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Effect of short term resistance exercise using elastic resistance band versus aerobic exercise in obese patient: Randomized clinical trail

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Abstract
Background: The purpose of this study was to compare effectiveness of short term resistance training using elastic resistance band over aerobics on obesity in multidisciplinary program and assess if eight weeks of training are decent for reduction of muscle and fat mass.
Methods: Thirty healthy and untrained obese adults (07males and 23 females) were included in study and then randomly assigned into an Elastic resistance training group (n=15) and Aerobic training group (n=15). Each subject underwent testing of BMI, WC, WHR, BMR before and after the intervention. Both the group completed an 8-week exercise training period.
Result: Average age, height, weight and BMI for the elastic resistance training subjects were 32.99 ± 1.59 and for aerobic training subjects 32.65 ± 1.97 respectively. There was no significant difference in age and BMI between the two groups. In our study we found that aerobic exercise and resistance training resulted in reduction in BMI, WC and BMR parameter. The results of this study clearly demonstrated that there was no significant difference between the two treatments and both the interventions found effective in treating obesity.
Conclusion: In conclusion, both resistance training using elastic band (Theraband) and aerobic exercise for 8 weeks is statistically significant in reduction of obesity.

Keywords: obesity, resistance training, aerobic exercise

Introduction

Obesity is a significant wellbeing problem on the planet, influencing proximate to 33% of all grown-ups. It might incorporate number of other wellbeing ailments like diabetes, hypertension, gallstone and gastro-esophageal reflux malady, and mental morbidities. As indicated by the WHO obesity is as of now in charge of 2– 8% of wellbeing costs and 10– 13% of passings in various parts of the region [1]. If common patterns proceed, by 2030 an expected 38% of the world's grown-up populace will be overweight and another 20% will be obese [2]. During the most recent century, general wellbeing mediations have moved toward becoming examples of overcoming adversity in decreasing risk factors, for example, smoking, irresistible infection, elevated cholesterol, hypertension and other multi-factorial approach like dietary alteration, exercise, psychotherapy and medication [3].

Moderate to high intensity aerobic exercise leads to associate improvement within the blood lipid profile [4]. The foremost recent studies in patients with established heart disease recommend that a comparatively high intensive, nevertheless aerobics exercise improves the intrinsic pump capability of the heart muscle [5]. Strengthening exercises with larger intensity (fewer repetitions and larger weight) with multiple sets will elicit larger enhancements in strength and power, and should not be applicable for older nonathletic participants [6]. Aerobic and resistance trainings induce improvement in body fat composition and have favorable metabolic effects in women [7].

Resistance exercise involving elastic bands has been oftentimes used as a treatment methodology and is taken into account safe for muscle strengthening all told aged cluster folks. Muscle activations in and self-perceived effectuality of this training area unit kind of like those of free-weight resistance training [8]. Resistance exercise with elastic resistance may be a distinctive variety of resistance training compared to alternative ancient forms like isotonic or isokinetic resistance exercises. The resistance provided by elastic bands is predicated on the amount that the band is stretched. Elastic resistance doesn't have confidence on gravity that provides continuous tension to the muscle being trained. It offers linear variable resistance, because the ROM will increase as resistance provided by elastic bands will also increase. This recruits a lot of range of muscle fibers so a lot of the muscle fibers used, bigger the variation in muscle strength is ascertained. Long-term resistance training (RT) could lead to a chronic increase in 24-hour energy expenditure (EE) and fat oxidization to level spare to help in maintaining energy balance and stop weight gain. A borderline RT program that needed very little time to finish (11 min per session) resulted in a very chronic increase in energy expenditure. This adaptation in energy expenditure could have a positive impact on energy balance and fat oxidization spare to help with the bar of avoirdupois in inactive, overweight young adults, at high risk for developing obesity [9].

The purpose of this study was to compare effectiveness of short term resistance training using elastic resistance band

over aerobics on obesity in multidisciplinary program and assess if eight weeks of training are decent for reduction of muscle and fat masses**.**

Methods

Study design

Randomized Clinical Trail

Participants

One hundred and two healthy adults with a age range from 18-50 year were medically screened before participation to ensure that they were not involved in any physical activity since last 1 month and were not taking any medication and that they were all functionally independent with no neurological, cardiovascular, metabolic, inflammatory, or musculoskeletal conditions.

