

Efficacy of the curves training program for losing body weight, body circumferences and fat mass percentage: a non randomized clinical trial

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Abstract

Purpose. Hypokinesia is the fourth cause of endemic death in the world. The prevalence of obesity, caused by hypokinesia, in the world continues to increase and it is the main risk factor of chronic diseases. Our aim was to evaluate the effectiveness of curves program and High-Intensity Interval Training (HIIT) in healthy women.

Methods. The study design is a non-randomized clinical trial. Eighty women with age between 30 to 40 years (who train 3/4 times a week) participated over a period of six months. They were allocated into a “Curves” program group (n = 40) and a “High-Intensity Interval Training” group (n = 40). BMI, body fat, the fat mass percentage was calculated by OMRON body fat 306 TM at baseline and the end of the intervention.

Results. the results between high-intensity interval training and curves show that curves scores were significantly lower among Interval training. after 6 months the most impact was on “Abdomen loss “in Curves Group Mean(SD) = -4.48(1.70). According to the multivariate analysis, we can say that for all the dependent variables Weight loss -0.320 (<0.001), Trunk loss -0.376 (<0.001), Abdomen loss -0.276 (<0.001), Hip loss -0.302 (<0.001), Lower arm loss -0.248 (0.003) and Fat mass loss -0.153 (0.061) the curves group shows significant results in comparison with the high-intensity interval training group (p < 0.001) while the civil status is significantly associated with only “Upper arm loss” variable ($\beta = -0.357$; p < 0.001).

Conclusions. This “Curves” program improved strength muscles, loss of fat and fat mass reduction more than High Intensity Interval Training. *Clin Ter 2019; 170(4):e??-???. doi: 10.7417/CT.2019.????*

Key words: efficacy, curves, training, body weight, body circumferences, fat mass percentage, clinical trial

Introduction

Obesity is an epidemic globally and one of the main risk factor of chronic diseases, including type 2 diabetes, hypertension, cardiovascular diseases, and stroke (Apovian C et al, 2017; Mukhra et al, 2018). Obesity is associated with metabolic and hormonal profiles and it is the major cause of breast cancer (Andò S et al, 2019). The prevalence of obesity

and overweight in the world continues to increase (Wilborn C et al, 2005; Panchallo M et al, 2015). 1.2 billion people in the world are overweight and 300 million of them being obese (Wilborn C et al, 2005; Panchallo M et al, 2015). The relationship of abdominal obesity and waist circumference (WC) to cardiovascular risk is well established and there is a very high correlation between BMI and WC (Ahima R et al, 2013).

The promotion of physical activity has been widely faced with children (La Torre et al, 2015) and few studies are present in the adult population. Physical activity has positive effects on weight management and changes of hormones in fat metabolism and cardiovascular disease risk and it is an important way to battle obesity (Mirghani S et al, 2018). There is evidence that the physical exercise is efficacious in reducing chronic diseases (Jin S et al, 2017). Previous studies clearly report that especially high-intensity interval training (HIIT) is an efficient protocol that reduction obese (Mirghani S et al, 2018). Interval-training is a popular training method used by young individuals to improve certain physiological and fitness variables (Huang G et al, 2016). It is determined by relatively high-intensity repetitions of physical activities that are interspersed with periods of rest for recovery (Huang G et al, 2016). The specific interval training variables – distance, intensity, and rest time between intervals – are determined according to the individuals’ specific needs (Huang G et al, 2016). Recent evidence shows that (HIIT) can generate change in body composition and body weight (Mirghani S et al, 2018). The curves fitness and weight loss program has become a very popular means of promoting health and fitness among women (Kerksick C et al, 2009). Curves International is currently the largest fitness franchise in the world with over 4 million members in 10,000 clubs in over 69 countries. The typical curves member is a 30 – 60-year-old sedentary female who ranges from being slightly overweight to obese according to BMI standards (Kreider R et al, 2012). The program involves a 30-minute circuit training program and a weight management program involving periods of moderate caloric restriction (1,200 to 1,600 calories per day) followed by short periods of higher

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caloric intake (2,600 calories per day). The program is designed to promote a gradual reduction in body fat while increasing strength and fitness (Kreider R et al, 2012).

