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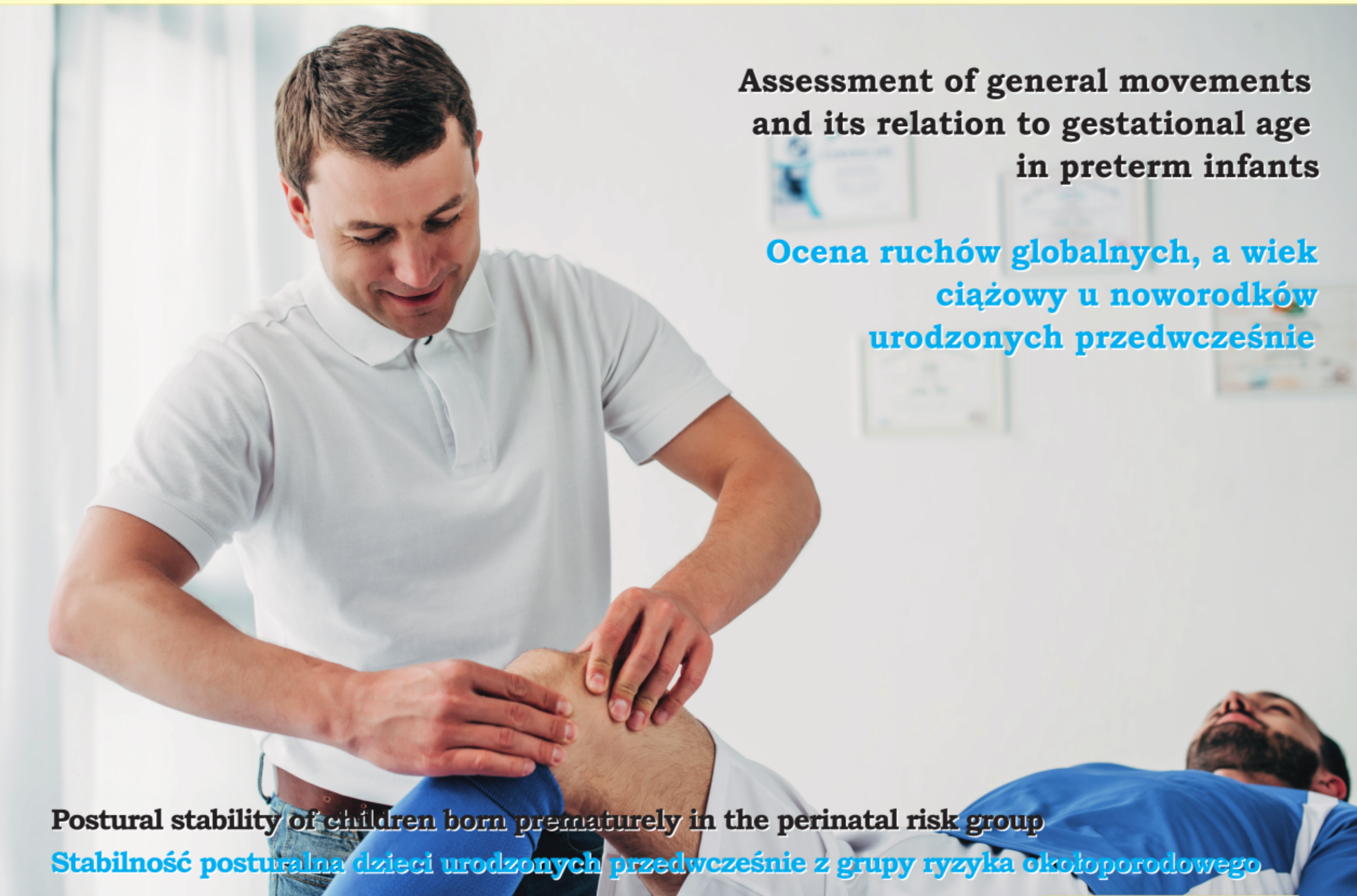

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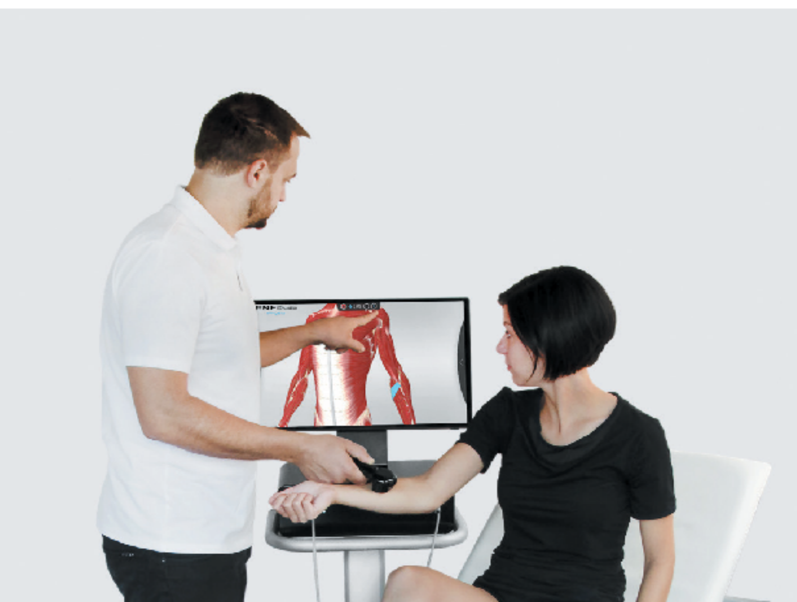

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Effect of exercise versus diet on visceral adiposity indicators in obese postmenopausal diabetic women: A comparative study

