



Effect of A 10 Week Moderate Intensity Progressive Exercise Program on Selected Body Composition Parameters of Adolescent, Obese, Male Schoolchildren

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ABSTRACT

Childhood obesity and its consequences have an increasing prevalence and health risks among Indian children and adolescents with school based data shows an obesity range of 5.6 to 24%. Moderate Intensity Progressive Exercise program (MPEP) program, an exercise intervention program including aerobic, muscular strength and endurance exercise were given to 40 obese, adolescent male children. Pre and post test measurements of Height, weight, Body mass Index and Percentage body fat were taken. Body Weight, Percent body fat and Body mass index reduced significantly for intervention group (Grp A) at 10 weeks ($P \leq 0.05$). No significance was observed in the control group. MPEP program can be used effectively to prevent and reverse body composition of obese adolescent children.

KEYWORDS

Obesity, Moderate Intensity Progressive Exercise Program, Body Composition

INTRODUCTION

Obesity and its consequences have an increasing prevalence and health risk among Indian children and adolescents with school based data showing a range of 5.6% to 24%¹. Adolescence corresponds to a critical period of weight gain specifically in boys as fat-free mass tends to increase and body fat as a percentage of body weight decreases². Body composition is a very important parameter to establish the pattern of fat distribution in the body, as it is associated with cardiovascular risk variables in obese children.³ Exercise or increasing physical activity is one of the cornerstones of pediatric obesity management. Various forms of exercises have proven to have beneficial effects but data is insufficient on the nature and type of exercise that can bring about beneficial clinical outcomes with regard to body composition in adolescent obesity.

MATERIALS AND METHODS

Subjects

40 male school children from high schools with their age group ranging between 11-15 years were selected, based on BMI percentile above 95% of population⁴ and other inclusion criteria. Subjects were randomly assigned to Group A (MPEP) with mean age of 12.45 years & Group B (Control) with mean age of 12.88 years. Informed consent was obtained from children and their parents.

Method of Data collection

Subjects wore light-weight loose fitting clothing without shoes. Height was measured in centimeters using stadiometer and weight in kilograms by weighing scale. Body Mass Index was calculated by the formula Height in centimeters/Weight in Metre². Percent Body fat was measured using Hand to hand bio-impedance analyzer (Lloyd's Pharmacy, Model - GL 5700). All instruments were calibrated by manufacturers. Measures were done at baseline and repeated after 10 weeks.

MPEP Exercise

Moderate Intensity Progressive Exercise program (MPEP) includes aerobic, muscular strength and endurance (resistance) exercises⁵, designed for overweight kids using moderate workouts, and is progressive as it gradually increases in duration and frequency with time.⁶

Aerobic training consisted of 30 to 45 minutes of moderate intensity (45–55% Vo_2max (mL/kg/min) or approximately 55–65% of predicted maximum heart rate based on heart rate response⁵, 5 days a week. Subjects chose their own mode of exercises from walking, fast walking or jogging, and running. Exercises were performed in school

playgrounds with distances marked as laps. Subjects were taught to measure their own wrist pulse. Subjects maintained even pace of exercise by checking their own pulse rate at the end of each lap. Exercises were concluded on attainment of pre calculated training heart rate or on exhaustion. Exercise sessions preceded with warm-up and concluded with cool down sessions.

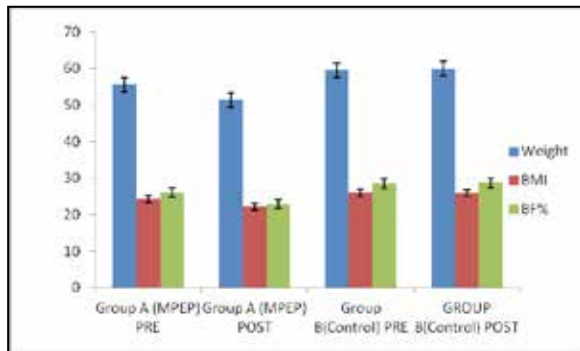
Muscle strength and endurance (Resistance) exercise consisted of circuit training for upper extremities, trunk and lower extremities. Push Ups, Arm Curls, Standing, Rowing, Pelvic Tilt, Lower Back Extension, Stomach Crunches, Squat and Standing Calves, specifically designed for overweight children by using their own body weight, were performed in one set of 8–12 repetitions, 5 days a week with adequate warm up & cool down.⁷ Proper techniques and guidelines for safe and effective resistance training were followed.⁸