The aim of this study is to assess the efficacy on the loss of weight, waist circumference and fat mass reduction of curves program training compared to high intensity interval training in healthy women with age between 30-40.

Methods

Study design

The study design is a non-randomized clinical trial of the effects of curves training vs high-intensity interval training reducing body weight, body circumferences, and fat mass percentage. In curves there is always an instructor in the circuit, to assist women in training and to motivate them. They are never alone. Furthermore, once a month the instructors update the personal data sheet taking the weight, body measurements and values of fat mass and lean mass, to have a more detailed view of the progress.

Setting

The trial will involve 80 physically active women aged 30 to 40 (who train 3/4 times a week) over a period of six months. The study will include the involvement of Dr. Graduates in Sports Science, who constantly supervised the work and guided the client in the execution of each individual movement.

The training sessions are held inside the curves club in Cassino, Italy. The clubs are open Monday to Friday from 9.00 a.m. to 8 p.m., allowing members to train every day, based on their availability.

Type of training

FIRST GROUP: 40 women participated in a 6 month Curves Training Program training 3 times a week.

SECOND GROUP: 40 women participated in High-intensity interval training classes for 6- months, 3 times a week.

– **FIRST GROUP:** Subjects participated in a supervised 30-min resistance training circuit program. The workout is complete with warm-up, strength training, cardio workout, cool down and stretching. The curves circuit is made up of 13 tools, which represent the ideal combination for a targeted full-body workout for arms, abdomen, and legs. Every 30 seconds you change the station and this allows you to recover and train different muscle groups but keeping the heart rate within the established intensity zone. The heart is a muscle that has to do a job to become strong and stay strong. Cardiovascular training is achieved with enough fatigue to raise the heart rate to the target training level. The machines we use to provide the effort required to raise the beat to its target level. Keeping the workout “in the right area” ensures that you are exercising in the ideal training zone. Exercising in

the target heart rate band ensures a cardiovascular benefit at a safe level but still effective. The final 30-minutes training component is characterized by five minutes of concentrated stretching. Stretching helps increase the range of movement and circulation. It is necessary to help increase and maintain flexibility, a key component for optimal health. By correctly and regularly stretching the muscles, you help to maintain joint integrity, avoiding back pain and, as studies show, significantly improving efforts and weight loss.

– **SECOND GROUP:** The three phases of the lesson. The typical high-intensity interval training workout lesson takes place this way. Heating (about ten minutes): it starts with a march on the spot to which shoulder rotations are added; then alternate side steps are made with the synchronized opening of the arms at shoulder level; you end up with hops in place, alternately raising your knees towards your chest. Training (about 40 minutes): there are a series of exercises to train the legs, arms, abdomen and back muscles. The (HIIT) focuses on short and high-intensity intervals, alternating effort, and recovery phases.

– Stress phase: Stress at the limit for 30 - 60 seconds
– Recovery phase: An active pause follows which can last from two to three times the previous effort phase

Relaxation (about 10 minutes): stretching exercises are done giving particular emphasis to the stretching of the muscles most stressed by the exercises of the day.

Physical fitness assessment tools are used, such as the OMRON body fat 306 TM for the calculation of BMI, % body fat; The OMRON is an electronic device that allows the determination with precision of the fat mass in the body (body fat), through a Bioelectrical impedance analysis (BIA) measurement (bimolecular impedance). The device has a double handle to be gripped with each hand, it will be sufficient to provide the required data (height, weight, age, male or female) and press a button to know in a few seconds your own percentage of fat and the weight of fat in the body.

- Measure the percentage of fat mass in the body
- Calculate the body mass index (BMI)
- Measurement in approximately 7 seconds
- Graphic indication of Fat Mass and Body Mass values (according to the parameters of the World Health Organization)
- Clinically validated
- Small, light and portable

The measurement is fast and simple. After setting the data, the body fat mass will simply be measured by holding the electrodes and pressing the start button. The measured results are displayed in about 7 seconds. Conditions and circumstances NOT suitable for a correct one measurement. If a measurement is made in the presence of the following physical condition, the percentage of body fat measured could vary considerably from the actual one, since the water content in the body changes during the day:

- Immediately after intense physical activity
- Immediately after having made a bath or a sauna
- After drank alcohol

– After drinking an abundant drink amount of water or after a meal (1-2 hours)

Moreover, the measuring tape will be used for the measurement of the chest, abdomen, hips, thighs, arm circumferences. In detail:

– Chest: Measure the circumference by placing the measuring tape measure in line with the nipples.

