

EFFECT OF ADDING AN EXERCISE REGIMEN TO DIET THERAPY IN DECREASING BODY FAT PERCENTAGE AND BODY MASS INDEX AMONG OBESE FEMALES

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ABSTRACT

BACKGROUND

Obesity is one among the leading health problems in many developing countries including India. Lifestyle modifications, which include diet therapy and regular exercises are considered as the mainstay in the management of this health issue. Brisk walking is the preferred socially and economically acceptable mode of exercise. This randomised controlled trial tries to evaluate the efficacy of adding an exercise regimen to diet therapy in reducing body fat percentage and Body Mass Index (BMI) among obese females.

MATERIALS AND METHODS

One hundred female patients aged between 20 and 60 years with BMI greater than 25 were recruited for this study of 6 months duration. Participants were randomised into either diet therapy alone group or diet therapy with exercise group. All participants were prescribed a low-calorie diet of 1500 kcal per day. The exercise intervention group was subjected to a home-based exercise regimen; walking for 30 minutes 5 days a week. Outcomes were measured by BMI and body fat percentage, documented every month.

RESULTS

Both groups showed significant reduction in body fat percentage and BMI, but the reduction was more in the exercise with diet therapy group (p value <0.001).

CONCLUSION

Adding a simple exercise like walking to other lifestyle modification measures can more efficiently bring down BMI and body fat percentage in turn significantly reducing the cardiovascular risk, morbidity and mortality in women.

KEYWORDS

Body Mass Index (BMI), Body Fat Percentage, Obesity, Brisk Walking, Diet Therapy.

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BACKGROUND

Obesity has become a serious health problem in both developing and developed countries. Overweight and obesity has taken fifth position as a leading cause of death.¹ The prevalence of obesity has increased dramatically for the past 4 decades.² Individuals with raised body mass index are at a higher risk of developing diabetes mellitus, coronary artery disease, dyslipidaemia, hypertension, gallbladder disease and osteoarthritis.³ Obesity affects female fertility

(infertility rates in India is about 2.5%) and obese females also face major health risks at the time of pregnancy.² It also increases the risk for postmenopausal breast and endometrial cancer.⁴ Newer style of living and sedentary style of work has forced humans to focus more on intellectual ability and less on physical activity.¹ This sedentary lifestyle leads to overweight, problems with locomotion and decreased cardiorespiratory reserve.⁵

Though, it has a strong genetic component, regular exercise and proper diet has got significant role in the management of obesity.² Diet therapy is important in the management of obesity. Low-calorie diet, which is defined as a balanced ratio of protein, carbohydrate and fat in reduced quantities to provide an energy intake of 800-1500 kcal/day is recommended for obese individuals. Such diet can be effective for long-term weight reduction and can be used complimentary to lifestyle modification.⁶

Studies have pointed out the positive effects of aerobic exercises like walking and swimming on body composition

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and anthropometric characteristics. Brisk walking of 150 minutes per week of moderate intensity is recommended for the treatment of obesity.⁷ Majority of our female population belong to middle and lower socioeconomic group and cannot afford weight loss therapy in gymnasiums.⁸

But, brisk walking among all aerobic exercises is a preferred form of physical activity for females and can be easily added to their daily routines.⁹

Clinical practice guidelines recommend exercises along with low-calorie diet as the first line treatment for obesity.³ Meta-analytical studies have found that diet and exercise combined was much superior to diet therapy alone in weight loss management.¹⁰ Even though walking added to diet therapy is an approved treatment for management of obesity, definite evidence in Indian population to show its efficacy is lacking. Therefore, the purpose of this randomised controlled trial is to examine the effectiveness of adding a brisk walking exercise regime in addition to low energy diet in reducing Body Mass Index (BMI) and body fat percentage in obese individuals.

Aim- To study the effectiveness of adding brisk walking regimen to diet therapy in reducing body fat percentage and BMI among obese individuals.

Setting and Design- A randomised controlled trial conducted in a tertiary care hospital in South India for a period of 2 years.

Objective of the Study- To study the effectiveness of adding a brisk walking regimen to diet therapy in reducing body fat percentage and BMI among obese females.

MATERIALS AND METHODS

Study design, randomised controlled trial.

Participants

100 patients with BMI 25 or above who attended the obesity clinic of a tertiary care hospital in South Kerala for a period of 2 years. The study was approved by the institutional ethics committee.

Inclusion Criteria

Female patients of age group of 20 years to 60 years, patient with BMI 25 or above, patients who had not undergone any diet or exercise programme within 6 months of the start of the study. A written informed consent was taken from all the patients.