DATA ANALYSIS & RESULTS

Initial measurements (weight, BMI, and percent body fat) for the treatment and control subjects were compared with those obtained at 10 weeks. Data were analyzed by two way, repeated-measures, analysis of variance (ANOVA) using INSTAT statistical software. There was a significant difference in the post test mean values of Group A (MPEP) while comparing with Pre test values. Group A (MPEP) showed greater significance while compared with Post test values of Group B (Control). Total body weight, BMI, and percent body fat decreased significantly for Group A (MPEP) at 10 weeks ($P < 0.0005$). No significance was observed in the control group. (Table 1)

TABLE 1: ANALYSIS OF VARIANCE AMONG ADJUSTED MEAN VALUES BETWEEN GROUPS A (MPEP) & B (CONTROL)

Parameter	Group A (MPEP) PRE	Group A (MPEP) POST	Group B (Control) PRE	Group B (Control) POST	P Value
Body Weight	55.6	51.35	59.55	59.85	< 0.0005
BMI	24.29	22.2	25.98	25.78	< 0.0001
BF%	26.06	22.92	28.55	28.68	< 0.0001

FIGURE 1: PRETEST POSTTEST COMPARISON OF STUDY PARAMETERS BETWEEN GROUPS A (MPEP) & B (CONTROL)

DISCUSSION

Aerobic exercise has a beneficial impact on blood lipids⁹, decreases body weight, BMI, waist circumference and body fat in obese children and adolescents.^{10,11,12,13,14,15} Exercise in the low to moderate intensity domain will maximize fat oxidation, decrease lipid storage and increase fat mass loss. An increased capacity to oxidize fat during exercise in obese children has been observed.¹⁵ Visceral adipose tissue and intra hepatic lipid significantly decrease.¹⁶ Lean Body Mass is increased by enhancing the capacity to oxidize fat by increasing the volume and function of mitochondria in skeletal muscles.^{17,18}

Resistance training decreases fat mass by increasing Lean Body Mass,¹⁹ by means of muscle hypertrophy and stimulation of new bone growth and associated connective tissue.^{20,21} Improved body composition of 7-12 year olds was seen after 8 weeks of training with a 5 to 7% reduction of body fat.²² By 8 weeks of resistance program (3 sessions per week) significant body composition improvement occurs, with reduced body fat in both overweight and obese children.^{23,24}

In the present study, a significant improvement in body composition was observed at 10 weeks, which was similar to the results obtained in earlier studies^{25,5}. Changes in body weight could be attributed to sufficient training volume and intensity as they were even when compared to previous research which found significant changes in both body weight and BMI. Also, intensity of the programme increased in such a manner that a substantial amount of muscular endurance work was performed. These changes were also observed by other researchers.²⁶

Some of the limitations in this study include non existence of control or influence over dietary habits and factors and medications, environmental and extraneous factors such as academic work loads, exams and vacations, inclusion of only males, and a limited study group.

CONCLUSIONS

Body Weight, Body mass index and Percent body fat decreased significantly at 10 weeks. This is of particular importance as MPEP may contradict or even reverse some of the most serious consequences of adolescent obesity, as normalization or reduction of increased body fat reverses the obesity-associated co-morbidities, such as hypertension, glucose intolerance, dyslipidaemia and fatty liver diseases in adulthood. MPEP program can be used effectively to prevent and reverse childhood obesity in clinical intervention as well as school based fitness programs due to its progressive nature, variety of options and moderate intensity levels.

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