Convenience sample of 30 healthy and untrained obese adults (07males and 23 females) were included in study on the basis of BMI range from 29-35. The study protocol was executed at the MGM Institute of Physiotherapy, Aurangabad and Lahuji Salwe Health Centre NSDL Project MIDC Railway Station, Aurangabad. Both patients and examiners were blinded to the group assignment. All patients were enrolled from October 2015 to January 2017. Written consent form was obtained from all subjects before commencing the study, which had local/college ethical committee approval and were then randomized into 2 groups: an Elastic resistance training group (Group A) and Aerobic training group (Group B).

Procedures

Pre-training assessments

In all subjects, stature (in cms) and weight (in kgs) were determined using a stadiometer (accurate to 1.5 mm) and an electronic beam scale (Inscale electroscale, model MRP200P) (accurate to 0.1 kg).

Waist circumference was measured by a measuring tape over the bared abdomen, with measurements made halfway between the lower border of the ribs and the highest point of iliac crest (at the umbilicus level) in the standing position.[10] Hip circumference was measured over lightweight clothing at the widest point over the buttocks when viewed from the side. Waist hip ratio was obtained by dividing the waist circumference by hip circumference [10]. BMR will be calculated by the Harris Benedict equation [11]. Detailed diet chart will be taken and individual habits will be recorded as per assessment format. A 600 kcal/day less diet than person's current calorific uptake will be prescribed [12].

Group A Protocol

The resistance training group was instructed on the utilization of Thera-Band® Latex Free Resistance Bands; the band hues, to be specific yellow, red, green, blue, dark, and silver, mean the level of flexibility and demonstrate the comparing protection level. The protection of the band was measured with the band completely expanded. At the point when the band was extended by 50, 75, and 100%, the comparing increments in quality utilizing the red, green and blue groups were 1.2/1.5/1.8 kg, 1.5/1.9/2.3 kg, and 2.1/2.7/3.2 kg, separately. Patients increased band resistance gradually to allow for adequate connective tissue adaptation. They used minimal resistance for the first two weeks and then gradually increased the resistance to 40 to 50% of the 1RM by the end of the 8-week program. All exercises will be demonstrated to patients and supervised repetitions was done three times per week and performed three sets of 10 to15 repetitions of each exercise as a group.

First Week program for Group A: (40 minutes):

Table 1

Day	Programme	Work Out
Day 1	Demonstration of all exercises	Abs, Hip, Knee
Day 2	1 Set of all exercises with 5 repetitions	Arm, Chest, Hip, Knee
Day 3	1 Set of all exercises with 10 repetitions	Abs, Hip, Knee
Day 4	Rest	Rest
Day 5	2 Sets of all exercises with 10 repetitions	Abs, Hip, Knee
Day 6	Set of all exercises with 5 repetitions	Arm, Chest, Hip, Knee
Day 7	Rest	Rest

From 2nd to 8th Week: 3 Set of all exercises with 10 repetitions. The exercise session consist of total 60 minute duration of which 10 minute warm up, 40 minute core exercises and 10 minute cool-down exercises. The resistance exercises include exercises of arm, chest, abdomen, hip and knee. Warm-up exercises for 10 minutes includes easy to moderate aerobic activity (slowly elevate the pulse And body temperature) and active range of motion exercises and cool-down exercises for 10 minutes i.e. Shavasana.

Group B Protocol

Among various forms of aerobic exercises like walking, brisk walking, jogging, running, swimming, etc. Brisk walking was selected for study protocol after discussing it with the participants. The protocol consists of total 60 min/day workout breaking into 10 min warm-up, 40 min aerobic exercise and 10 min cool-down period. Warm-up exercises for 10 minutes includes easy to moderate aerobic activity (slowly elevate the pulse And body temperature) and active range of motion exercises and cool-down exercises for 10 minutes i.e. Shavasana.

Walking speed and distance covered in 6 min of individuals was identified in closed environment and noted down by using 6 min walk test and is used as a progression parameter for further program.

First Week program for Group B:

Table 2

Day	Work Out
Day 1	15 min brisk walking with 10% more distance
Day 2	20 min brisk walking with 10% more distance
Day 3	25 min brisk walking with 20% more distance
Day 4	Rest
Day 5	25 min brisk walking with 25% more distance
Day 6	30 min brisk walking with 30% more distance
Day 7	Rest

From 2nd to 8th Week: 40 min brisk walking with 35% more distance. After completion of 8 week program, assessment will be done of individuals who have successfully completed the protocol with 90% participation and analysis of outcome measures will be done to compare the effectiveness of both protocols.

Statistical Analysis

All data are presented as mean ± standard deviation (SD). The pre and post-test data were analyzed with a statistical paired sample t-test. Statistical significance was accepted at $P<0.05$. An alpha level of 0.001 was used in determining statistical significance using the SPSS program for Windows, version 14.0.

