

EFFECTIVENESS OF A WEIGHT LOSS PROGRAMME INCLUDING LOW CALORIE DASH DIET AND BRISK WALKING IN REDUCING BLOOD PRESSURE LEVELS IN OBESE FEMALE PATIENTS

Clinical Research

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ABSTRACT

The prevalence of obesity is rising alarmingly in low and middle income countries. Risk of hypertension increases with weight gain. This study aimed to find out the reduction in blood pressure achieved by a weight loss programme which included a low calorie DASH diet and brisk walking. We screened 262 patients from obesity clinic and selected 60 hypertensive patients with systolic BP of 120 to 139 mm of Hg and diastolic BP of 80 to 89 mm of Hg. Baseline BMI and BP were recorded. They were prescribed a low calorie DASH diet and brisk walking of 150 minutes per week. The BMI and BP were assessed at the end of six months. There was a decrease in systolic BP of 9.1 ± 0.4 mm of Hg and diastolic BP of 6.2 ± 0.6 mm Hg following a reduction of BMI of 4.05 ± 0.2 . Weight reduction was associated with lowering of blood pressure in obese females

KEYWORDS

Obesity, blood pressure, low calorie DASH diet, brisk walking, body mass index

Introduction

Obesity is one among the most significant public health problems of modern world. The prevalence of obesity is rising alarmingly in developing countries like India for the past three decades.¹ Obese individuals are at higher risk of developing metabolic and cardiovascular disease and disability compared to lean individuals.²

Hypertension is commonly seen among obese subjects. There is a linear relation between obesity and hypertension. Age adjusted prevalence of hypertension which is defined as systolic blood pressure >140 mmHg, diastolic pressure >90 mmHg in obese women was 38%. Risk of hypertension increases with weight gain with an increase by 6.5 mmHg with every 10% increase in body weight.³

Weight reduction is an important strategy to control hypertension in obese individuals. The diet recommended for hypertensive individuals is DASH (Dietary approaches to Stop Hypertension) eating plan which has been proved to reduce systolic BP in the range of 8 to 14 mm of Hg. This diet is rich in potassium and calcium along with dietary sodium restricted to <3 grams per day.² To achieve weight loss, a low calorie diet defined as a balanced ratio of protein, carbohydrate and fat in reduced quantities to provide an energy intake of 800-1500 Kcal/day is found to be effective.⁴

Physical activity (aerobic exercise) in addition to diet have got a significant role in the management of obesity.⁵ Brisk walking of 150 min /week of moderate intensity is recommended for weight loss.⁴ Brisk walking among all aerobic exercise is a preferred form of physical activity for females in low and middle income countries like India.⁶ Weight loss achieved by combining diet therapy and aerobic exercise like walking has shown to significantly reduce blood pressure even in trials in which weight loss was minimal.⁷

This study aimed to find out the reduction in blood pressure achieved by a weight loss programme which included a low calorie DASH diet and brisk walking.

Objective: To find out the reduction in blood pressure achieved by a weight loss programme which included a low calorie DASH diet and brisk walking

Material And Methods

Study design

Longitudinal study

Ethical clearance

Ethical clearance was obtained from Institutional ethics committee. Informed consent was taken from all patients at the onset of the study

Participants

232 patients with BMI 25 or above who attended the obesity clinic of a tertiary care hospital in South Kerala were screened for hypertension. 60 patients who met the inclusion criteria were recruited for the intervention.

Inclusion criteria

- Female patients of age group of 20 years to 60 years
- BMI 25 or above
- Undergoing treatment for hypertension with a systolic BP between 120 to 139 mm of Hg and diastolic BP between 80 and 89 mm of Hg (both criteria satisfied)
- Patients who had not undergone any diet or exercise programme within 6 months of the start of the study.

Exclusion criteria

- Patients with normal systolic BP but diastolic BP between 80 and 89 mm of Hg
- Patients who were diagnosed of hypertension at the time of recruitment
- Patients with history of coronary artery disease, type II Diabetes mellitus, patients on medications to decrease body weight, patients on corticosteroids, anti psychotic drugs and other medications that increase body weight
- Pregnancy

Sample size

We expected a reduction of 10 mm of Hg in systolic BP after the intervention. The sample size calculated for a power of 80% and α 0.05, with an expected drop out rate of 25% was 60

Intervention

262 patients were screened in the obesity clinic. 75 of the overweight and obese individuals were already diagnosed to have hypertension and were undergoing treatment. 60 of these patients had systolic BP between 120 to 139 mm of Hg and diastolic BP between 80 and 89 mm

of Hg(pre hypertension). These 60 patients with hypertension were included in the study.