Exclusion Criteria

Patients with history of coronary artery disease, type II diabetes mellitus, patients on medications to decrease bodyweight, patients on corticosteroids, antipsychotic drugs and other medications that increase bodyweight and pregnancy.

Sample size- The number of patients to be recruited was determined to be 65 in each arm based on previous evidence with a projected dropout rate of 25%. For the primary

outcome measures of BMI and body fat percentage, sample size was calculated for a power of 80% and α at 0.05.¹¹

Randomisation- Participants were randomised individually by a research assistant external to the project and had no contact with the participant prior to or during the trial. Selected females were randomised into group A and B using sealed opaque envelopes in blocks of 10. Each envelope contained a white sheet of paper folded into four and had the group allocation. One envelope was chosen at random from the stack of 10 envelopes that contained 5 of each group allocation (group A and group B) reduced to 2 envelopes. This is then combined with the next group of 10 envelopes to reduce the chance of predictability. Each participant was given an identification number.

A detailed history taking and medical examination were conducted to identify any contraindication to diet control, exercise training or both in selected patients.

Group A patients were prescribed only a diet of 1500 kilocalories per day. Group B patients were prescribed a diet of 1500 kilocalories per day and aerobic exercise consisting of brisk walking for a distance of 2.5 kilometres within 30 minutes, 5 days per week. Each exercise session consisted of 5 minutes of warm up, 30 minutes of brisk walking and 5 minutes of cool down. Patients were made aware of the fact that desired results were obtained only if prescribed diet and exercise were undertaken regularly. Dietician would record each patient's dietary history and suitable changes would be made for 1500 kilocalorie diet. Patients were asked to record the daily diet taken and the days of exercise undertaken. Any illness, injury or other reasons for not doing exercise would be recorded and patient was asked to make up the lost days in the following weeks. Patients were reviewed monthly for a period of 6 months. At the end of 6 months study period, BMI status and body fat percentage status were compared in both groups.

Outcome Measures- Each patient was assessed according to a proforma covering various aspects like age, occupation, income, education, waist-hip ratio, BMI, body fat percentage, blood pressure, fasting lipid profile, fasting blood sugar and electrocardiogram.

Height was determined using a standard calibrated stadiometer with patient standing in the anatomical position. Weight and body fat percentage were measured using body fat monitor (Tanita bioimpedance analyser). BMI was calculated using the mathematical formula- weight (kg)/height (m²). Three measurements were taken and the mean of the two nearest measurements used. Based on BMI, patients were categorised into normal weight (18.5-24.9 kg/m²), overweight (25-29.9 kg/m²), class I obesity (30-34.9 kg/m²), class II obesity (35-39.9 kg/m²), class III obesity (\geq 40 kg/m²), class IV obesity (\geq 40 kg/m²).³ Patients with $>$ 30% body fat were considered obese. Waist circumference was measured using a steel tape with the patient in the standing position. The tape was placed horizontally around the patient's waist immediately above the iliac crest. Three measurements were taken and mean of the two nearest measurements was used. Hip

circumference was measured using a steel tape with the patient in the standing position. The tape was placed horizontally around the widest part of the hips. Three measurements were taken and the mean of the two nearest measurements was used. Waist-to-Hip Ratio (WHR) was calculated. A ratio of 1 or higher was considered "at risk" for undesirable health consequences.

Statistical Analysis

Analysis was done by including only those who completed the 6 months intervention period. No intention to treat, analysis was done. Analysis was done using R Version 3.4.1. Data was checked for normality using Kolmogorov Smirnov test of normality. All outcome measures were found to be normally distributed. Analysis was done using independent sample t-test to compare between two groups and paired t-test for pre and post-intervention outcome measures.

RESULTS

A total of 130 females were recruited and randomised into two groups. A total of 100 females completed the study. The dropout rate was equal in both arms. 52 females in arm A (diet therapy alone) and 48 females in arm B (brisk walking and diet therapy) were available for assessment of final outcome measures at the end of 6 months period.

Randomisation was effective as the two groups were comparable in most of the baseline parameters. The mean age of the population was 44.22 ± 2.3. Age was the only parameter, which was significantly different in both the groups, the mean age of group B (40.21 ± 2.1) was significantly lower than group A (44.08 ± 2.7). Most of the females who were recruited had gone to college, but were currently unemployed.