Result

Table 3: Baseline characteristics

Characteristics	Group A	Group B
Subjects (n)	15	15
Male/Female	0/15	7/8
Age (yrs)	36.93±9.63	41.33±9.88
Height (m)	1.51±5.61	1.57±9.06
Weight (kg)	75.54±6.07	81.31±9.25
BMI	32.99 ± 1.59	32.65 ± 1.97

Among all patients, 30 patients (Group A: 15, Group B: 15) were included in this study. Average age, height, weight and BMI for the Group A subjects were 32.99 ± 1.59 and for Group B 32.65 ± 1.97 respectively. There was no significant difference in age and BMI between the two groups.

Table 4: Changes in WC, WHR and BMR

Group	Measure	Pre-treatment	Post-treatment	Diff change
A	WC	110 ± 8.35	105.4 ± 7.94	4.6 ± 0.41
	WHR	0.937 ± 0.073	0.933 ± 0.071	0.004 ± 0.002
	BMR	1453.46 ± 87.53	1424.38 ± 80.77	29.08 ± 6.76
B	WC	113.6 ± 6.72	108.6 ± 7.56	5 ± 0.84
	WHR	0.93 ± 0.047	0.92 ± 0.049	0.01 ± 0.002
	BMR	1606.2 ± 210.86	1573.3 ± 199.82	32.9 ± 11.04

Table 4 presents the mean and stands deviation of pre-treatment and post treatment parameters between the groups. A significant correlation was observed in WC and BMR parameter between the groups.

Table 5: Intra Group A comparison

Outcome Measures	Pre	Post	t value	df	95% CI Upper - Lower	p value	Inference
	Mean ± SD	Mean ± SD					
BMI	32.9987 ± 1.5944	31.69 ± 1.4489	10.7036	14	1.0464 to 1.5709	0.0001	Significant
WC	110 ± 8.36	105.40 ± 7.94	13.7218	14	3.88 to 5.32	0.0001	Significant
WHR	0.9373 ± 0.0704	0.9327 ± 0.0713	1.2005	14	0.0037 to 0.0130	0.2499	Significant

Table 5 presents the mean and stands deviation of pre-treatment and post treatment parameters in the Group A.

Table 6: Intra Group B comparison

Outcome Measures	Pre	Post	t value	df	95% CI Upper - Lower	p value	Inference
	Mean ± SD	Mean ± SD					
BMI	32.658 ± 1.9758	31.4967 ± 1.8072	12.4913	14	0.9619 to 1.3607	0.0001	Significant
WC	113.6 ± 6.73	108.6 ± 7.57	7.8132	14	3.63 to 6.37	0.0001	Significant
WHR	0.9313 ± 0.0478	0.9273 ± 0.0499	0.7508	14	0.0074 to 0.0154	0.4652	Significant

Table 6 presents the mean and stands deviation of pre-treatment and post treatment parameters in the Group B.

Table 7: Comparison of mean values, SD of Post-treatment Assessment values of outcome measures between Group A and Group B using unpaired t test

Outcome Measures	Group A (post)	Group B (post)	t value	Df	95% CI Upper - Lower	p value	Inference
	Mean ± SD	Mean ± SD					
BMI	31.69 ± 1.4489	31.4966 ± 1.8071	0.3234	28	1.0316 to 1.4149	0.7488	Nonsignificant
WC	105.4 ± 7.9444	108.6 ± 7.5668	1.1296	28	9.0027 to 2.6027	0.2682	Significant
WHR	0.93266 ± 0.0712	0.92733 ± 0.04992	0.2374	28	0.04068 to 0.05135	0.8141	Nonsignificant

The comparison between the two groups on the basis of various post intervention parameters was done by using students unpaired t test. The results show a non-significant difference between them ($p > 0.5$) for BMI and WHR and significance was found for WC.

Discussion

The present study was designed to compare the effectiveness of resistance training using elastic resistance band over aerobics in obese patients. The results of this study clearly demonstrated that there was no significant difference between the two treatments and both the interventions found effective in treating obesity. In this study we investigate the effect of resistance training using elastic band (Theraband) and aerobic exercise for 8 weeks.

In the present study, aerobic exercise and resistance training resulted in reduction in BMI, WC and BMR parameter showed that both the group are statistically significant. The thought of aerobic exercises was to extend energy expenditure by activation of lipolysis. Therefore aerobic exercise leads to reduction of weight and body fat, whereas resistance exercise leads to chronic increase in 24Hr energy expenditure and fat oxidization to tier important to help in maintaining energy balance and helps weight loss.

