

## The effects of Aerobic Exercise vs. Progressive Resisted Exercise on body composition in obese children

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### ABSTRACT

**Background:** Globally, the prevalence of childhood obesity has risen in recent years. The International Association for the Study of Obesity (IASO) and International Obesity Task Force (IOTF) estimate that 200 million school children are either overweight or obese

**Objectives:** To determine whether a 16-week training program without dietary intervention; could have beneficial effects on body composition and aerobic capacity in obese children.

**Materials and Methods:** Twenty obese children (11 boys, 9 girls; aged 12-14 years) were selected and were randomly assigned into 2 group either the exercise group ( $n = 10$ ) or the control group ( $n = 10$ ). Both groups participated in a 16-week exercise training programme (four 60-min sessions per week at 70-85% of HRmax (maximum heart rate). Fat-Free Mass (FFM) and Fat Mass (FM) were assessed with bioelectrical impedance equipment. To assess aerobic capacity, maximal workload ( $W_{max}$ ) were estimated with an electronically braked cycle ergometer

**Results:** Aerobic exercise showed significant reduction in BMI and waist circumference compared with the baseline values. Aerobic exercise training significantly decreased fat mass and increases the  $W_{max}$  only in the EG and no significant changes in these parameters were seen in the CG.

**Conclusion:** Aerobic training program has beneficial effects on body composition in obese children.

**Key words:** Aerobic capacity, body composition, children obesity, physical exercise

## INTRODUCTION

The prevalence of childhood obesity is rising tremendously in the developing countries like India. Excessive gain in body weight in children will have an array of co morbid disorders and it isolates those children from the peer group in schools and at home. If left untreated this childhood obesity is highly associated with negative impact on self-esteem and there is a risk of cardiovascular events and diabetes. Childhood obesity has direct consequence on affecting the quality of life of children and however the average life expectancy is reduced as a consequence of Obesity<sup>1</sup>.

Developing an appropriate exercise programs is in need for decreasing the obesity and its negative co morbidities associated with it. Developing a Strategy for exercise prescription will decrease obesity prevalence and it will have a positive impact on limiting the obesity-associated long-term health complications<sup>2</sup>.

Regular physical activity participation during school physical education session and getting involved with exercise regimen increases the possibility to reduce the impact of obesity on the cardio-vascular system. Only possibility that lies behind the reduction of childhood obesity is in the active participation in physical activity and increasing the possibilities of engagement in a regular physical activity<sup>3</sup>. Participation in regular physical activity will contribute to an increase in energy expenditure and maximum oxygen consumption. This will have a positive impact on the child's QoL

However, it is evident from the previous researchers that the obese child is always reluctant to play along with peer groups and they prefer indoor games. Thus they have a reduced exercise capacity on comparing the age matched peers. Moreover, childhood obesity will lead to poorer motor performance and coordination. There is a continuous need for motivation with this group of children to increase their physical competence<sup>4</sup>. Motivation is the key to unlock the limitation in initiating PA in children with childhood obesity

Despite a growing researchers done in childhood obesity. None of the researcher have designed a protocol that is significant in reducing the obesity. No research have concerned on independent effect of exercise training in childhood. There is a need to create a valid protocol involving aerobic exercise program which is standardized and easier to perform for these obese children<sup>5</sup>.

The purpose of this study was to evaluate the effectiveness of a aerobic exercise program vs. resistance exercise for obese children.

## METHODOLOGY

10 obese children have been selected in this study. (5 girls and 5 boys) and all the participants in the age group of 12-13 years they have been randomly allocated to group A and B

TABLE: 1- BODY COMPOSITION OF PARTICIPANTS BEFORE AND AFTER EXERCISE SESSION

	GROUP A		GROUP B	
	Pre test	Post test	Pre test	Post test
BMI	30.4	20.5	32.5	29.7
WC	90	65.5	89.5	77.5
FM	39	20.5	35.5	30.4
FFM	35	39	29.6	32.9

GROUP A received aerobic exercise and Group B received resistance exercise. Selection criteria of the children were based on the detailed assessment of history from their parents about the history of cardiovascular and metabolic disorders, if present were excluded out of the study. Children with consumption of medication for any of the illness were excluded out of the study.