– Abdomen: Measure the circumference, placing the measuring tape one cm above the navel.

– Hips: Measure the circumference with the legs closed, in the most prominent part of the buttocks.

– Arm: With the palm facing forward and the arm extended, measure the mid-point between the shoulder and elbow.

– Leg: Measure the circumference just below the gluteal fold, ie at the beginning of the limb.

In addition, one was used a professional scale to periodically record your weight.

Statistical analysis

The following variables were considered as outcome measures:

Weight loss; Trunk loss; Back--- loss; Abdomen loss; Hip loss; Lower arm loss; Upper arm loss; Fat mass loss.

Differences between the two groups were assessed using the Student t-test and chi-square test for quantitative and categorical variables, respectively.

Finally, a multiple regression analysis was carried out for adjusting the analysis of the univariate analysis considering also the following covariates:

Age; civil status; the number of a training session.

The results are presented as beta coefficients (p values). The goodness of fit of the models was assessed using the R² value.

The statistical analysis was carried out using the software SPSS for Windows, release 25.0. The statistical significance was set at (p < 0.05).

Results

The trial is reported according to the CONSORT statement (Fig. 1).

80 women entered the study, 40 in the Curves group and 40 in the High-intensity interval training group. Table 1 shows a basic descriptive statistic and baseline characteristics and a total number of participation in High-intensity interval training group (N= 40) with "age" Mean(SD)= 31.0 (8.7) and Curves group(N=40) with "age" Mean(SD)= 39.5