The mean Age of group A is 36.93 and Group B is 41.33. In that we compared effectiveness of the intervention in each group pre and post of the treatment. Mean weight loss for Group A was 3.02 kg and 2.9 kg for Group B. The values of

BMI, WC and WHR are significant (p value, 0.001, 0.001 and 0.2499 respectively) for resistance training group and also for aerobic exercise group BMI, WC and WHR are significant (p values 0.001, 0.001 and 0.4652 respectively). Where in previous studies, the post treatment BMI is (0.45±1.15), WC is (-0.76±3.64) for aerobic exercise group and for resistance training group the values for BMI are (0.49±0.33) and WC is (-0.05±2.57). Post treatment values are; for BMI is (t= 0.3234) and (p= 0.7488), for WC (t = 1.1296) and (p= 0.2682) and for WHR (t = 0.2374) and (p= 0.8141).

In this study, subjects was incontestable a major weight loss in each group A and B. Previous study states that the result of resistance exercise and aerobic exercise on insulin sensitivity in overweight Korean Adolescents showed a marked reduction in BMI and a major reduction in muscle mass within the aerobic exercise group when compared to the resistance exercise group [13].

In our study, we have given 600 calorie less diet compared to their daily calorie intake. A previous study examined the effect of intensive, high volume resistance exercise combined with a VLCD (Very Low Calorie Diet) on these parameters and concluded that, the addition of an intensive, high volume resistance training program resulted in preservation of LBW and RMR during weight loss with a VLCD [14].

There is still scope to study effects of different treatments on obesity and the same study can also be done by varying treatment parameters like intensity, duration, frequency, etc.

The present study has certain limitations. First, the study included more number of female patients so our results might not be generalizable to all populations. Moreover, the patients in this study were young to adult age group which could represent a bias for old age patients.

Conclusion

In this study we conclude that both resistance training using elastic band (Theraband) and aerobic exercise for 8 weeks is statistically significant in reduction of obesity. So the combination of Aerobic exercise and Resistance training can also be used and will be more beneficial than single treatment maneuver alone.

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Conflict of interests

This research received no specific financial support from any public, commercial or non-profit sectors. The authors declare that they have no competing interest.

References

1. World Health Organization. Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks. Geneva: World Health Organization, 2009.
2. Kelly T, Yang W, Chen CS, *et al*. Global burden of obesity in and projections to 2030. 2005, 2008; 32(9):1431-7.
3. Mazansky H. A review of obesity and its management in 263 cases. S Afr Med J. 1975; 49(47):1955-62
4. Leon AS, Sanchez OA. Response of blood lipids to exercise training alone or combined with dietary intervention. J Am College of Sports Med. 2001; 33:502-515.
5. Kemi OJ, Wisloff U. High-intensity aerobic exercise training improves the heart in health and disease. J Cardiopulm Rehabil Prev. 2010; 30:2-11.
6. Pollock ML, Vincet KR, Corbin C, Pangrazi B. Resistance Training for Health. The President's Council on Physical Fitness and Sports Research Digest. 1996; (2).
7. Fenkci S, Sarsan A, Rota S, Ardic F. Effects of resistance or aerobic exercises on metabolic parameters in obese women who are not on a diet. Advances in Therapy. 2008; 23:404-13
8. Yasuda T, Fukumura K, Uchida Y, *et al*. Effects of low-load, elastic band resistance training combined with blood flow restriction on muscle size and arterial stiffness in older adults. J Gerontol A Biol Sci Med Sci. 2015; 70:950-8
9. Erik P. Minimal resistance training improves daily energy expenditure and fat oxidation, Med Sci Sports Exerc. 2009; 41(5).
10. World Health Organization. Obesity preventing and managing the Global Epidemic: Report of a WHO consultation on obesity, 1998.
11. Roza AM, Shizgal HM. The Harris Benedict equation reevaluated. American Journal of Clinical Nutrition. 1984; 40(1):168-182.
12. Sharon A, *et al*. National Clinical Guideline Centre Obesity, Identification, assessment and management of overweight and obesity in children, young people and adults, 2014.
13. Bryner RW, *et al*. Effects of Resistance vs. Aerobic Training Combined with an 800 Calorie Liquid Diet on Lean Body Mass and Resting Metabolic Rate, Journal of the American College of Nutrition. 1999; 18(1):115-121.
14. Sunghwan S. Effects of Resistance Training and Aerobic Exercise on Insulin Sensitivity in Overweight Korean Adolescents: A Controlled Randomized Trial, Diabetes Metab J. 2011; 35:418-426.