

The role of physical training in lowering the cardio-metabolic risk

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Abstract

The cardio-metabolic risk represents the overall risk of developing type 2 diabetes mellitus and / or cardiovascular disease (including heart attack or stroke) due to a complex risk factors. The aim of the current prospective study is to evaluate the lifestyle intervention group in a special benefit (overweight young students) with cardio-metabolic risk. Material and Methods: Subjects considered for the study: young obese, sedentary, a number of 43 patients (mean age 21.3 ± 3.1 years, 93% female). There were made two evaluations on an interval of 6 months, during which patients have performed physical training at least 3 times a week (individually according to the individual test), supervised by a physical therapist. The remission rate was high (37%), from the initial of 43 patients only 27 remained at the second test. Results: After 6 months of lifestyle intervention, we noticed a significant decrease of weight (from 83.61 ± 21.04 to 79.7 ± 20.13), body mass index (from 30.93 ± 6.67 to 29.55 ± 6.74), FindRisc score (2.7 to 2) waist circumference (from 98.98 ± 10.14 to 89.54 ± 12.32), waist to hip ratio (from 0.87 to 0.85), visceral fat area (98.6 to 88). Conclusion: The active intervention and closely monitoring of changing lifestyles leads to a significant improvement of cardiovascular risk factors at young obese patients. This type of intervention is effective both in terms of benefits in medium term, and relatively increased due compliance of young patients to programs involving physical activity.

Keywords: *physical training, cardio-metabolic risk*

Rezumat

Riscul cardio-metabolic reprezintă riscul global de dezvoltare a diabetului zaharat tip 2 și/sau a bolilor cardiovasculare (incluzând IMA/AVC) datorat unui complex de factori de risc. Scopul acestui studiu este de a evalua intervențiile asupra stilului de viață la un grup cu risc cardio-metabolic (studenți tineri obezi). Material și metode: Subiecții luați în studiu au fost 43 tineri obezi, sedentari (vârsta medie 21.3 ± 3.1 ani, 93% de gen feminin). S-au efectuat două evaluări, la un interval de 6 luni de zile, timp în care pacienții au efectuat antrenament fizic de minim 3 ori pe săptămână (individualizat în urma testării la efort), supravegheați de către un kinetoterapeut. Rata de renunțare a fost mare (37%), din cei 43 de pacienți, rămânând doar 27 la a doua testare. Rezultate: După 6 luni de intervenție asupra stilului de viață, am observat o scădere semnificativă în greutate (de la 83.61 ± 21.04 kg la 79.7 ± 20.13 kg), indicele de masă corporală (de la 30.93 ± 6.67 kg/m² la 29.55 ± 6.74 kg/m²), scorul FindRisc (de la 2.7 la 2), circumferința taliei (de la 98.98 ± 10.14 cm la 89.54 ± 12.32 cm), raportul talie-șold (de la 0,87 la

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0,85), aria grăsimii viscerale (de la 98.6 la 88 cm²). Concluzii: Intervenția activă și atent monitorizată de schimbare a stilului de viață conduce la ameliorarea semnificativă a factorilor de risc cardiovascular la pacienții tineri obezi. Acest tip de intervenție este eficient atât din punct de vedere al beneficiilor pe termen mediu, cât și datorită complianței relativ crescute a pacienților tineri la programe ce implică activități fizice.

Cuvinte cheie: antrenament fizic, risc cardio-metabolic

The cardio-metabolic risk represents the overall risk of developing type 2 diabetes mellitus (DM) and / or cardiovascular disease (including AMI / CVA) due to a complex risk factors. They are represented by classical risk factors, such as smoking, increase of LDL, hypertension, hyperglycemia and risk factors associated to abdominal obesity (especially abdominal adiposity), like insulin-resistance, decrease of HDL, hypertriglyceridaemia and

inflammatory markers. The risk of cardio-metabolic risk is based on the concept of continuous risk. (1) Visceral fat (abdominal) is the fat which surrounds the vital organs of the torso / stomach. High levels of visceral fat may speed the start of hypertension, heart disease and type 2 diabetes. Reducing these fat level can substantially stabilize insulin action and reduces the risk of diabetes and related diseases



Figure 1. InBody 720 (2)

Waist-hip ratio is the proportion between waist and hip circumference. It is calculated by reporting highest waist circumference measured at the hips. This proportion is used as an indicator of abdominal obesity and of predisposition to cardiovascular diseases (coronary disease, hypertension) and/or metabolic diseases (diabetes mellitus). Research

shows that people with a body in "apple shape" (with more fat around the waist) have higher risk than people with body in "pear-shape", with a provision of fat in the hips.