Wpływ ćwiczeń i diety na wskaźniki otyłości trzewnej u otyłych kobiet z cukrzycą po menopauzie: badanie porównawcze

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Abstract

Objective. To evaluate the effect of aerobic exercise versus dietary modification on visceral adiposity indicators in obese postmenopausal diabetic women. Design. A prospective, randomized, controlled comparative study.
Methods. Thirty-six obese postmenopausal women, suffering from type 2 diabetes (T2D), participated in this study. They were randomized into two equal groups. The exercise group received aerobic exercise program for 8 weeks (n = 18), whereas the diet group received dietary modification for 8 weeks (n = 18). The anthropometric parameters, fasting blood glucose (FBG), triglyceride (TG), high density lipoprotein (HDL) and visceral adiposity indicators were evaluated for all women in the two groups before and following 8 weeks of treatment.
Results. All outcome measures showed statistically significant improvements within both groups ($p < 0.05$), with statistically non-significant differences between both groups after treatment ($p > 0.05$).
Conclusion. Aerobic exercise and dietary modification have similar positive effects on visceral adiposity indicators in obese postmenopausal diabetic women.

Key words:

aerobic exercise, dietary modification, visceral adiposity indicators, postmenopausal women, diabetes, obesity

Streszczenie

Cel. Ocena wpływu ćwiczeń aerobowych w porównaniu z modyfikacją diety na wskaźniki otyłości trzewnej u otyłych kobiet z cukrzycą po menopauzie. Projekt. Prospektywne, randomizowane, kontrolowane badanie porównawcze.
Metody. W badaniu wzięło udział 36 otyłych kobiet z cukrzycą typu 2 po menopauzie. Kobiety zostały losowo podzielone na dwie równe grupy. Grupa ćwicząca wykonywała program ćwiczeń aerobowych przez 8 tygodni (n = 18), podczas gdy grupa dietetyczna zastosowała modyfikację diety przez 8 tygodni (n = 18). U wszystkich kobiet w obu grupach przed i po 8 tygodniach leczenia oceniano parametry antropometryczne, glikemię na czczo (FBG), trójglicerydy (TG), lipoproteiny wysokiej gęstości (HDL) oraz otyłość trzewną.
Wyniki. Wszystkie miary wyników wykazały statystycznie istotną poprawę w obu grupach ($p < 0,05$), przy statystycznie nieistotnych różnicach między obiema grupami po leczeniu ($p > 0,05$).
Wniosek. Ćwiczenia aerobowe i modyfikacja diety mają podobny korzystny wpływ na wskaźniki otyłości trzewnej u otyłych kobiet z cukrzycą po menopauzie.

Słowa kluczowe

ćwiczenia aerobowe, modyfikacja diety, wskaźniki otyłości trzewnej, kobiety po menopauzie, cukrzyca, otyłość

Introduction

Postmenopausal women have high risk of developing chronic diseases, most commonly type 2 diabetes (T2D) [1]. Reduced levels of growth and sex hormones after menopause produce decreased metabolism in addition to increased general and abdominal obesity. Visceral adiposity, in postmenopausal women, is accompanied by insulin resistance, T2D and cardiovascular disease [2, 3].

Visceral adiposity indicators, including visceral adiposity index (VAI) and lipid accumulation product (LAP), combine both anthropometric and lipid measurements. They represent novel, simple and more powerful risk markers for T2D among women than either traditional anthropometric outcomes or lipid investigations alone, while they were as good as dual-energy x-ray absorptiometry body fat assessment [4, 5].

Since obesity predisposes significantly to T2D, lifestyle strategies like exercising and dietary modification represent keystones in management of T2D through achieving weight control, improving glycemic control and reducing cardiovascular disease risk factors [6, 7].

Although previous studies have investigated the valuable effects of exercising and/or dietary modification strategies on patients suffering from T2D [6, 8, 9], none of them have compared their effects on visceral adiposity indicators in diabetics. Therefore, the present study aimed to compare the effect of aerobic exercise versus dietary modification on visceral adiposity indicators in obese postmenopausal women with T2D.

Materials and methods

Study Design

The study was designed as a prospective, randomized, controlled comparative study. Prior to the study initiation, the institutional review board at Cairo University's Faculty of Physical Therapy gave ethical approval [No: P.T.REC/012/002984]. The study was carried out in accordance with the Helsinki Declaration guidelines on human research. Between October 2020 and March 2021, the research was conducted.

Participants

A sample of thirty-six obese postmenopausal women was recruited from the National Institute of Diabetes and Endocrinology, Kasr El Ainy, Egypt. Participants were chosen ambulant, sedentary, nonsmoking women having menopause naturally at least one year prior to participation in the study with no history of surgical removal of uterus and/or both ovaries. They had T2D (fasting blood glucose (FBG) was more than or equal to 7.0 mmol/L)) [10]. Their age was 50-65 years old and their body mass index (BMI) was 30-35 kg/m2. Exclusion criteria were premature menopause, type 1 diabetes, morbid obesity, bariatric surgery, cardiopulmonary, thyroid, renal, hepatic or musculoskeletal diseases, anemia, cancer, or receiving hormonal replacement therapy, anti-diabetic drugs or any weight loss medications within the past 6 months.

Randomization

Each participant received information regarding the study's nature, objective, and benefits, the right of withdrawal or refusal anytime, and the confidentiality of any data gathered. Computer-generated randomization cards preserved in sealed envelopes were used to randomize participants into two groups of equal number (Exercise group & Diet group). No dropping out of subjects was reported following randomization, Figure 1.

Interventions

The exercise group included 18 participants who received aerobic exercise program for 8 weeks, whereas the diet group included 18 participants who received dietary modification program for 8 weeks.

