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Research Article

COMPARATIVE ANALYSIS OF EFFECTIVENESS OF THREE DIFFERENT WEIGHT REDUCTION TECHNIQUES IN PRE-MENOPAUSAL WOMEN

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ABSTRACT
The present study was aimed at assessing the effectiveness of three different techniques of weight reduction in pre-menopausal women. The inclusion criteria for subjects were: i) women; ii) Age - 20-45 years (Child bearing age); iii) Pre-menopausal; iv. BMI ≥ 25kg/m2 v) Absence of medical problem and vi) Willingness to participate in the study. All subjects were assessed for anthropometric indicators of height (cms), weight (kg), waist circumference (WC), hip circumference (HC), waist-to- hip ratio (WHR) and mid upper arm circumference (MUAC). Other indicators included assessment of energy intake (kcal), energy expenditure (kcal), energy balance (kcal), intake of carbohydrate, fats and proteins in grams and physical efficiency index. Reduction in total calorie intake was better predictor of weight loss as compared to individual macronutrient intake. Improvement in physical efficiency index was better in Gym group. Exercise is a more effective method for improvement in body composition while not targeting weight alone.

Keywords*: Weight Reduction, Women, Menopause*

INTRODUCTION
Overweight and obesity are typical phenomena of affluent societies and are one of the most serious public health problems. Obesity as chronic disease shows a limited quality of life and a high morbidity and mortality risk. A problem which is not yet solved is that dietary and behavioral as well as extensive lifestyle programs have a long-term effect only for a few affected persons (yo-yo effect) (Korczak and Kister, 2013).
Worldwide obesity has been estimated to account for between 0.7% and 2.8% of a country's total healthcare expenditures. Furthermore, in obese individuals, medical costs have been found to be approximately 30% greater than their normal weight peers (Withrow and Alter, 2011). The primary aim of obesity therapy is not the maximum possible reduction of weight but the long-term maintenance of a moderate reduced weight (5 to 10% of the original weight).
This can be achieved by different forms of therapy (Korczak and Kister, 2013). The most effective method of weight loss remains unclear. Some programs emphasize physical activity, others diet, but existing evidence is not clear, as to whether these are more effective individually or in combination (Johns *et al*., 2014).

Objective
The present study was aimed at assessing the effectiveness of three different techniques of weight reduction in pre-menopausal women.

MATERIALS AND METHODS
Methodology:
Purposive sampling technique was used for sample selection. Sample selection was done in two stages. Firstly, three centres were selected on basis of their willingness to participate in the study. These centres were based on three different techniques of weight management namely- comprehensive weight reduction programme (CWRC) (body therapy + diet counselling + advice for exercise), dietary counselling (DC) (1200 kcal diet) and gymnasium (Gym) (exercise- endurance and resistance training). Secondly, 30 subjects from each of the three weight reduction centres were identified. The inclusion criteria for

subjects were: i) women; ii) Age - 20-45 years (Child bearing age); iii) Pre-menopausal; iv. BMI ≥ 25kg/m^2 v) Absence of medical problem and vi) Willingness to participate in the study.

All subjects were assessed for anthropometric indicators of height (cms), weight (kg), waist circumference (WC), hip circumference (HC), waist-to- hip ratio (WHR) and mid upper arm circumference (MUAC). Other indicators included assessment of energy intake (kcal), energy expenditure (kcal), energy balance (kcal), intake of carbohydrate, fats and proteins in grams and physical efficiency index. The methods used for anthropometric indices were according to Jeliffe and Jeliffe (1966), data on dietary intake and physical activity level was collected by 24 hour food recall method and physical efficiency index (PEI) was assessed by Havard's step test. The subjects were monitored for 2 months and assessed for all parameters in pre and post intervention stages.

RESULTS AND DISCUSSION

Results:

Study comprised of 90 women in the age group of 20-45 years. These women were undergoing a weight reduction programme in either of the three intervention methods- a) CWRC b) DC and C) Gym. Thirty women from each centre participated in the study.

Table I: Centre-wise change in anthropometric indices and physical efficiency index

Parameters	CWRC (n=30)	DC (n=30)	GYM (n=30)	F
Weight (kg)	3.80 ± 2.09	1.97 ± 1.55	3.37 ± 1.10	10.34* a* b NS c*
BMI	1.54 ± 0.85	0.78 ± 0.61	1.41 ± 0.46	10.97* a* b NS c*
WC	2.83 ± 2.10	2.57 ± 3.19	3.56 ± 1.80	1.34NS a NS b NS c NS
HC	3.54 ± 2.29	3.51 ± 2.60	7.42 ± 2.17	23.65* a NS b* c*
MUAC	5.41 ± 23.14	0.63 ± 14.49	-21.64 ± 51.65	5.496* a NS b* c*
Physical Efficiency Index	-0.94 ± 7.26	-2.42 ± 2.53	-5.95 ± 3.05	8.70* a NS b* c*