Table I. Waist-hip ratio and cardio-metabolic risk

Men	Women	Cardiometabolic risc
under 0.95	under 0.80	very low risc
between 0.96 and 1	between 0.81 and 0.85	moderated risk
over 1	over 0.85	high risk

A waist-hip ratio proportion of 0.7 for women and 0.9 for men is strongly correlated with a general feeling of health and fertility. Thus, waist - hip ratio proportion is a simple, but very useful method for determining the distribution of body fat. This proportion is an accurate indicator of the risks that weight has on health (3).

The risk of developing type 2 diabetes in the next 10 years can be calculated by a questionnaire (FINDRISC) the patients have completed before and at the end of the study.

It was intended to follow the decrease of weight and life style change, in order to reduce cardio-metabolic risk. This questionnaire included a series of 8 questions: data about the patients lifestyle and nutrition and DA (daily amounts) cases at the family members, scores range between 0-26 points (4,5).

Purpose

The aim of the current prospective study is to evaluate the lifestyle intervention group in a special benefit (overweight young students) with cardiometabolic risk.

Materials and methods

Subjects considered for the study: young obese, sedentaries, 43 patients (mean age 21.3 ± 3.1 years, 93% female) There were performed two evaluations, in an interval of 6 months, time in that patients have performed physical training at least 3 times a week (individualized by effort test), supervised by a physical therapist.

Patients were evaluated using the multifrequency bioimpedantometer (InBody 720). Thus it could be

determined: Body Mass Index (BMI) - calculated by reporting weight to the square of height, visceral fat area (AGV) and the waist - hip ratio (RTS). Also the patients completed the FINDRISC questionnaire, to find the risk of developing diabetes in the next 10 years. During the 6 months between the two tests, patients participated at trainings at least 3 times a week in the physical therapy room of the Faculty of Physical Education and Sports, Bogdăneștilor street no. 32. The training program was conceived based on intensity intervals on the following machines: ergometric bicycle, elliptical bicycle, treadmill, hydraulic stepper. Patients were monitorized during the trainings with pulsmeter Polar F3 by a physical therapist, and they have been advised to have a healthy and balanced diet. Nevertheless the abandonment rate was quite high (37%), of the 43 patients there remained only 27 at the second test.

Results

Using the paired test to compare the data at the start of the program and after 6 months of lifestyle intervention, we noticed a significant decrease of weight (from 83.61 ± 21.04 to 79.7 ± 20.13), body mass index (from 30.93 ± 6.67 to 29.55 ± 6.74), FindRisc scor (2.7 to 2), waist circumference (from 98.98 ± 10.14 to 89.54 ± 12.32), waist - hip ratio (from 0,87 to 0,85), visceral fat area (98.6 to 88). The data are presented in Table II, III, figure 2 to 6. Studies show an increased incidence of type II DM at obese patients. The risk of developing type II DM in the next 10 years (evaluated by FindRISC questionnaire) decreased by applying measures of lifestyle changes.

Table I. The trend of metabolic risk factors in the supervised lifestyle

Parameter	Group S at baseline N: 27 patients (3 ♂)	Grup S after 6 months, N: 27 patients (3 ♂)	p value
G (kg)	83.61±21,04	79.7±20.13	0.0027
IMC (Kg/m ²)	30.93±6,67	29.55±6.74	0.0032
FindRISC Scor	2.7±1.26	2 ±1.12	0.011
Circ.abd. (cm)	98.98±10.14	89.54±12.32	<0.0001

The values represent: mean ± standard deviation.
G: weight; IMC: body mass index; Circ. Abd: waist circumference.

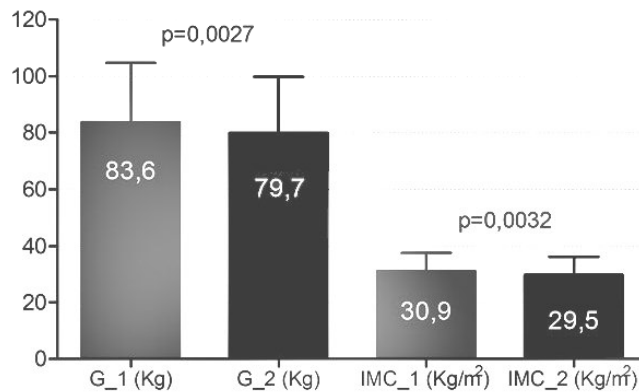


Figure 2. Evolution of weight and body mass index in the study group; G: The average weight at initial evaluation (G_1) and final evaluation (G_2), BMI: body mass index at initial evaluation (IMC_1) and final evaluation (IMC_2);

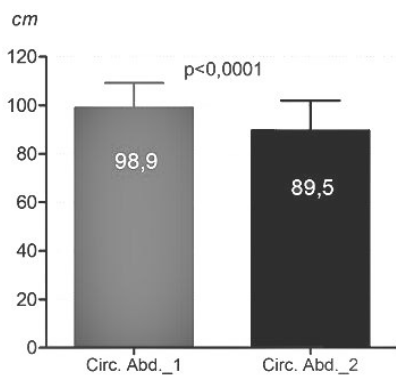


Figure 3. Evolution of abdominal circumference in the study group. Circ. abd: The average of abdominal circumference at the initial evaluation (Circ. abd._1) and final evaluation (Circ. abd._2).

