



ORIGINAL ARTICLE

Home-based treadmill training improved seminal quality in adults with type 2 diabetes[☆]



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KEYWORDS

Type 2 diabetes mellitus;
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Abstract

Objective: This was the first study conducted to determine the influence of home-based treadmill training on seminal quality in adults with type 2 diabetes.

Materials and methods: Sixty sedentary adults with type 2 diabetes volunteered for the current study. Thirty were randomly allocated to the intervention group and performed a 14-week, home-based, treadmill training program, 3 sessions per week, consisting of a warm-up (10–15 min), 40 min treadmill exercise at a work intensity of 55–70% of peak heart rate (increasing by 2.5% each two weeks) measured during a maximal treadmill test, and cooling-down (5–10 min). The control group included the age of 30, and BMI matched adults with type 2 diabetes who did not take part in any training program. Seminal quality analysis included semen volume, sperm concentration, motility and normal morphologic features. Furthermore, total antioxidant status (TAS) and glutathione peroxidase (GPX) activity were assessed in seminal plasma. This protocol was approved by an Institutional Ethics Committee.

Results: The home-based treadmill training significantly increased sperm concentration as well as percentages of total sperm motility and normal spermatozoa. Furthermore, TAS and GPX activity were increased after the completion of the training program. No significant changes in any of the measured variables were found in the control group.

Conclusions: Home-based treadmill training improved seminal quality in adults with type 2 diabetes. A secondary finding was that seminal antioxidant defense system was significantly increased after being exercised.

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PALABRAS CLAVE

Diabetes mellitus tipo 2;
Ejercicio;
Semen;
Defensas
antioxidantes

El entrenamiento en tapiz rodante a domicilio mejora la calidad seminal en adultos con diabetes de tipo 2

Resumen

Objetivo: El presente estudio se diseñó para determinar la influencia de un programa de entrenamiento domiciliario en la calidad seminal de adultos con diabetes tipo 2.

Material y método: Participaron un total de 60 adultos varones con diagnóstico de diabetes tipo 2 distribuidos aleatoriamente en un grupo intervención ($n=30$) y otro control ($n=30$). Los participantes incluidos en el grupo de intervención desarrollaron un programa de entrenamiento domiciliario en tapiz rodante de 14 semanas, 3 sesiones/semana de 40 min a una intensidad del 55-70% FC_{máx} (incrementando un 2,5% cada 2 semanas). Los parámetros de calidad seminal ensayados fueron: volumen, concentración y porcentaje de movilidad y morfología normal. Asimismo se estudió el nivel de defensas antioxidantes en plasma seminal. Nuestro protocolo fue aprobado por un comité de ética institucional.

Resultados: Tras completar el programa de entrenamiento se observó un incremento significativo de la concentración espermática, así como de los porcentajes de movilidad y de morfología normal. Paralelamente, se observó un incremento del estatus total antioxidante en el plasma seminal. No se observaron cambios significativos en ninguna de las variables ensayadas en el grupo control.

Conclusiones: El programa de entrenamiento mejoró la calidad seminal en pacientes con diabetes tipo 2. Este hallazgo podría explicarse por una mejora de las defensas antioxidantes seminales inducida por el ejercicio.

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Introduction

Previous studies have highlighted the prevalence of diabetes in a population of male partners of infertile couples.¹ Echevarria-Sánchez et al.² found that patients with type 2 diabetes mellitus (T2DM) exhibited a low sperm progressive mobility that might be associated to subfertility. In a more detailed way, the highest percentage of sperm DNA damage because of oxidative stress seen in T2DM patients may be responsible for the poor embryonic development and pregnancy outcome in these individuals.³ In fact, oxidative stress is widely recognized as one of the major causes of male subfertility/infertility both in experimental⁴ and human studies.⁵

Fortunately, de Oliveira et al.⁶ have already demonstrated that a 12-week training program provided important upregulation in antioxidant enzymes and increased nitric oxide bioavailability, which may help minimize oxidative stress and the development of the chronic complications of T2DM. Therefore, this was the first study conducted to determine whether home-based training may improve seminal quality in adults with T2DM. A secondary objective was to assess its influence on antioxidant defense system in seminal plasma.

Materials and methods

Participants

A total of sixty adults with T2DM were recruited from the community for the current study. The characteristics of the participants at baseline are summarized in Table 1. All the subjects met the following inclusion criteria: (1) young

adults (25–40 years); (2) diagnosis of T2DM; (3) medical approval for physical activity participation. On the other hand, exclusion criteria were: (1) participation in a training program in the 6 months prior to their participation in the trial; (2) testicular varicocele, genital infection, and/or leukocytospermia; (3) previous surgery (e.g. vasectomy reversal, varicocele removal, etc.); (4) receiving medication and/or antioxidant consumption that may interfere with measured outcomes; (5) toxic habits (smoking and/or alcohol); (6) not completing at least 90% of the training sessions.

Participants were randomly allocated to the intervention ($n=30$) or control group ($n=30$) using a concealed method.

Home-based treadmill training

Participants in the intervention group performed a 14-week, home-based, treadmill training program, 3 sessions per week, consisting of a warm-up (10–15 min), 40 min treadmill exercise at a work intensity of 55–70% of peak heart rate (increasing by 2.5% every two weeks) measured during a maximal treadmill test, and cooling-down (5–10 min).

Table 1 Anthropometric, biochemical and fitness status of adults with type 2 diabetes enrolled in the intervention and control groups at baseline.

	Intervention	Control	P value
Age (years)	36.2 ± 3.5	35.7 ± 4.0	>0.05
Fat mass (%)	30.3 ± 2.8	29.7 ± 2.6vs	>0.05
HbA1c (5)	7.8 ± 0.5	7.5 ± 0.3	>0.05
Fitness (ml/kg/min)	34.7 ± 2.1	33.9 ± 2.4	>0.05

Note: Results expressed as mean ± sd.

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