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**TRANSFORMACIÓN ANTROPOLÓGICA EN MAYORES CON DIABETES TIPO II A
TRAVÉS DEL EJERCICIO: PILATES Y EJERCICIO AERÓBICO**
**TRANSFORMATION OF ANTHROPOLOGICAL STATUS IN ELDERLY WITH TYPE II
DIABETES THROUGH EXERCISE: PILATES AND AEROBIC EXERCISE**

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RESUMEN

PALABRAS

CLAVE:

Diabetes Tipo 2,
Personas
mayores,
Actividad física,
Salud

Las estadísticas muestran que 285 millones de personas sufren de Diabetes Tipo II, esto es el 6% de la población mundial adulta y 60 millones de personas en los Estados Unidos (10% de la población). De los 47 millones de habitantes que posee España, más de 3 millones de personas sufren de diabetes (6.4%). En el año 2010 se gastaron más de 106 mil millones de dólares en salud por causa de la diabetes en los Estados Unidos. El ejercicio físico es una manera de evitar la diabetes en la población a través de: un mejor uso de la propia insulina producida por el cuerpo, de la quema de grasas, del control del peso corporal, del aumento de la fuerza muscular y del aumento en la densidad y calidad ósea. Una frecuencia semanal de 250 a 300 minutos de actividad física puede resultar de gran ayuda en el control de esta patología. La práctica de Pilates es un ejercicio que puede ser utilizado para lograr fácilmente un estado físico saludable. Puede ser realizado en el hogar, aprendiendo la técnica a través de la TV o de DVDs, es conveniente y sin costos. Además no presenta riesgos para las personas con diabetes tipo II, quienes son vulnerables por presentar una biomecánica disminuida en los miembros inferiores y/o una disfunción de la marcha.

ABSTRACT

KEY

WORDS:

Type 2 diabetes
mellitus,
Elderly people,
Physical activity,
Health

Estimations are that 285 million people suffer from Type 2 diabetes, or 6% of the world's adult population and 60 million people in the EU (10% of population). Spain's population 47 million people, over 3 million have diabetes (6.4%). In 2010 year 106 billion was spent on healthcare for diabetes in the EU. Exercise is a key component to good diabetes management as well as helping people to avoid diabetes altogether by improving body's use of insulin, burning body fat, helping to decrease and control weight, increasing muscle strength, increasing bone density and strength. Walking, aerobic, strength training, stretching, swimming are highly recommended activities to people with Type 2 Diabetes. A 250-300 minutes frequency of physical activity (PA) per week can be very helpful in controlling this pathological state. Pilates is a controlled exercise program that can be used to achieve fitness and health goals. It is convenient and inexpensive. Pilates can be done at home, learning techniques from TV or a DVD. Also, Pilates is free of risk for people with Type 2 diabetes which is a vulnerable category because of altered lower limb biomechanics and possible gait dysfunction.

INTRODUCTION

Management of type 2 diabetes focuses on lifestyle interventions, lowering other cardiovascular risk factors, and maintaining blood glucose levels in the normal range¹. Self-monitoring of blood glucose for people with newly diagnosed type 2 diabetes was recommended by the British National Health Service in 2008^{2,3}. However, the benefit of self monitoring in those not using multi-dose insulin is questionable. Managing other cardiovascular risk factors, such as hypertension, high cholesterol, and microalbuminuria, improves a person's life expectancy.

Epidemiology

Globally as of 2010 it was estimated that there were 285 million people with type 2 diabetes making up about 90% of diabetes cases. This is equivalent to about 6% of the world's adult population. Diabetes is common both in the developed and the developing world. It remains uncommon, however, in the underdeveloped world⁴.

About 60 million people in the European Region have diabetes: about 10.3% of men and 9.6% of women aged 25 years and over. Prevalence is increasing among all age groups in the Region, mostly owing to increases in lifestyle-related risk factors⁵. According this Jakab,, WHO regional director for Europe, *"the only sure way to control the diabetes epidemic is to stop people getting diabetes"*. For example, Spain's population 47,042,984 (2011) has grown in the last 10 years due to immigration.

This has put massive pressure on medical services, especially as many of these immigrants have retired, have type 2 diabetes, or are well on their way to developing it. As of 2010, over 3 million people in Spain have diabetes, and approximately 450,000 have type 1 diabetes⁴.

Type 2 Diabetes and exercise

Exercise is very important in managing type 2 diabetes^{6,7}. Several guidelines recommend to practice moderate to vigorous aerobic exercise to improve the cardiovascular system of patients with type 2 diabetes⁸. Combining diet, exercise, and prescribed medicine can help control your weight and blood sugar level.

According to Castaneda et al.⁹, high intensity exercise might improve the body's use of insulin, glycemic control and some abnormalities which are associated with the metabolic síndrome in elderly. High intensity of resistance exercise might improve the muscle strength¹⁰ and risk factors for cardiovascular disease such as blood pressure¹¹ and reducing the risks of heart disease, body mass index¹² (BMI), and protect against heart and blood vessel disease by lowering LDL cholesterol¹³. This is related with decrease and control of weight.