Aerobic exercise program

Each postmenopausal woman in the exercise group participated in moderate aerobic exercise on a treadmill, 3 days/week with no more than two successive days without exercising, for 8 weeks. The exercise intensity for each woman was based on the target heart rate (THR) that was calculated in accordance with Karvonen's equation, using resting heart rate (HRrest), maximal heart rate (HRmax) and training fraction. THR = HRrest (bpm) + (HRmax (bpm) – HRrest (bpm)) × training fraction. For HRmax calculation, the age was subtracted from 220. For moderate intensity, the training fraction was 65 to 75% [11]. Each exercise session had three phases. The phase of warming up involved 5 minutes of slow walking on a treadmill [Biodex Gait Trainer 2, USA] with training fraction equals 30-40%. During the active phase, the speed of the treadmill was gradually raised and determined for each woman in accordance with the prescribed intensity depending on THR. In the first week of training, the active phase continued for 20 minutes; then, its duration was gradually increased every week by 5 minutes till reaching 55 minutes by the end of program. The session terminated with cool down phase for 5 minutes on the treadmill, whilst its speed was subjected to gradual lowering till return of heart rate to its resting level. Aerobic exercise program was performed after eating breakfast by 2 hours. Blood glucose levels were checked, before and after exercising, to avoid the danger of hypoglycemia. Women in this group were instructed to follow their habitual diet throughout the study period.

Dietary modification program

Each postmenopausal woman in the diet group followed dietary modification program of food quantity and quality for 8 weeks. Firstly, the total energy requirement per day was determined by multiplying the Harris-Benedict equation by 1.2 [12]. Then, the daily caloric intake was restricted by 500 Kcal daily (Daily caloric intake = total energy requirement per day - 500 kcal). The calories were divided into three meals and three snacks with keeping a well-proportioned diet, incorporating carbohydrates, fats and proteins of 55%, 30% and 15% respectively. Regarding carbohydrates, low glycemic index diet, whole grains, fruits, vegetables, legumes and low-fat dairy were emphasized, while added sugar, as well as sweetened foods and beverages (including fruit juices) were limited. Regarding fats, monounsaturated (e.g. olive oil) as well as polyunsaturated omega-3 types (e.g. nuts, oily fish and seafood) were emphasized, while saturated and trans fats were restricted to not more than 10% of the daily caloric intake. Regarding proteins,