*NS- Not significant; *Significant*
a-Between CWRC and DC; b- between CWRC and Gym; c- between DC and Gym

Table I depicts the change in anthropometric indices in the three centres in the post intervention stage when compared to pre intervention values. Weight loss was maximum for CWRC group (3.80 ± 2.09 kg) followed by Gym (3.37 ± 1.10 kg) and DC (1.97 ± 1.55 kg). The change was statistically different within each group but in between groups significant difference was observed between CWRC and DC; DC and Gym but not between CWRC and GYM. Similar pattern was observed for change in BMI. A recent meta-

analysis showed significantly greater weight loss in the combined behavioural weight management program (BWMP) at 3 to 6 months (–5.33 kg; 95% CI –7.61 to –3.04) and 12 to 18 months (–6.29 kg; 95% CI –7.33 to –5.25). Weight loss is similar in the short-term for diet-only and combined BWMPs but in the longer-term weight loss is increased when diet and physical activity are combined. Programs based on physical activity alone are less effective than combined BWMPs in both the short and long term (Johns *et al.*, 2014). Change in waist circumference was insignificant within each group and between groups also. Maximum change in hip circumference (HC) and mid upper arm circumference (MUAC) was observed in the Gym group and it was significantly different from the change in CWRC and DC. These results suggest that although CWRC group might have better weight loss but a positive shift in body composition, reduction in body fat and conservation of lean mass was greater for GYM group.

Table II: Centre-wise change in macronutrient intake and energy balance of subjects

Parameters	CWRC (n=30)	DC (n=30)	GYM (n=30)	F
Energy intake (kcal)	1031.50 ± 114.59	606.13 ± 431.64	963.20 ± 453.06	9.04* a* b NS c*
Total energy expenditure (kcal)	14.53 ± 114.59	-59.90 ± 137.40	-429.50 ± 190.09	68.42* a NS b* c*
Energy balance (kcal)	1046.03 ± 340.65	666.03 ± 480.30	1392.70 ± 483.74	20.74* a* b* c*
Fat (gm)	48.79 ± 24.37	32.65 ± 34.63	51.24 ± 34.50	3.07* a* b NS c*
Carbohydrate (gm)	129.16 ± 48.76	63.66 ± 52.40	107.96 ± 52.36	12.78* a* b NS c*
Protein (gm)	18.59 ± 12.40	11.87 ± 10.64	17.07 ± 13.07	2.55 NS a* b NS c *

*NS- Not significant; *Significant*
a-Between CWRC and DC; b- between CWRC and Gym; c- between DC and Gym

Table II depicts centre-wise change in mean macronutrient intakes and energy balance in pre and post intervention stages. The maximum difference in energy intake in pre and post intervention stage was for CWRC group, followed by GYM and DC group. The difference was statistically significant for all groups but between groups significant difference was computed for CWRC and DC and DC and GYM.

Change in energy expenditure was maximum for the GYM group and minimum for the CWRC group. Similarly, difference in the energy balance was highest for GYM group followed by CWRC and DC and the difference were statistically significant within the groups and in between groups. Change in fat intake was found to be highest in the GYM group which reflected in better weight loss in the group as compared to DC. There is high quality, consistent evidence that reduction of total fat intake has been achieved in large numbers of both healthy and at risk trial participants over many years. Lower total fat intake leads to

small but statistically significant and clinically meaningful, sustained reductions in body weight in adults in studies with baseline fat intakes of 28-43% of energy intake and durations from six months to over eight years (Hooper *et al.,* 2012). For carbohydrate intake the change was most for CWRC group and change in protein intake was comparable in CWRC and GYM group. The DC group was with least change for all the parameters. Unrefined, complex carbohydrates and lean protein diets are used to combat obesity. Consuming increased protein (~35%) more frequently (6×) throughout the day decreases body fat and abdominal fat, increases lean body mass and thermogenesis (Arciero *et al.*, 2013)

Conclusion

Commercial weight reduction programme (CWRP) based on dietary counselling, exercise advice and body therapy was found to be more effective for weight loss as compared to GYM (exercise only) and DC (only diet counselling); in pre-menopausal women. Gym group was found to have positive changes in body composition assessed by waist and hip circumference and mid upper arm circumference. Reduction in total calorie intake was better predictor of weight loss as compared to individual macronutrient intake. Improvement in physical efficiency index was better in Gym group. Therefore, it can be safely concluded that exercise is a more effective method for improvement in body composition while not targeting weight alone.

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