



Obesity indices and haemodynamic response to exercise in obese diabetic hypertensive patients: Randomized controlled trial

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KEYWORDS

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Summary

Introduction: Obesity, diabetes and hypertension are major worldwide interconnected problems. The aim of this study was to investigate body mass index (BMI), waist circumference (WC), systolic and diastolic blood pressure (SBP and DBP) responses to circuit weight training (CWT) or aerobic exercise training (AET) in obese diabetic hypertensive patients (ODHP).

Methods: Fifty-nine ODHP were randomly assigned into CWT, AET and control groups. Either CWT or AET was performed thrice weekly for 12 weeks. Variables were evaluated pre-training (evaluation-1), after 3 months (evaluation-2) and 1 month post-training cessation (evaluation-3).

Results: At evaluation-2, BMI, WC, SBP, DBP mean values and percentages of decrease were 31.56 ± 1.48 (9.23%), 104 ± 5.97 (6.2%), 141 ± 2.2 (3.09%), 91.2 ± 1.24 (2.98%) and 32.09 ± 1.21 (7.11%), 107.66 ± 3.92 (3.07%), 138.3 ± 1.17 (4.79%), 88.05 ± 1.05 (6.02%) for CWT and AET groups respectively ($P < 0.05$). At evaluation-3, mean values and percentage of decrease in BMI, WC, SBP, DBP were 31.88 ± 1.54 (8.29%), 105 ± 5.28 (5.26%), 142.6 ± 2.21 (1.99%), 92.7 ± 0.86 (1.38%) and 33.26 ± 1.22 (3.72%), 109.1 ± 4.15 (1.77%), 140.35 ± 1.23 (3.38%), 89.5 ± 0.61 (4.47%) for CWT

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and AET groups respectively ($P < 0.05$). There were also significant differences in BMI, WC, SBP, and DBP between groups at evaluation-2 and 3 ($P < 0.05$).

Conclusions: While CWT is the intervention of choice to control obesity indices, AET is still the best intervention to lower blood pressure in ODHP, for a more extended period of time.

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Introduction

Obesity and its related disorders, type 2 diabetes mellitus (T2DM) and hypertension are serious problems associated with increased morbidity and mortality worldwide. Coupling of T2DM or hypertension with obesity predispose patients to target organs damage [1]. Obesity is the principal risk factor for hypertension and T2DM [2]. Globally, the massive worldwide explosion in rates of obesity is responsible for increased diabetes rate [3].

There is clear and strong association between obesity and hypertension [4]. Excess adiposity plays direct role in the establishment of obesity-induced hypertension where obesity per se can be classified as a prime cause of hypertension in obese subjects [5]. Furthermore, the close association between obesity and T2DM cannot be underestimated, as obesity is associated with increased T2DM and hypertension risk [6].

Hypertension is a major cause of cardiovascular events in obese diabetic patients, so blood pressure should be closely monitored and controlled in those populations [7]. Hypertensive patients with concomitant diabetes mellitus (DM) or obesity should be treated as a matter of priority to prevent subsequent cardiovascular complications [8].

Lifestyle behaviour plays an essential role in the prevention and treatment of the most non-communicable chronic diseases [9], so it should be included in the treatment of obese diabetic hypertensive patients (ODHP) [10]. As the primary goal in the treatment of the sedentary inactive subject is to encourage him to be active, so resistance training may be an alternative and a more attractive option than endurance training because the workout duration is interrupted by multiple resting episodes [11].

Although many studies have been published on the influence of aerobic exercise training (AET) on obesity, DM and hypertension, but still there is a little information regarding responses of ODHP

to dynamic exercise. Furthermore, and up to our knowledge and available literature – none of them compared the effects of circuit weight training (CWT) and AET programs on obesity indices and blood pressure in ODHP and so, there is no specific recommendations regarding the management of those patients. This study was a trial to explore and compare the responses of the obesity indices and blood pressure to CWT or AET on both short-term basis (after 3 months exercise training) and long-term basis (1 month after training cessation), to establish proper therapeutic recommendations when caring for ODHP.

Materials and methods

Subjects

Sixty-four eligible, volunteer, obese, type 2 diabetic participants with mild essential hypertension (systolic blood pressure [SBP] = 140–150 mmHg, diastolic blood pressure [DBP] = 90–100 mmHg) were screened to be enrolled in this study. Of them, five patients were excluded. The remaining 59 patients (33 women and 26 men) were included (Fig. 1).

They were recruited from Cairo University hospitals' outpatient clinics, provided informed consent forms giving agreement for participation and publication of the study results, they underwent the initial evaluation, completed the study and underwent the afterwards evaluations. This study was approved by the departmental council and the ethics committee of the Faculty of Physical Therapy, Cairo University.

The inclusion criteria

Age ranged from 45 to 60 years, with established obesity (class I and II), BMI = 30–39.9 kg/m², WC > 102 cm in men and > 88 cm in women,

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