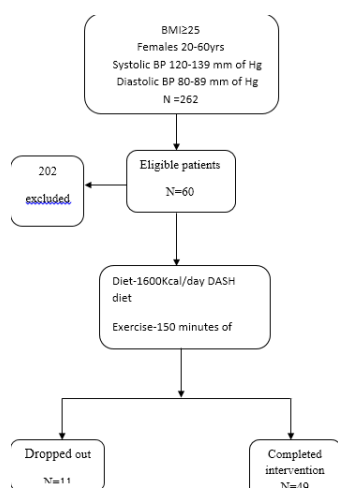
Table 1 : Distribution of hypertension among the several 262 patients

Category	No. of Patients
Total number of subjects screened	262
Total number of hypertensives	82
Newly diagnosed hypertension	7
No of hypertensives on pharmacotherapy	75
No of hypertensives meeting inclusion criteria	60

A detailed history taking and medical examination were conducted to identify any contraindication to both diet control and exercise training in selected patients. Each patient was assessed according to a proforma covering various aspects like age, occupation, income, education, waist hip ratio and fasting lipid profile. Baseline blood pressure was recorded with mercurial sphygmomanometer (model Elko meter 300). Blood pressure was measured after the patient having rested for at least 15 minutes, in sitting position and left arm placed on the table at heart level. 3 readings were taken 5 minutes apart and the mean of 3 readings was recorded as the blood pressure. Height was determined using a standard calibrated stadiometer with patient standing in the anatomical position. Weight was measured and 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, patient were categorized into 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 (≥ 40 kg/m²)

These patients were prescribed a DASH diet (Dietary approaches to Stop Hypertension) which is rich in potassium and calcium along with dietary sodium restricted to <3 gms per day. The sodium restriction was brought about by avoiding sodium rich food items like dried fish, pappads and pickles. The calorie intake was restricted to 1600 kilocalories per day. Aerobic exercise consisting of brisk walking for a distance of 2.5 kilometers within 30 minutes, 5 days per week was prescribed. 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.

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. For every follow up visit a dietician would record each patient's dietary history and suitable changes would be made to match the prescribed diet



Outcome measures

At the end of 6 months study period BMI status and blood pressure status were recorded and compared with the pre intervention levels.

Results

Table 2 : Baseline demographic and clinical characteristics of patients recruited

Variable		No. of Patients
Mean age	40.34 $\pm$ 2.3	
Educational status	High school College & above	21(42%) 28(58%)
Employment status	Employed Unemployed	37(76%) 12(24%)
Monthly family income	<1500 1500-5000 >5000	14(28.5%) 9(38.8%) 16(32.7%)
Waist to hip ratio	0.80-0.89 0.90-0.99 ≥ 1	8(16.3%) 31(63.3%) 10(20.4%)

A total of 262 patients were screened for the study. 75 (28.6%) patients were already diagnosed to have hypertension and was under treatment. Seven patients (2.6%) were newly diagnosed at the time of screening. The prevalence of hypertension among screened was therefore 31.2%. The mean age of the individuals was 40.34 $\pm$ 2.3. More than half (58%) had gone to college and three fourth of them were employed (76%).

The mean systolic and diastolic BP was calculated for overweight and each class of obesity. Both the mean systolic and the mean diastolic BP increased with increase in BMI and the increase was found to be significant. (One way ANOVA, $p < 0.05$)

Table 3 : Relationship between BMI and mean Blood Pressure (BP) of the study population

Obesity class	BMI (Kg/m ²)	BMI before intervention No. of patients	Mean systolic BP	Mean diastolic BP
Over weight	25-29.9	6(12%)	123.4 $\pm$ 7.5	91.2 $\pm$ 3.4
Class I obesity	30-34.9	20(41%)	127.4 $\pm$ 6.8	93.1 $\pm$ 4.9
Class II obesity	35-39.9	13(27%)	132.9 $\pm$ 6.2	94.8 $\pm$ 4.2
Class III obesity	≥ 40	10(20%)	136.2 $\pm$ 5.9	95.3 $\pm$ 5.1

49 patients completed the intervention and was available for follow up at the end of 6 months. The reduction in BMI for the study population was 4.05 $\pm$.32 which was found to be significant (paired t test, $p < 0.05$). This was achieved by a mean weight loss of 9.1 $\pm$.24 kg. There was a change in the classification with individuals moving towards overweight and Class I obesity from Class II and Class III.