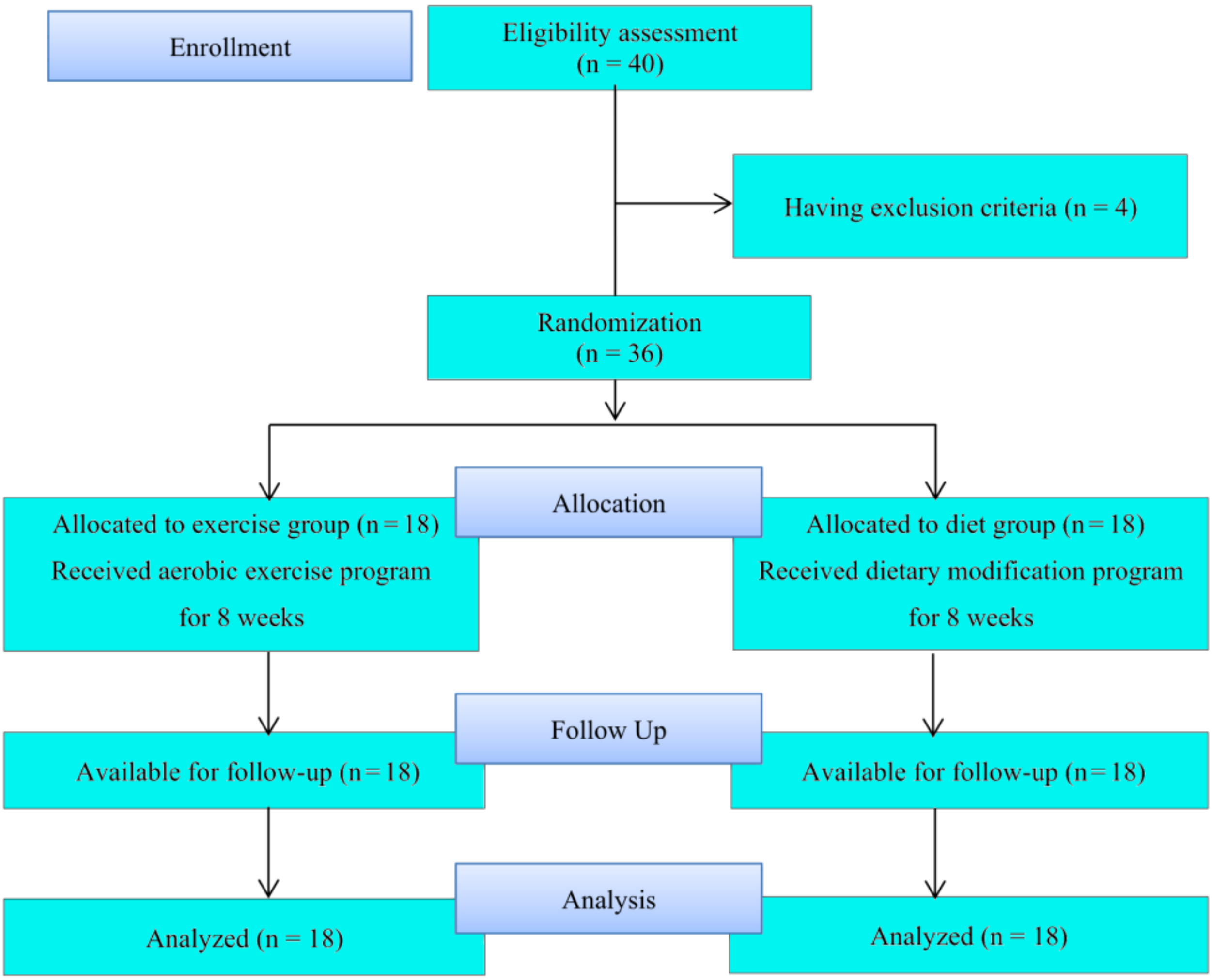

Figure 1. Flow chart of the randomized trial

plant protein sources (e.g. legumes) were emphasized, while animal protein sources rich in saturated fats (e.g. red meat and eggs) were reduced [9,13]. All postmenopausal women in the diet group adhered closely to the diet program and were reassessed every week through follow up visits to note their improvement in weight and identify the new total energy requirement per day and the new daily caloric intake that should be followed.

Outcome measures

Anthropometric parameters

Anthropometric parameters, involving weight, height and waist circumference (WC), were assessed for all postmenopausal women in both groups before and after the end of treatment. The weight and height were measured using a weight-height scale without shoes and with light clothes. Then, weight was divided by height squared (kg/m2) to calculate the BMI. At the exhalation end, WC was measured in standing position by a tape measure, which was placed horizontally at the narrowest point between rib cage bottom and iliac crests top.

Biochemical parameters

The levels of biochemical parameters, including fasting blood glucose (FBG), triglyceride (TG) and high density lipoprotein (HDL), were measured for all postmenopausal women in both groups before treatment program initiation and after the end of treatment program by 72 hours. Blood samples were obtained at 9:00–10:00 a.m. following 8 hours of fasting. Then, they were subjected to centrifugation, plasma separation and storage at −20ºC till analysis. The COBAS 8000 Modular Analyzer (Roche Diagnostics GmbH) was used to measure the fasting levels of FBG, TG and HDL [4].

Visceral adiposity indicators

The visceral adiposity indicators, including visceral adiposity index (VAI) as well as lipid accumulation product (LAP), were calculated for all postmenopausal women in both groups before and after the end of treatment, in accordance with the following equations [5]:

$$\mathrm{VAI} = \left(\frac{\mathrm{WC\ (cm)}}{36.58 + (1.89 \times \mathrm{BMI})}\right) \times \left(\frac{\mathrm{TG\ (mmol/l)}}{0.81}\right) \times \left(\frac{1.52}{\mathrm{HDL\ (mmol/l)}}\right)$$

$$\mathrm{LAP} = (\mathrm{WC\ (cm)} - 58) \times \mathrm{TG\ (mmol/l)}$$

Sample size estimation and statistical analysis

Test size estimation was performed preceding the investigation utilizing G*POWER statistical programming (version 3.1.9.2;

Franz Faul, Universitat Kiel, Germany) [F tests- MANOVA: Special effects and interaction, $\alpha = 0.05$, $\beta = 0.5$, Pillai V = 0.35, and effect size = 0.53] and revealed that the appropriate sample size for this study was N = 34]. This effect size calculated from pilot study on12 participants (6 in each group) (figure 2).