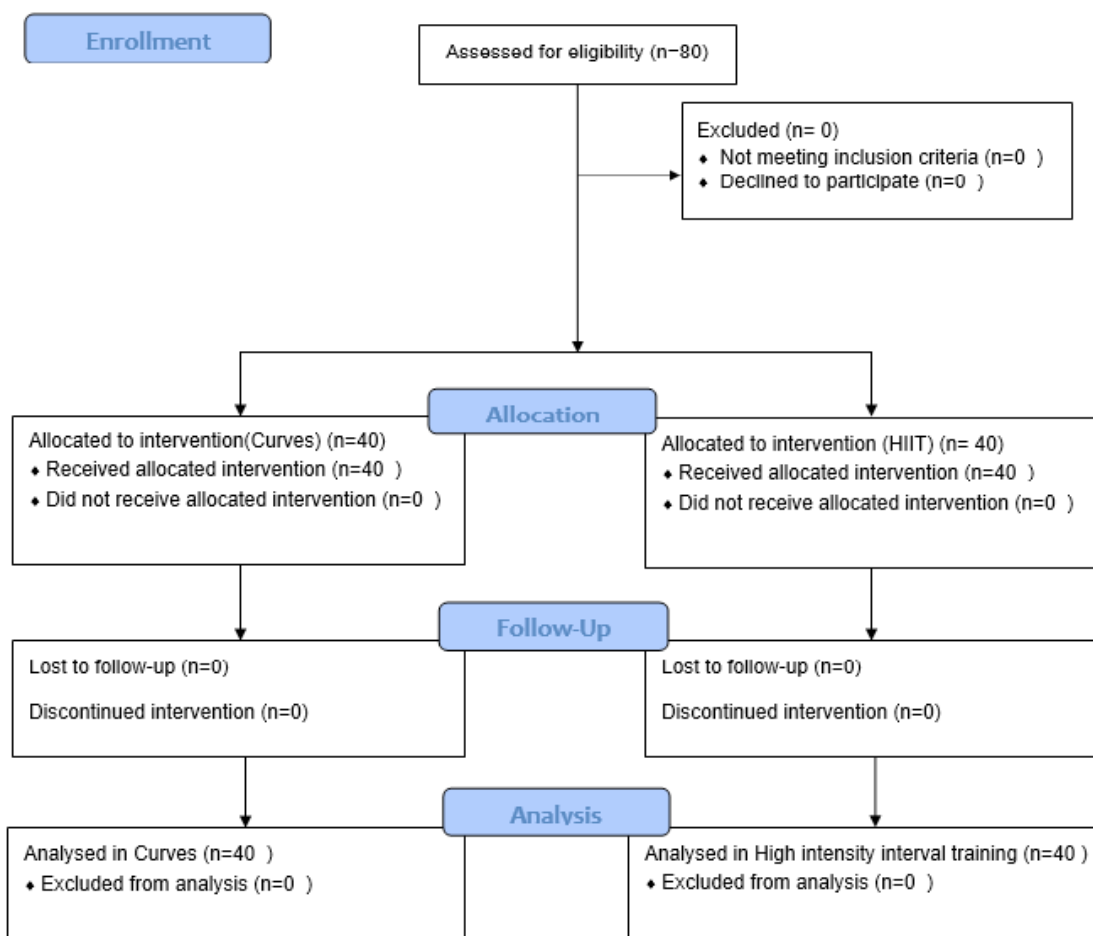


Table 1. Characteristics of the sample

Variables	Interval training Mean(SD) or n(%)	Curves Mean(SD) or n(%)	p
	40	40	
Age	31.0 (8.7)	39.5 (10.8)	< 0.001
<i>Work</i>			
Employed	20(50)	26(65)	0.175
Housewives/student	20(50)	14(35)	
<i>Marital status</i>			
Married/cohabitant	26 (65)	19 (47.5)	0,115
Single/Divorced	14 (35)	21 (52.5)	
Training sessions	84.6 (9.8)	84.8 (8.7)	0.510
Weight at T0 (Kg)	66.43(9.53)	65.09(12.55)	0.057
BMI at T0	24.34 (3.62)	23.22 (4.46)	0.222

(10.8). Most participants in Curves group were "Employed" Mean(SD)= 26(65) and "Single/Divorced" Mean(SD)= 21 (52.5). The result represents High-intensity interval training score was relatively low except only in "Housewives/student" Mean(SD)= 20 (50), "Married/cohabitant" Mean(SD)= 26 (65), and "Weight" Mean(SD) = 66.43(9.53).

The Univariate analysis (Table 2) comparing the results between High-intensity interval training and curves show

that Curves scores were significantly lower among Interval training. After 6 months the most impact was on "Abdomen loss" in Curves Group Mean(SD) = -4.48(1.70). In Curves group "Weight loss" scored (p=0.219) and "Upper arm loss" (p=0.10) insignificant higher than Interval training.

According to the multivariate analysis (Table 3), we can say that for all the dependent variables the Curves group shows significant results in comparison with the

Table 2. Univariate analysis comparing the results between the two groups

Variables	Interval training Mean(SD)	Curves Mean(SD)	p
Weight loss (Kg)	-1.66(0.57)	-3.14(0.94)	0.219
BMI reduction (Kg/height ²)	-0.61 (0.21)	-1.13 (0.36)	<0.001
Trunk loss (cm)	-2.39(0.73)	-4.06(1.46)	0.001
Back--- loss (cm)	-2.53(0.77)	-3.93(1.35)	0.018
Abdomen loss (cm)	-1.99(0.62)	-4.48(1.70)	<0.001
Hip loss (cm)	-1.93(0.95)	-4.23(1.56)	0.001
Lower arm loss (cm)	-2.00(0.60)	-3.89(1.40)	<0.001
Upper arm loss (cm)	-2.17(0.65)	-2.65(0.83)	0.10
Fat mass loss (%)	-2.07(0.58)	-3.47(0.84)	0.02

Table 3. Linear multivariate analysis of several dependent variables, according to type and number of training and civil status

Variables	Curves vs Interval training	Married or cohabitant vs Single/divorced	Number of training	R ²
	β (p)	β (p)	β (p)	
Weight loss	-0.689 (<0.001)	-	-0.320 (<0.001)	0.582
Trunk loss	-0.586 (<0.001)	-	-0.376 (<0.001)	0.489
Back--- loss	-0.539 (<0.001)	-	-	0.290
Abdomen loss	-0.759 (<0.001)	-	-0.276 (<0.001)	0.560
Hip loss	-0.751 (<0.001)	-	-0.302 (<0.001)	0.542
Lower arm loss	-0.635 (<0.001)	-	-0.248 (0.003)	0.493
Upper arm loss	-0.357 (<0.001)	-0.267 (0.014)	-	0.143
Fat mass loss	-0.693 (<0.001)	-	-0.153 (0.061)	0.497

High-intensity interval training group ($p < 0.001$ for all the models).