### METHODS

All children were instructed not to change dietary habits during the study period. Weight was calculated without shoes and by using an electronic weighing machine at 0.1 kg. Height was measured by a wall-mounted stadiometer. BMI was calculated by dividing weight (kg) by height squared ( $m^2$ ). Waist circumference (WC) was measured with a non-elastic tape applied at a point between the lower border of rib cage and iliac crest by instructing the patient to breathe in and breath out, at the end of normal expiration, WC is measured. Fat-free mass (FFM) and fat mass (FM) were assessed with bioelectrical impedance equipment. Group A has been evaluated with the initial aerobic capacity in electronically braked cycle ergometer, under the supervision of therapist. Verbal instructions was given to document to maximal performance. Progressive incremental test has been done to measure the initial aerobic fitness. Signs of facial flushing, exhaustion of child should be monitored during the exercise session. A strong verbal encouragement is needed to continue the exercise regimen. Children in both group has participated in their routine habitual physical education program in school. Sessions has been conducted on weekdays after school hours. The exercise programs were maintained as continuous bouts at 70-85% of maximum HR calculated during a maximal progressive exercise test. Intensity of exercise program is individually tailored and progressively increased in both the group. HR was measured continuously every 15min. based upon the individual tolerance , progression in exercise program has done. The participants were instructed to adjust their speed according to the target HR training. The training program consisted of warm up , conditioning exercise and cool down exercise. During the warm up phase, the children were given instructions to jog for 5 min and then stretch. Circuit

training is included in conditioning phase of the exercise program. Circuits which in individually tailored in this exercise programme consists of 1-2 sets; 3-5 exercises; period 5-15 min, work-rest ratio between exercises 1/3 depending on aerobic fitness; passive rest recovery is attained with continuous slow pace walking

## RESULTS

All the participants in this study sample has completed the intervention without any difficulty and with continuous monitoring by the therapist and verbal motivation has been used well by the therapist in making the children to train at HR MAX zone. During baseline evaluation there has been no difference found between the two group of participants at the end of the exercise program , bioelectrical impedance analysis shows a positive impact on the reduction of FM and in WH ratio. At the end of the exercise program weight reduction has been reported in both the group but significant values has been achieved in the group received aerobic exercise programme.(  $P < 0.001$ ). After training program, BMI reduction has a significant score in Group A received aerobic exercise programme, ( $P < 0.001$ ). The training program at the end shows a significant decrease of the WC ( $P < 0.001$ ) and a not significant increase of the WC in the group B ( $P = 0.15$ ).FFM has shown significant increase in both the groups participated in the study.(  $P < 0.01$ )

## DISCUSSION

The present study has not included the diet modification and dietary habits and its influence on body composition and fitness. Effects of individually tailored exercise programme has shown significant modification in BMI, FM,FFM in all the children received aerobic training as well as progressive resistance exercise programme. It has been found that aerobic training has improved body composition and aerobic capacity following the prescribed exercise regimen. Its main findings of the study are physical training program was able to improve both body composition and aerobic capacity parameters in the obese children. Circuit training programme was designed for all the children's who were doing aerobic training programme. Obese children were not willing to participate in any of the exercise programme in school and at home, thus they need an individual exercise prescription. However, Exercise prescription should incorporate new advancement that should facilitate participation in children. To reduce reluctant to continue exercising, circuit training program has been initiated in this study on a routine basis.

It has been assured that all children participating in the circuit training program had been exposed to a substantial physical training dose as compared to the resistance training group. Decrease in BMI and WC has attained in all the children participated in aerobic training group.

Previous researcher has concluded that greater activity is associated with lower BMI and girth. In contrast, children with obesity have inability to participate in physical education session because of lack of motivation and cardiovascular fitness. Hence they are in need of individually designed exercise protocol. One reason for this failure of exercise programs in obese children is that participation in physical activity will lead to higher calorie consumption. Therefore, reduction in BMI can be attained through a combined approach of aerobic training and progressive resistance exercise.

### CONCLUSION

It has been extensively demonstrated that aerobic training has an added benefit on reducing the consequence of overweight. In this study, it has been proved that varied aerobic activities like circuit training programs provided improvement in WS and aerobic fitness.

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