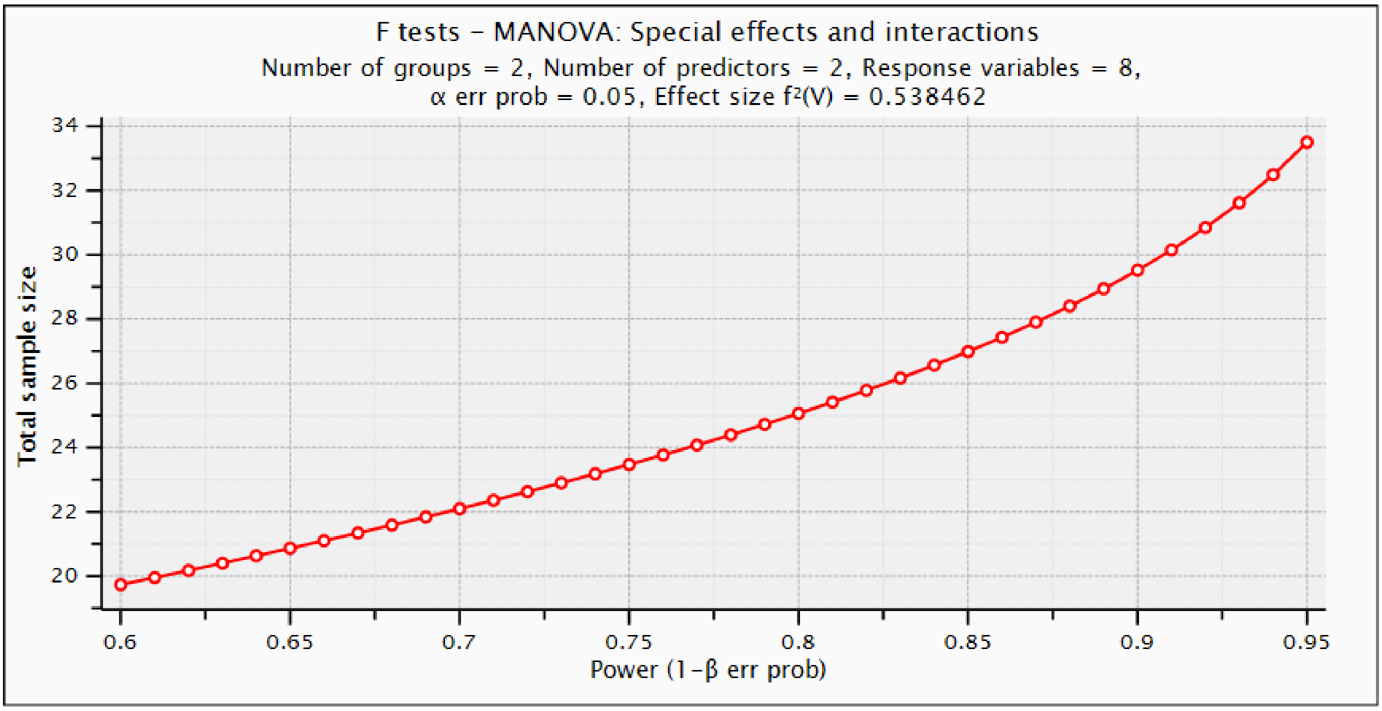

Figure 2. Plot of sample size calculation

The data was presented as a mean with a standard deviation. Data were examined for normality, homogeneity of variance, and the existence of extreme scores before final analysis. This investigation was carried out as a prerequisite for the study of difference's parametric computations. As shown by the Shapiro-Wilk test ($p > 0.05$), data for anthropometric parameters (weight, BMI, and WC), biochemical parameters (FBG, TG, HDL), and visceral adiposity indicators (VAI and LAP) were normally distributed; no univariate or multivariate outliers were found, as determined by boxplot and Mahalanobis distance ($p > 0.05$), respectively; there were linear relationships, as determined by scatterplot; no multicollinearity. According to Levene's test of homogeneity of variances and Box's M test, there was homogeneity of variances ($p > 0.05$) and covariances ($p > 0.05$). Accordingly, 2×2 mixed design MANOVA was utilized for comparing the anthropometric parameters, biochemical parameters and visceral adiposity indicators at different measuring periods at both groups. The Statistical Package for the Social Sciences (SPSS) computer program for windows, version 23 (SPSS, Inc., Chicago, IL) was utilized for statistical analysis. The p-value of ≤ 0.05 was considered significant.

Results

Before commencement of treatment, both groups were similar in age, height and all outcome measures ($p > 0.05$) (Tables 1-2).
All anthropometric and biochemical parameters showed statistically significant reductions ($p < 0.5$) within both groups, except for HDL that revealed a statistically significant increase ($p < 0.05$) within both groups. Comparison of the two groups after treatment showed statistically non-significant differences in all anthropometric and biochemical parameters ($p > 0.05$) (Table 2).
The visceral adiposity indicators (VAI and LAP) showed statistically significant reductions ($p < 0.5$) within both groups. However, comparison of the two groups after treatment showed statistically non-significant differences in both visceral adiposity indicators ($p > 0.05$) (Table 2).

Table 1. Baseline characteristics of postmenopausal women in both groups

Characteristics	Exercise group (n = 18)	Diet group (n = 18)	p value
Age [years]	56.00 ± 3.27	56.72 ± 3.06	0.499^{NS}
Height [m]	1.60 ± 0.06	1.62 ± 0.07	0.279^{NS}

NS p > 0.05 = non-significant, S p < 0.05 = significant, p = probability

Table 2. Anthropometric parameters, biochemical parameters and visceral adiposity indicators for the two groups

Variable		Exercise group (n = 18)	Diet group (n = 18)	p value
Anthropometric parameters				
Body weight [kg]	Pre-treatment Post-treatment p value**	95.00 ± 7.46 87.44 ± 7.07 0.0001^{S}	98.35 ± 8.38 89.05 ± 7.20 0.0001^{S}	0.227^{NS} 0.513^{NS}
BMI [kg/m^2]	Pre-treatment Post-treatment p value**	36.92 ± 1.50 33.96 ± 1.48 0.0001^{S}	37.27 ± 1.24 33.77 ± 1.30 0.0001^{S}	0.462^{NS} 0.699^{NS}
WC [cm]	Pre-treatment Post-treatment p value**	116.59 ± 3.57 113.93 ± 3.34 0.0001^{S}	119.00 ± 4.46 115.59 ± 4.40 0.0001^{S}	0.091^{NS} 0.225^{NS}
Biochemical parameters				
FBG [mmol/l]	Pre-treatment Post-treatment p value**	11.19 ± 1.11 10.72 ± 1.10 0.0001^{S}	10.53 ± 1.23 10.16 ± 1.23 0.0001^{S}	0.110^{NS} 0.175^{NS}
TG [mmol/l]	Pre-treatment Post-treatment p value**	2.00 ± 0.28 1.88 ± 0.23 0.0001^{S}	2.02 ± 0.18 1.84 ± 0.17 0.0001^{S}	0.865^{NS} 0.532^{NS}
HDL [mmol/l]	Pre-treatment Post-treatment p value**	1.03 ± 0.15 1.17 ± 0.13 0.0001^{S}	1.01 ± 0.09 1.12 ± 0.07 0.0001^{S}	0.696^{NS} 0.267^{NS}
Visceral adiposity indicators				
VAI	Pre-treatment Post-treatment p value**	4.01 ± 0.35 3.41 ± 0.23 0.0001^{S}	4.16 ± 0.50 3.52 ± 0.35 0.0001^{S}	0.316^{NS} 0.279^{NS}
LAP	Pre-treatment Post-treatment p value**	117.3 ± 17.01 105.11 ± 13.87 0.0001^{S}	122.99 ± 14.05 105.88 ± 13.49 0.0001^{S}	0.302^{NS} 0.871^{NS}

** Inter-group comparison; ** intra-group comparison of the results pre- and post-treatment; NS $P > 0.05$ = non-significant, S $P < 0.05$ = significant, P = Probability*

Discussion

Menopause is associated with general obesity as well as visceral adiposity due to fat accumulation redistribution from periphery towards intra-abdominal area, leading to development of T2D [14, 15]. Thus, this study aimed to compare the impact of aerobic exercise versus dietary modification on visceral adiposity indicators in obese postmenopausal women with T2D.