During practice of PA and exercise, the body needs extra energy through glucose for the exercising muscles. However, for short bursts of exercise such as a quick sprint, the skeletal muscles mass and the liver use the glucose as

fuel¹⁴. Moreover, if the PA is continued by moderate exercising, muscles will take glucose 20 times more than normal rate. Thus, blood sugar levels considerably decrease and insulin levels are going also to decrease whether the insulin is no used and the risks of hypoglycemia or low blood sugar is minimized¹⁴. However, high intensity exercise might temporarily increase the blood glucose levels just after the final of any exercise. The physiological system can recognizes high intensity of exercise as stress and activate the stress hormones to increase available blood sugar necessary for skeletal muscles mass^{8,9}. Thus, it is necessary to check often the sugar level after practicing exercise.

Exercise is one of the most important ways that diabetics can lose weight and control their blood sugar^{6,15}. The ability to start slow, to modify exercises, and even the fact that you can do a whole Pilates workout without standing are features of Pilates that make it an appealing choice for diabetics. Exercise, of almost any kind, is a key component to good diabetes management as well as helping people avoid diabetes altogether. The importance of Pilates method exercises have experienced a improvement and innovation since first steps of Joseph Pilates through his two books: *Your Health*¹⁶. The Pilates method coincides with the modern principles of fitness, personal training, and mental happiness through exercises that maintain a neutral spine position and appropriate of the floor and

equipment to develop strength and balance¹⁷.

Pilates is an appropriate PA for people with diabetes because it helps to improve the flexibility, balance, and strength through fluid movements using the own body weight¹⁸. The American Diabetes Association¹⁹ reports in 2012 that 29.1 million of American people (9.3% of total population) have been diagnosed with diabetes and another 8.1 million have it but haven't been diagnosed. Diabetes prevalence in American elderly people is 25.9% of total (11.8 million of elderly diagnosed and undiagnosed).

Pilates is a proven set of exercises that strengthens and conditions the body's key core areas. In addition, Pilates classes are widely available at most of fitness clubs, gyms and on DVD, so getting started is easy. The Pilates method is a controlled series of exercise^{20,21,22,23,24} proven physical and clinical benefits through several studies^{25,26}. According to Irez et al.²⁷, the importance of these physical fitness parameters on reducing the risk of falling in elderly populations was clearly documented by a recent study²⁸ which suggested that lower extremity flexibility, reaction time, and strength should be studied and considered when developing exercise-based fall intervention programs for older adults.

Aerobic exercise is a very important component of physical fitness and could improve other components through exercises with large muscle

groups working dynamically²⁹. One of the most important physiological changes in ageing process is the declination of aerobic process³⁰. The aerobic capacity starts to decrease after 40 years and experiences a loss of 30% after 65 years³¹. In the other hand there is a reduction in maximal oxygen uptake of 0.5%–1.0% per year³². Walking is the most typical low impact exercise and preferred in type 2 diabetes patients who practice some exercise³³.

Conclusions

Interventional program of exercise focused to diabetic patients might improve the gait speed, balance, muscle strength and other fitness capacities. The mixture of aerobic and resistance exercise such as Pilates method might prevent and control the insulin resistance and diabetes problems related with health. Therefore, type 2 diabetes patients can experience a improvement in their blood sugar level and prevent cardiovascular diseases.

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References

1. Rippe, edited by Richard S. Irwin, James M. Manual of intensive care medicine (5th ed.). Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins, 2010.

2. American Diabetes Association. Diabetes Care “January 2010”, 2010. http://care.diabetesjournals.org/content/33/Supplement_1/S3.full
3. Gorsky M. The British National Health Service 1948-2008: A review of the historiography. *Social History of Medicine*. 2008; 21(3): 437-460.
4. Jakab S. Europe day: setting the scene. Intersectoral elements of the Health 2020 Strategy. 8th Global Conference on Health Promotion. Helsinki: WHO, 2013.
5. Jakab S. Better health for Europe. PINSAP Strategy and Programme. Barcenola: WHO, 2014.
6. Makura CB, Nirantharakumar K, Girling AJ, Saravanan P, Narendran P. Effects of physical activity on the development and progression of microvascular complications in type 1 diabetes: retrospective analysis of the DCCT study. *BMC Endocr Disord*. 2013; 13: 37.
7. Schellenberg ES, Dryden DM, Vandermeer B, Ha C, Korownyk C. Lifestyle interventions for patients with and at risk for type 2 diabetes: a systematic review and meta-analysis. *Ann Intern Med*. 2013; 159: 543–551.
8. American Diabetes Association. Standards of medical care in diabetes–2014. *Diabetes Care*. 2014; 37(Suppl): 1S14–80.
9. Castaneda C, Layne JE, Munoz-Orians L, Gordon PL, Walsmith J, Foldvari M, et al. A Randomized Controlled Trial of Resistance Exercise Training to Improve Glycemic Control in Older Adults With Type 2 Diabetes. *Diabetes Care*. 2002; 25: 2335–2341.
10. Evans WJ, Cyr-Campbell D. Nutrition, exercise, and healthy aging. *J Am Diet AsSoc*. 1997; 97: 632–638.
11. Kelley GA, Kelley KS, Tran ZV. Walking and resting blood pressure in adults: a meta-analysis. *Prev Med*. 2001; 33: 120–127.
12. Murphy MH, Nevill AM, Murtagh EM, Holder RL. The effect of walking on fitness, fatness and resting blood pressure: a meta-analysis of randomised, controlled trials. *Prev Med*. 2007; 44: 377–385.

