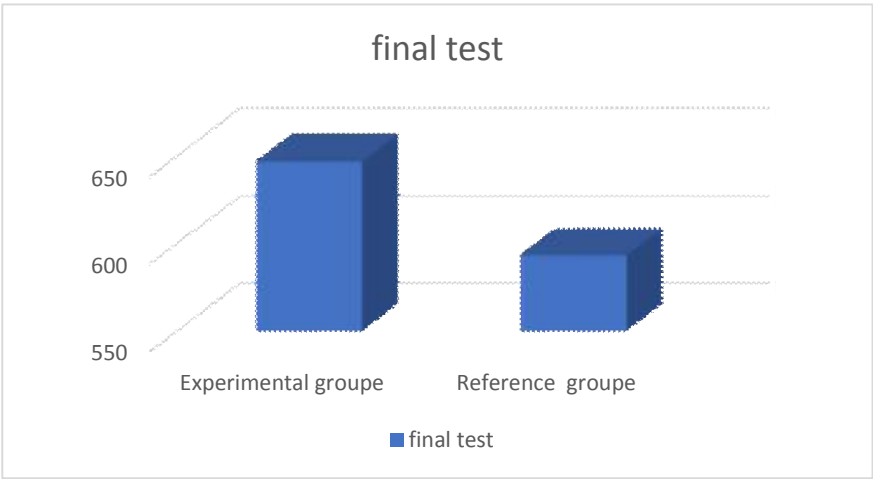
Table No. (04): shows the difference in the mean, standard deviation, and the calculated and calculated value of T between the two experimental and control groups for the post test.

	sample size	final test		T-test		D F	significance level	Statistical significance
		Mean Arithmetic	Standard deviation	Calculated	Scheduled			
empirical groupe	09	647.55	28.07	2.39	2.21	10	0.05	Is'n statistically significant
Reference groupe	09	593.82	58.55					

Table No. (04) shows the statistical results in the post-test for the cumulative blood sugar analysis test, and through this it is clear to us that the experimental group obtained in this test a mean average of (647.55) and a standard deviation of (28.07) and the calculated (t) was calculated (2.39) is smaller than the value

of (T) scheduled (2.21) and under the degree of freedom (10) at the level of significance 0.05 As for the control group, it reached in this test a mathematical average of (593.82) and a standard deviation of (58.55) and the value of (T) Scheduled is greater than the calculated value of (T) under the degree of freedom (10) and the significance level is 0.05 From it it becomes clear to us that there are statistically significant differences at the significance level 0.05 between the experimental and control groups with respect to the cumulative blood analysis test for the dimensional measurement. For the benefit of the experimental group. The following diagram shows this:

Figure (2): shows the difference in the arithmetic mean between the experimental and control groups for the dimensional measurement



From it it is clear to us that there are statistically significant differences at the significance level 0.05 between the experimental and control groups with respect to the cumulative blood analysis test for the posttest measurement. For the benefit of the experimental group. These results demonstrate that the sports program adapted to adjust the cumulative blood sugar in the benefit of the experimental group.

General conclusion :

In the light of the above statistical treatments for data and comparing them with theoretical studies for each of the hypotheses presented in the study, it was realized that all the hypotheses that were formulated and then the application of the program for a period of (12 weeks) which was preceded by a pre-measurement test for the cumulative blood sugar analysis test that gives us the cumulative sugar percentage for the last three months have been achieved. Then the dimensional measurement was done in the same previous conditions and the results were variable in favor of the experimental group. As a result of applying the adapted Riyadh program, and with the fulfillment of the previous hypotheses, and by extrapolating the results from the previous data, we can say that the adapted mathematical program proposed by the researcher has proven successful.

Conclusion :

Diabetes is one of the most prevalent diseases around the world, and 422 million patients worldwide suffer from it (WHO 2014) and 1.8 million diabetics suffer in Algeria (International Diabetes Federation 2017) whose number is increasing every year by a large percentage, and WHO doctors are likely This disease is likely to be the seventh cause of death in the world during the next two decades, with increased rates of infection in both Asia and Africa for reasons related to nutrition and the environment in developing countries. However, it is a disease that can be coexisted with and it has been expressed as a friend disease and its complications are avoided through medical care, the application of a healthy diet and exercise based on scientific grounds.

References

1- International Diabètes Fédération 2017

2- JurgonWeineckManualD’entrainment . Edition vigo 2004.

3- world health organization 2014_2018

4- http://www.who.int/nmh/countries/dza_ar.pdf?ua=1, 2015

5- ابراهيم محمد سلامة، الياقة البدني والتدريب، دار المعارف القاهرة ،1980.

6- ايمن عبد الواحد، السكر، الحرية للنشر والتوزيع ، 2013 .

7- بزار علي جوكل ، معالجة السكري بالتمارين الرياضية، ط1 ، عمان دار دجلة للنشر والتوزيع، 2007

8- عايدة الرواجبة، علاج مريض السكر ، دار الاسراء للنشر والتوزيع ، ط 1 ، 2012

9- ليلى السيد ، حلمي إبراهيم ، التربية الرياضية والترويج للمعاقين، دار الفكر العربي ط1 1998،

10- محمد سعيد حسن العزة ، مدخل الى التربية الخاصة ، دار الثقافة للنشر والتوزيع ط1، عمان 2009

11- مصطفى محمد نور، مرض السكر والتمارين البدنية، المكتبة المصرية للنشر والتوزيع، 2005 .