The civil status is significantly associated with only “Upper arm loss” variable ($\beta = -0.357$; $p < 0.001$), while the Number of training is significantly associated with all the dependent variables, with the exception of “Back-loss”, “Upper arm loss” and “Fat mass loss”.

Discussion

Physical activity is worldwide recognized as a tool for improving health in a different setting (Mannocci et al, 2016) and is an important instrument for weight control/reduction if compared to diet alone (Pancallo et al, 2016; La Torre G et al, 2016). The research is a pilot study that investigates the difference between two training systems carried out in the gym, dedicated exclusively to women: “Curves” and “Interval Training”, resulted in the first method being more effective than the second, is more intense and more individually followed. For the time that is used in the commitment (of 30’), the results can be defined as satisfactory.

There are few randomized controlled trials that concurrently consider the relationship between curves training and loss of weight. Jin S et al reported that gut microbiota is associated with obesity-related disorders such as adiposity, insulin resistance, dyslipidemia, and the data analysis displayed the positive effect of curves exercise on gut microbiota especially endotoxin (Jin S et al, 2017). Negaresh R et al demonstrated that exercise (Short Term Interval Training) is an effective therapeutic intervention for improving fatigue, depression and functional parameters, independent of initial weight status in person with Multiple Sclerosis (Negaresh R et al, 2019). The results of Kerksick C et al indicated that combining a diet with resistance exercise program stimulates the greatest amount of weight loss and improvements in measures of body composition (Kerksick C et al, 2009). In some studies has been shown that orderly participation in resistance exercise program cause losses of body mass, improvements in cardiovascular, musculoskeletal fitness and health-related quality of life (Kerksick C et al 2009; Arija V et al 2018). There is strong evidence that physical activity is a determining factor in the reduction and maintenance of a healthy weight, with greater benefits being observed when it is upper 150 min/week (physical activity guidelines committee scientific report, 2018). Arija Vrija and colleagues represented the relationship between physical activity (PA) and health-related quality of life (HRQoL) (Arija V et al, 2018) and the result was the same with Battaglia G et al. They found positive relationship between aerobic PA programmes and (HRQoL) (Battaglia G et al, 2016) while other studies that were not supervised with high levels of aerobic PA (Imayama I et al, 2011) or with high intensity did not report any benefit on HRQoL (Chin A et al, 2004; Conradsson M et al, 2010).

- Strengths: the study led to the conclusion that the “Curves” training is above all more suitable for people who have physical problems, working with hydraulic machinery and therefore with isokinetic muscle contractions. In terms of timing, it is relatively more effective. Furthermore, the training is more followed by specialized personnel, having

few subjects to follow, compared to the other, enhancing individuality. The T. Instead has more positive the situation of sociality that develops among the users, even if the results are less effective. The 2 methods are similar; they are both intense but the second + heavy (not suitable for people with trauma).

- Weaknesses: Plyometric measures were not taken in the pilot study. The sample is not randomized, but the subjects are all prepared for enrollment in the courses. Even the age of the subjects is too different by not allowing one

- Conclusion: Curves (strengthens muscles and burns fat, abdomen reduction) is in terms of absolute values better than IT.