13. Kelley GA, Kelley KS, Tran ZV. Walking and Non-HDL-C in adults: a meta-analysis of randomized controlled trials. *Prev Cardiol.* 2005; 8: 102–107.
14. Mahmuda F, Yasmin A, Mahi Uddin M, Begum R. Effect of Exercise in the Prevention and Management of Type 2 Diabetes Mellitus. *Pulse.* 2013; 6: 33-36.
15. Qiu S, Cai X, Schumann U, Velders M, Sun Z, Steinacker JM. Impact of Walking on Glycemic Control and Other Cardiovascular Risk Factors in Type 2 Diabetes: A Meta-Analysis. *PLOS One.* 2014; 9(10): e109767.
16. Pilates, JH. *Your Health.Presentation. Dynamics,* 1998
17. Levine B, Kaplanek B, Jaffe WL. Pilates training for use in rehabilitation after total hip and knee arthroplasty: a preliminary report. *Clin Orthop Relat Res.* 2009; 467(6):1468–1475.
18. Johnson EG, Larsen A, Ozawa H, Wilson CA and Kennedy KL. The effects of Pilates-based exercise on dynamic balance in healthy adults. *Journal of Bodywork and Movement Therapies.* 2007; 11(3): 238-242.
19. American Diabetes Association. *Statistics about Diabetes.* 2013. <http://www.diabetes.org/diabetes-basics/statistics/?loc=superfooter>
20. Bernardo LM. The effectiveness of Pilates training in healthy adults: An appraisal of the research literature. *Journal of Bodywork and Movement Therapies.* 2007; 11: 106-110.
21. Cozen DM. Use of Pilates in foot and ankle rehabilitation. *Sports Medicine and Arthroscopy Review.* 2000; 8(4): 395-403.
22. Kloubec JA. Pilates for improvement of muscle endurance, flexibility, balance, and posture. *Journal of Strength & Conditioning Research.* 2010; 24(3): 661-667.
23. Latey P. The Pilates method: history and philosophy. *Journal of Bodywork and Movement Therapies.* 2001; 5(4): 275-282.
24. Smith K and Smith E. Integrating Pilates-based core strengthening into older adult fitness programs implications for practice. *Topics in Geriatric Rehabilitation.* 2005; 21(1): 17-67.
25. Babiyigit G., Ozdemir RA, Evin R, Irez SG, Korkusuz F. Integrating Pilates exercise program for 65+ year-old women to reduce falls. *Journal of Sport Science and Medicine.* 2011; 10: 105-11.
26. Di Lorenzo MD, Cameron C, Bruno V, Valuria DB, Carlo C. In preparation for the international symposium on obesity in the elderly. *Ageing Health.* 2006; 2:47-51.
27. Irez GB, Ozdemir RA, Evin R., Irez SK, Korkusuz, F. Integrating Pilates exercise into an exercise program for 65+ year-old women to reduce falls. *Journal of Sport Science and Medicine* 2011; 10: 105-111.
28. Hsiao-Wechsler, ET. Biomechanical and age-related differences in balance recovery using the tether-release method. *Journal of Electromyography and Kinesiology.* 2008;18(2): 179-187.
29. Tumiati R, Mazzoni G, Crisafulli E, Serri B, Beneventi C, Lorenzi CM, et al. Home-centred physical fitness programme in morbidly obese individuals: a randomized controlled trial. *Clinical Rehabilitation.* 2008; 22: 940-950.
30. Fleg JL, Morrell CH, Bos AG, Brant LJ, Talbot LA, Wright JG, et al. Accelerated Longitudinal Decline of Aerobic Capacity in Healthy Older Adults. *Circulation.* 2005; 112: 674-682.
31. Kostić R, Pantelić S, Uzunović S, Djuraskovic R. A comparative analysis of the indicators of the functional fitness of the elderly. *Facta Univ Ser Phys Educ Sport.* 2011;9(2):161–171.
32. Martin PE, Morgan DW. Biomechanical considerations for economical walking and running. *Med Sci Sports Exerc.* 1992;24(4):467–474.
33. Thomas N, Alder E, Leese GP. Barriers to physical activity in patients with diabetes. *Postgrad Med J.* 2004; 80: 287–291.

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