Table 4 : BMI of the study population before and after intervention

Obesity class	BMI (Kg/m ²)	BMI before intervention No. of Patients	BMI after intervention No. of Patients
Normal	18.5-24.9	0(0%)	4(8%)
Overweight	25-29.9	6(12%)	20(41%)
Class I Obesity	30-34.9	20(41%)	15(31%)
Class II Obesity	35-39.9	13(27%)	8(16%)
Class III Obesity	≥ 40	10(20%)	2(4%)

To assess the reduction in blood pressure following weight reduction the study population was divided into two groups. Group A whose systolic BP was between 120 and 129 mm of Hg and group B whose systolic BP was between 130 and 139 mm of Hg. The reduction in BMI and reduction in both systolic and diastolic BP was calculated. For a BMI reduction of 4.05 which amounted to a mean weight reduction of 9.54 kg the reduction in systolic BP was 9.1 mm of Hg. So there was a reduction of 1 mm of Hg in systolic BP for a weight reduction of 1 kg.

Table 5

Blood pressure (BP) (mmHg) Before intervention	No. of Patients	Reduction in BMI (Kg/m ²) after intervention	Reduction in BP after intervention Systolic BP/Diastolic BP (mmHg)
Group A (Systolic BP 120-129)	32(65%)	3.04 $\pm$ 2.8	8.0 $\pm$ 0.2/5.7 $\pm$ 0.8
Group B (Systolic BP 130-139)	17(35%)	5.03 $\pm$.36	10.2 $\pm$ 0.7/7.4 $\pm$ 0.4
Total population	49(100)	4.05 $\pm$.32	9.1 $\pm$.4/6.2 $\pm$ 0.6

Discussion

Our study was intended to find out whether introduction of a DASH diet along with brisk walking will produce weight loss and in turn cause reduction in blood pressure. If found effective this diet and brisk walking, introduced in to their daily routine will significantly reduce the risk for cardiovascular diseases.

Out of the 262 obese females who were enrolled in the study 72 patients were found to be hypertensive. Thus the prevalence of hypertension in obese individuals in our study is 31.2%. Literature shows that prevalence of hypertension in obese females is about 38%. The lower prevalence in our study could be because the mean age of the study group was only 42 and prevalence of hypertension tend to be lower in younger age group.

The proportion of patients belonging to higher class of obesity came down after the intervention as follows: overweight (12% to 4%) class I obesity (41% to 31%), class II obesity (27% to 16%), class III obesity (20% to 4%). There is a movement of patients from higher BMI to lower BMI. It indicates that the weight reduction programme instituted in the study was quite effective. Our results also support the existing evidence that brisk walking added to diet therapy significantly reduces the BMI.⁸

There is a decrease in mean systolic BP of 9.1 ± 0.4 mm of Hg and diastolic BP of 6.2 ± 0.6 mmHg following reduction of BMI. JNC guidelines shows that the reduction in blood pressure with diet alone is 2-8 mmHg and physical exercise is 4-9 mmHg⁹. There was a reduction in blood pressure associated with the reduction in BMI but this reduction was seen more with individuals recording a higher baseline blood pressure value. Weight loss has always found to bring about significant reduction in blood pressure values. The proposed mechanism includes reduction in extracellular volume thereby decreasing the cardiac output, improvement of insulin resistance and normalization of renin-angiotensin-aldosterone system.¹⁰

The reduction in both BMI and blood pressure values is higher than reported by other studies. This could be because the baseline exercise levels and diet control in these females were very low. Moreover the study period was only six months. As the duration of follow up increases the reduction is found to be lesser because of the difficulty in sustaining the lifestyle modification.

Our study helped to strengthen the scientific basis for including lifestyle modifications including DASH diet and exercise in the management of obese hypertensive females.

Conclusion

Reduction in weight and BMI through lifestyle interventions like proper diet and regular physical activity are safe and effective methods of management of hypertension in obesity. They also help women with low income to reduce cost of pharmacotherapy and burden of pills. It shows that even when drugs are warranted lifestyle interventions should continue.

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