The present study's results demonstrated significant reductions in anthropometric parameters, FBG, TG and visceral adiposity indicators, along with a significant increase in HDL within both exercise and diet groups. These results indicated the positive effects of either program on improving anthropometric and biochemical parameters, as well as visceral adiposity indicators in obese postmenopausal diabetic women.

Regarding the exercise group, the results of the present study came in line with early studies reporting the effectiveness of regular aerobic training in decreasing body weight and visceral adiposity, as well as improving glucose homeostasis and lipid parameters in T2D [16,17]. Additionally, previous studies reflected the valuable effect of moderate aerobic exercise on reducing visceral fat measures of obese persons [18,19]. Moreover, recent research investigated the beneficial impact of physical exercise on visceral adiposity indicators, including LAP in overweight diabetic women [20] and VAI in obese prediabetic men [21].

As for the best parameters of aerobic exercise program for improvement of glycemic control and entire health, the American Diabetes Association recommended moderate aerobic exercising for 150 minutes per week as a minimum, distributed over at least 3 days, with no more than two successive days with no training [9]. In addition, a systematic review by De Sá et al. [22] concluded that performance of moderate intensity aerobic exercise for ≥ 3 days/week has significant reducing effects on WC and glycemia in T2D.

In the current study, the favourable effects of aerobic exercise could be related to fat burning effect for getting energy, central fat mobilization during regular exercising and anti-inflammatory mechanisms modulated via cytokines and chemokines, leading to anthropometric parameters reduction and body composition alterations, with subsequent improvements in insulin sensitivity, glucose levels and lipid profile of diabetics

[23-25]. Since anthropometric and lipid parameters are used for calculation of visceral adiposity indicators [5], reductions in VAI and LAP could be attributed to reductions in anthropometric parameters and TG levels in addition to increase in HDL levels in the exercise group of the current study.

In contrast to our results, Silva et al. [26] found that 8 weeks of moderate aerobic exercise resulted in significant improvement of glycemic control, without changing adiposity as well as TG and HDL levels in diabetics. Also, Arslan et al. [24] reported significant reductions in anthropometric measures with non-significant differences in lipid profile following 12 weeks of aerobic exercise in T2D. In addition, Colberg et al. [27] stated that exercise performance for less than one hour daily is not effective for achieving weight loss in T2D. Moreover, Ribeiro et al. [28] revealed that 4 months of aerobic training resulted in significant reduction of WC, without modifying weight and BMI, as well as levels of glucose and lipid parameters. Furthermore, Zoppini et al. [29] showed that 6 months of moderate aerobic program produced 12% increase in HDL levels, with no alterations in anthropometric parameters, FBG and TG levels. The controversy between the findings of those previous studies and our results could be related to the differences in age and sex of studied sample as well as exercise parameters (intensity, frequency and duration).

Regarding the diet group, the results of the current study could be supported by Dietary Guidelines Advisory Committee 2015 that recommends consumption of healthy food groups instead of following a single diet plan for achieving healthy eating patterns [30]. Also, the American Diabetes Association recommends consumption of different fiber-rich food groups (e.g. fruits, vegetables and whole grains) and avoidance of added sugar foods and beverages in order to achieve glycemic and lipidemic control [31]. Similarly, several studies reported the importance of optimizing food quantity and quality not only to treat T2D [13,32], but also to prevent its occurrence in high-risk population [8].

The mechanisms underlying the positive effects of dietary modification on anthropometric, glycemic and lipidemic parameters in the diet group cannot be limited to one food component; however, they are related to the synergistic effect of whole food components in addition to the powerful effect of caloric restriction and distribution of calories over three meals and three snacks. Energy deficit of 500-750 kcal/day is successful in achieving weight reduction. Obese persons with T2D showed glycemic and lipidemic improvements after loss of more than 5% of their body weight [33]. Additionally, caloric distribution on three meals and three snacks has a valuable impact on maintaining blood glucose levels consistency and minimizing glycemic variability and its consequential complications [32]. Moreover, optimization of food quality impacts positively the diabetic patients [13,32]. High consumption of whole grain, legumes, vegetables and fruits provides the body with fibers, antioxidants, vitamins and minerals, helping glucose and lipids control in diabetic individuals. Diet concentrating on low glycemic index and limiting added sugar is accompanied by weight loss, enhanced function of beta cells and reduced plasma levels of insulin, glucose and lipids [8,13]. Diet rich in monounsaturated and polyunsaturated fats improves metabolic risk factors among T2D patients, through optimizing lipid levels in blood [34,35]. Replacement of animal protein with plant protein sources provides significant improvements in fasting glucose and insulin levels along with a greater lowering in serum cholesterol levels in diabetics [36,37].

The advantageous effect of dietary modification on visceral adiposity indicators in the diet group could be confirmed by Magkos et al. [38] who reported that losing 5% of weight through dieting reduces intra-abdominal adipose tissue in obese persons. Also, eating low glycemic index food and restricting added sugar induce visceral fat reduction [8]. Consequently, the positive effect of dieting on visceral fat, as well as different anthropometric and lipid parameters could explain the improvements in VAI and LAP in the diet group of the current study.

The results of the present study revealed non-significant differences between the exercise and diet groups in all outcome measures. The review of literature did not discover any study comparing the impact of aerobic exercise versus dietary modification on visceral adiposity indicators in obese postmenopausal diabetic women. Therefore, the current work is considered the first one studying this point. Consequently, the results cannot be compared or discussed with other research outcomes but reflected the same beneficial effects of either exercise or dietary programs on obese postmenopausal diabetic women.