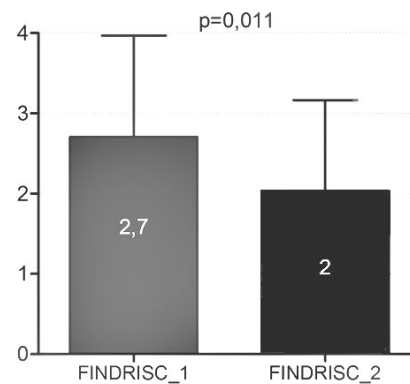


Figure 4. Evolution of the FindRISC score at the study group. FindRISC: FindRISC score at the initial evaluation (FindRISC_1) and at the final one

Waist-hip ratio and visceral fat area - two parameters that show the dimension of central type obesity, and also increase the insulin resistance and cardio-metabolic risk, also evolved favorably in the study (table III, figures 5 and 6). Studies show an

increased incidence of type II DM at obese patients. The risk of developing type II DM in the next 10 years, (evaluated by questionnaire FindRISC) decreased in the group by applying measures of lifestyle changes. (FindRISC_2).

Table III. The evolution of the corporal composition parameters

Parameter	Group S at baseline N: 27 patients (3 ♂)	Grup S after 6 months, N: 27 patients (3 ♂)	p value
RTS	0.87 (0.81-1.02)	0.85 (0.78-1.03)	0.0031
AGV (cm ²)	98.6 (60.2-283.1)	88 (33-249.9)	0.0005

The values represent: median (minimal - maximal); RTS: waist - hip ratio; AGV: visceral fat area.

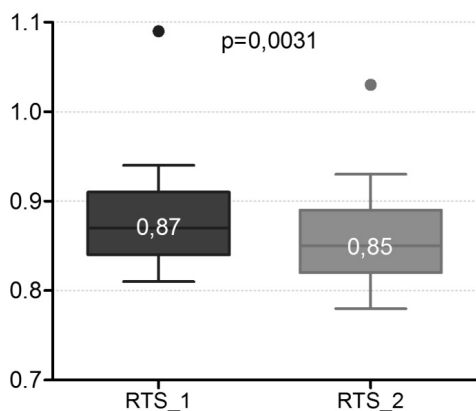


Figure 5. Evolution of waist-hip ratio at the study group. RTS: waist-hip ratio at the initial evaluation (RTS_1) and at the final evaluation (RTS_2).

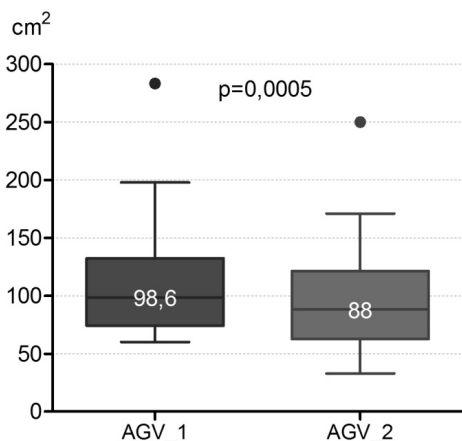


Figure 6. Evolution of visceral fat area in the study group. AGV: visceral fat area at the initial evaluation (AGV_1) and at the final evaluation (AGV_2).

Conclusions

After the statistical analysis it has been observed that modest weight loss was obtained, but it was realized by the reduction of visceral fat and the RTS. It may be remarked that the average waist - hip ratio and the visceral fat of the study group patients at

the final testing is lower, leading to the improvement of cardio-metabolic risk FINDRISC.

The active and closely monitored intervention of lifestyle change leads to a significant improvement of cardiovascular risk factors at young obese patients. This type of intervention is effective both in medium term benefits and due to the relatively increased compliance of young patients to programs involving physical activity (in contrast to pharmacological intervention type).

The individualized physical training is safe, decreasing the risk of sedentary obese patient getting injured, when he is constantly supervised and receives guidance on the technical progress of work and training programs.

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