References

1. Mannocci A, Sinopoli A, Masala D, et al. The Physical Activity Country Card is coming: health is moving on!. *Epidemiol Prev.* 2016; 40(3-4):153
2. Pancallo M, Saule R, Semyonov L, et al. Effectiveness of a protocol treatment for overweight/obese patients (SIAN - ASL RMA). *Cli Ter* 2015;166(5):e306-11
3. La Torre G, Mannocci A, Saule R, et al. GiochiAMO! The protocol of a school based intervention for the promotion of physical activity and nutrition among children. *Cli Ter* 2016; 167(5)
4. Mukhra R, Kaur T, Krishan K, et al. Overweight and Obesity: A major concern for health in India. *Cli Ter* 2018 Sep-Oct;169(5):e199-e201
5. Huang G, Wong R, Chen P, et al. Dose-response relationship of cardiorespiratory fitness adaptation to controlled endurance training in sedentary older adults. [https://doi.org/10.1111/j.2016.23\(5\):518-529](https://doi.org/10.1111/j.2016.23(5):518-529)
6. Jin S, Kim S, Seo H, et al. The Curves Exercise Suppresses Endotoxemia in Korean Women. *Korean Med Sci* 2017; 32: 272-277
7. Imayama I, Alfano CM, Cadmus LA, et al. Effects of 12-month exercise on health-related quality of life: a randomized controlled trial. *Prev : Med (Baltim)*, 2011; 52:344–51
8. Battaglia G, Bellafore M, Alesi M, et al. Effects of an adapted physical activity program on psychophysical health in elderly women. *Clin Interv Aging*, 2016;11:1009–15
9. Chin A, Paw MJ, van Poppel MN, et al. Effects of resistance and all-around, functional training on quality of life, vitality and depression of older adults living in long-term care facilities: a “randomized” controlled trial. *BMC Geriatr*, 2004; 4:5
10. Physical Activity Guidelines Advisory Committee, scientific report. 2018
11. Kerksick C, Thomas A, Campbell B, et al. Effects of a popular exercise and weight loss program on weight loss, body composition, energy expenditure and health in obese women <http://nutritionandmetabolism.com>, 14 May 2009
12. Kreider R, ACSM F, Rasmussen C, et al. Effects of the Curves™ Fitness & Weight Loss Program on Weight Loss and Resting Energy Expenditure. Exercise & Sport Nutrition Lab, Center for Exercise, Nutrition & Preventive Health Research, Baylor University, Waco, 2012, TX 76798-7313
13. Wilborn C, Beckham J, Campbell B, et al. Obesity: Prevalence, Theories, Medical Consequences, Management, and Research Directions. *Journal of the International Society of Sports*, 2005; 2:4-31

14. Mirghani S, Seydyousefi M, Pekkala S, et al. Shorter recovery time following high-intensity interval training . *Sport Sciences for Health* <https://doi.org/10.1007/s11332-018-0505-7>, 21 September 2018
15. Negaresh R, Motl R, Mokhtarzade M, et al. Efect of short term interval exercise training on fatigue, depression, and fitness in normal weight vs. overweight person with multiple sclerosis. Elsevier Inc. <https://doi.org/10.1016/J.EXPLORE.2018.07.007>, 15:134-141;2019
16. Conradsson M, Littbrand H, Lindelöf N, et al. Effects of a high-intensity functional exercise programme on depressive symptoms and psychological well-being among older people living in residential care facilities: a cluster-randomized controlled trial. *Aging Ment Health* 2010;14:565–76
17. Andò S, Gelsomino L, Panza S, et al, Leptin and Breast Cancer: Epidemiological Evidence and Proposed Mechanisms. *Cancers (Basel)*, 2019; 9;11(1). pii: E62
18. Apovian CM, Riffenburg KM. Perspectives on the global obesity epidemic // *Curr Opin Endocrinol Diabetes Obes* - 2017; 24(5):307–309
19. Arija V, Villalobos F, Pedret R, et al. Physical activity, cardiovascular health, quality of life and blood pressure control in hypertensive subjects: randomized clinical trial. *Health and Quality of Life Outcomes* ,<https://doi.org/10.1186/s12955-018-1008-6>, (2018) 16:184
20. Jin S, Sun Kyeong Kim, Hee Jung Seo, et al. The Curves Exercise Suppresses Endotoxemia in Korean Women with Obesity .*Endocrinology, Nutrition & Metabolism*, 2017; 32: 272-277
21. Ahima RS, Lazar MA. The health risk of obesity—better metrics imperative. <https://dx.doi.org/10.1126/science.1241244>., *Science* 2013; 341(6148):856–858