The current study's first limitation is its short duration. Thus, additional research is desirable to investigate the longitudinal impact of exercise versus diet on visceral adiposity indicators in obese postmenopausal diabetic women. Another limitation is the lack of measuring levels of various markers of inflammation, such as cytokines and chemokines as well as high-sensitivity C-reactive protein. Therefore, additional research is desired to assess the influence aerobic exercise versus dietary modification on inflammatory markers in obese postmenopausal diabetic women.

Conclusion

Aerobic exercise and dietary modification have similar improving effects on anthropometric, glycemic and lipidemic parameters, as well as visceral adiposity indicators in obese postmenopausal women suffering from type 2 diabetes.

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Piśmiennictwo/ References

1. Li Q, Wang X, Ni Y, Hao H, Liu Z, Wen S, Shao X, Wu X, Yu W, Hu W. Epidemiological characteristics and risk factors of T2DM in Chinese premenopausal and postmenopausal women. Lipids in Health and Disease 2019;18(1):155.
2. Bitoska I, Krstevska B, Milenkovic T, Subeska-Stratrova S, Petrovski G, Mishevska SJ, Ahmeti I, Todorova B. Effects of Hormone Replacement Therapy on Insulin Resistance in Postmenopausal Diabetic Women. Open Access Maced J Med Sci. 2016;4(1):83-8.
3. Chandrasekhar V. Diabetes and Menopause. J Anesth Crit Care Open Access 2016;6(4):00233.
4. Brahimaj A, Rivadeneira F, Muka T, Sijbrands EJG, Franco OH, Dehghan A, Kavousi M. Novel metabolic indices and incident type 2 diabetes among women and men: the Rotterdam Study. Diabetologia. 2019;62(9):1581-1590.
5. Anık İlhan G, Yıldızhan B. Visceral adiposity indicators as predictors of metabolic syndrome in postmenopausal women. Turk J Obstet Gynecol. 2019;16(3):164-168.
6. Chen L, Pei JH, Kuang J, Chen HM, Chen Z, Li ZW, Yang HZ. Effect of lifestyle intervention in patients with type 2 diabetes: a meta-analysis. Metabolism. 2015;64(2):338-347.
7. Pratley RE. The early treatment of type 2 diabetes. Am J Med. 2013;126(9 Suppl 1):S2-9.
8. Toi PL, Anothaisintawee T, Chaikledkaew U, Briones JR, Reutrakul S, Thakkinstian A. Preventive Role of Diet Interventions and Dietary Factors in Type 2 Diabetes Mellitus: An Umbrella Review. Nutrients. 2020;12(9):2722.
9. American Diabetes Association. 5. Lifestyle Management: Standards of Medical Care in Diabetes-2019. Diabetes Care. 2019;42(Suppl 1):S46-S60.
10. American Diabetes Association. 2. Classification and Diagnosis of Diabetes. Diabetes Care 2015;38(Suppl. 1):S8–S16.
11. Karvonen MJ, Kentala E, Mustala O. The effects of training on heart rate; a longitudinal study. Ann Med Exp Biol Fenn. 1957;35(3):307-315.
12. Agrawal K. Role of nutrition in wound healing. In: Sarabahi S, Tiwari VK, editors. Principles and Practice of Wound Care, New Delhi: Jaypee Brothers Medical Publishers; 2012. pp. 433.
13. Riccardi G, Vitale M, Giacco R. Treatment of Diabetes with Lifestyle Changes: Diet. In: Bonora E, DeFronzo RA, editors. Diabetes Epidemiology, Genetics, Pathogenesis, Diagnosis, Prevention, and Treatment, Switzerland: Springer International Publishing; 2018. pp 497-512.
14. Xia MF, Lin HD, Chen LY, Wu L, Ma H, Li Q, Aleteng Q, Chen Y, Sun YX, Hu Y, Pan BS, Li XY, Gao X. Association of visceral adiposity and its longitudinal increase with the risk of diabetes in Chinese adults: A prospective cohort study. Diabetes Metab Res Rev. 2018;34(7):e3048.
15. Berg G, Mesch V, Siseles N. Abdominal Obesity and Metabolic Alterations in the Menopausal Transition. Curr Obstet Gynecol Rep. 2012;1:63-70.
16. Hu G, Jousilahti P, Barengo NC, Qiao Q, Lakka TA, Tuomilehto J. Physical activity, cardiovascular risk factors, and mortality among Finnish adults with diabetes. Diabetes Care. 2005;28(4):799-805.
17. Stewart KJ. Role of exercise training on cardiovascular disease in persons who have type 2 diabetes and hypertension. Cardiol Clin. 2004;22(4):569-586.
18. Goedecke JH, Micklesfield LK. The effect of exercise on obesity, body fat distribution and risk for type 2 diabetes. Med Sport Sci. 2014;60:82-93.
19. Slentz CA, Bateman LA, Willis LH, Shields AT, Tanner CJ, Piner LW, Hawk VH, Muehlbauer MJ, Samsa GP, Nelson RC, Huffman KM, Bales CW, Houmard JA, Kraus WE. Effects of aerobic vs. resistance training on visceral and liver fat stores, liver enzymes, and insulin resistance by HOMA in overweight adults from STRRIDE AT/RT. Am J Physiol Endocrinol Metab. 2011;301(5):E1033-1039.
20. Banitalebi E, Faramarzi M, Nasiri S, Mardaniyan M, Rabiee V. Effects of different exercise modalities on novel hepatic steatosis indices in overweight women with type 2 diabetes. Clin Mol Hepatol. 2019;25(3):294-304.