		Diet Therapy N=52 (Group A)	Diet Therapy and Walking N=48 (Group B)	P value
Mean age (SD)		44.08	40.21	<0.05
Educational status	High school	26 (50%)	18 (37.5%)	>0.05
	College and above	26 (50%)	30 (62.5%)	
Employment	Employed	37 (71%)	37 (71%)	>0.05
	Unemployed	15 (29)	11 (23%)	
Monthly income	<1,500	14 (27%)	14 (29.2%)	>0.05
	1,500-5,000	22 (42%)	17 (35.4%)	
	5,000 and above	16 (31%)	17 (35.4%)	
W/H ratio	0.80-0.89	9 (17%)	9 (19%)	>0.05
	0.90-0.99	29 (56%)	27 (56%)	
	1 and above	14 (27%)	12 (25%)	
Hypertension	Hypertensive	17 (33%)	12 (25%)	>0.05
	Non-hypertensive	35 (67%)	36 (75%)	

Table 1. Baseline Demographic and Clinical Characteristics of Patients

Baseline body fat percentage of group A was 49.33 (8.02) and 49.28 (6.75) for group B. Majority of the patients had a body fat percentage between 40 to 60 (78% in group A and 88% in group B). Most of the females belonged to class I obesity (44% in group A and 50% in group B). Pre and post intervention body fat percentage and BMI were compared. There was a significant reduction in both the parameters as shown in Table 2.

		Before Mean (SD)	After Mean (SD)	P Value*
Diet therapy	Body fat %	49.33 (8.02)	48.85 (8.95)	<0.0001
	BMI	33.65 (5.33)	32.65 (5.32)	<0.0001
Diet therapy + walking	Body fat %	49.28 (6.75)	43.66 (7.65)	<0.0001
	BMI	32.44 (4.51)	29.45 (4.62)	<0.0001

Table 2. Difference in BMI and Body Fat Percentage Before and After Intervention

*Paired t-test.

Though both groups A and B showed significant reduction of body fat percentage and BMI, the reduction was found to be higher in the group, which underwent diet therapy and executed a brisk walking regime. The difference in the reduction was 5.14 (4.37-5.90) for body fat percentage and 1.9 (1.64-2.31) for BMI. The difference in the reduction obtained between the two arms were statistically and clinically significant.

Groups	Diet Therapy Mean (SE) (A)	Diet Therapy + Walking Mean (SE) (B)	Difference in Reduction and 95% CI CI (B-A)
Reduction in body fat %	0.48 (1.85)	5.62 (1.98)	5.14 (4.37-5.90)
Reduction in BMI	1.00 (0.85)	2.98 (0.81)	1.98 (1.64-2.31)
P <0.0001	Df = 98	t = 13.36	

Table 3. Comparison of "Reduction of Fat Percentage and BMI" between Two Groups

DISCUSSION

Females with obesity have a higher risk of developing diabetes and cardiovascular diseases. Both diet therapy and exercise have been found to be effective in the management of obesity. Our objective was to find out whether addition of an aerobic exercise like walking to diet therapy will prove to be more effective than diet modification alone. The advantage of this intervention is the negligible cost and acceptability and its reach across all socioeconomic classes. In our study, we found that addition of brisk walking to diet therapy significantly increased the reduction of BMI and body fat percentage. The difference in reduction or the additional advantage gained was 1.98 for BMI and 5.14 for body fat percentage. This reduction is more than that reported by similar studies. This could be because the baseline exercise or physical activity levels of these females were almost nil as compared to the western population who tend to be physically more active.

Diet therapy alone caused a reduction of BMI by 1.00. A pooled analysis of randomised clinical trials in similar settings have shown similar results. Body fat percentage reduction in our study was only 0.48, which is much lower than reported from other studies, which ranges from 1.6 to 4.2.¹¹ When brisk walking was added, the BMI and body fat percentage decreased by 2.98 and 5.62, respectively. The body fat percentage reduction is comparable to other studies. The reduction in BMI of 5.62, which is higher compared to that achieved in trials of similar designs could be attributed to the low baseline physical activity as mentioned above.¹¹

The strength of our study is that it could bring out lifestyle changes in both the groups and inclusion of an exercise regime into their daily routines. The limitation of our study is that the mean age of our study population was only 42 and this age group maybe more motivated and willing to bring in a lifestyle change as compared to older generation. So, the applicability of these findings to higher age groups may be limited.

CONCLUSION

Adding a simple exercise like brisk walking is more effective in bringing down body fat percentage and BMI, which will significantly reduce the risk for cardiovascular risk among the study subjects.

Since prevalence of diabetes, hypertension and stroke among females is very high in Kerala, weight reduction and bringing down of body fat percentage by simple addition of walking will go a long way in reducing mortality and morbidity.

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