21. Ahmed MM, Abd allatif EQ, Mohamed MN, Zayed EK. Impact of Aerobic Exercise on Visceral Adiposity Index in Pre-Diabetic Obese Men: A Randomized Controlled Trial. Fizjoterapia Polska 2020;20(3):32-35.
22. De Sá CA, Grudka Heizen P, Corralo VS, Gonzaga Dos Santos GA, Moura Soares NM. Chronic effect of aerobic exercise on anthropometric, biochemical and hemodynamic variables in individuals with type 2 diabetes mellitus: A systematic review. Revista Andaluza De Medicina Del Deporte 2016;9(4):173-179.
23. Pedersen BK. Anti-inflammatory effects of exercise: role in diabetes and cardiovascular disease. Eur J Clin Invest. 2017;47(8):600-611.
24. Arslan M, Ipekci SH, Kebapcilar L, Dogan Dede N, Kurban S, Erbay E, Gonen MS. Effect of Aerobic Exercise Training on MDA and TNF-α Levels in Patients with Type 2 Diabetes Mellitus. Int Sch Res Notices. 2014;2014:820387.
25. Yang Z, Scott CA, Mao C, Tang J, Farmer AJ. Resistance exercise versus aerobic exercise for type 2 diabetes: a systematic review and meta-analysis. Sports Med. 2014;44(4):487-499.
26. Silva VRR, Belozo FL, Pereira RM, Katashima CK, Cordeiro AV, Alves JF, Pauli JR, Silva A, Ropelle ER, De Moura LP. The effects of ninety minutes per week of moderate intensity aerobic exercise on metabolic health in individuals with Type 2 Diabetes: A pilot study. J Rehab Therapy 2020;2(2):1-12.
27. Colberg SR, Sigal RJ, Fernhall B, Regensteiner JG, Blissmer BJ, Rubin RR, Chasan-Taber L, Albright AL, Braun B; American College of Sports Medicine; American Diabetes Association. Exercise and type 2 diabetes: the American College of Sports Medicine and the American Diabetes Association: joint position statement. Diabetes Care. 2010;33(12):e147-167.
28. Ribeiro ICD, Iborra RT, Neves MQTS, Lottenberg SA, Charf AM, Nunes VS, Negrão CE, Nakandakare ER, Quintão ECR, Passarelli M. HDL atheroprotection by aerobic exercise training in type 2 diabetes mellitus. Medicine and Science in Sports and Exercise 2008;40(5):779-786.
29. Zoppini G, Targher G, Zamboni C, Venturi C, Cacciatori V, Moghetti P, Muggeo M. Effects of moderate-intensity exercise training on plasma biomarkers of inflammation and endothelial dysfunction in older patients with type 2 diabetes. Nutr Metab Cardiovasc Dis. 2006;16(8):543-549.
30. Dietary Guidelines Advisory Committee. Scientific Report of the 2015 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Health and Human Services and the Secretary of Agriculture. U.S. Department of Agriculture, Agricultural Research Service, Washington, DC; 2015.
31. American Diabetes Association (ADA). Standard of medical care in diabetes -2017. Diabetes Care. 2017;40(sup 1):s4–s128.
32. Gupta L, Lal P, Khandelwal D. Optimizing Macronutrients in People with Diabetes. J Soc Health Diab 2018;6(2):65-71.
33. Franz MJ, Boucher JL, Rutten-Ramos S, VanWormer JJ. Lifestyle weight-loss intervention outcomes in overweight and obese adults with type 2 diabetes: a systematic review and meta-analysis of randomized clinical trials. J Acad Nutr Diet. 2015;115(9):1447-1463.
34. Qian F, Korat AA, Malik V, Hu FB. Metabolic Effects of Monounsaturated Fatty Acid-Enriched Diets Compared With Carbohydrate or Polyunsaturated Fatty Acid-Enriched Diets in Patients With Type 2 Diabetes: A Systematic Review and Meta-analysis of Randomized Controlled Trials. Diabetes Care. 2016;39(8):1448-1457.
35. Evert AB, Boucher JL, Cypress M, Dunbar SA, Franz MJ, Mayer-Davis EJ, Neumiller JJ, Nwankwo R, Verdi CL, Urbanski P, Yancy WS Jr. Nutrition therapy recommendations for the management of adults with diabetes. Diabetes Care. 2014;37 Suppl 1:S120-143.
36. Viguiliouk E, Stewart SE, Jayalath VH, Ng AP, Mirrahimi A, de Souza RJ, Hanley AJ, Bazinet RP, Blanco Mejia S, Leiter LA, Josse RG, Kendall CW, Jenkins DJ, Sievenpiper JL. Effect of Replacing Animal Protein with Plant Protein on Glycemic Control in Diabetes: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Nutrients. 2015;7(12):9804-9824.
37. Pfeiffer AFH, Pedersen E, Schwab U, Risérus U, Aas AM, Uusitupa M, Thanopoulou A, Kendall C, Sievenpiper JL, Kahleová H, Rahélic D, Salas-Salvadó J, Gebauer S, Hermansen K. The Effects of Different Quantities and Qualities of Protein Intake in People with Diabetes Mellitus. Nutrients. 2020;12(2):365.
38.Magkos F, Fraterrigo G, Yoshino J, Luecking C, Kirbach K, Kelly SC, de Las Fuentes L, He S, Okunade AL, Patterson BW, Klein S. Effects of Moderate and Subsequent Progressive Weight Loss on Metabolic Function and Adipose Tissue Biology in Humans with Obesity. Cell Metab. 2016;23(4):591-601.