

## EFFECTIVENESS OF FITNESS TRAINING IN OBESE CHILDREN

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### ABSTRACT

**Background:** Obesity is an abnormal or excessive fat accumulation that may impair health. Children and adolescents with a body mass index over the 85th centile for age are classified overweight and those over the 95th centile, obese. Childhood obesity however can also lead to life-threatening conditions including diabetes, high blood pressure, heart diseases, sleep problems, cancer, and other disorders. A physically active lifestyle as a child or as an adolescent is conducive to a healthy lifestyle and preventing disease, where as a sedentary lifestyle is associated with chronic disease and ill health. Available prevalence shows that childhood overweight and obesity are increasing dramatically in developed and developing countries. Childhood obesity can be brought on by a range of factors which often act in combination. Fitness training is needed to prevent secondary complication which occurred due to obesity. It is used to maintain the strength and endurance in the obese children. The purpose of the study is to find the effectiveness of fitness training in young obese children improve the functional activities in children and prevent the long term hazards of obesity and inactivity in children.

**Results:** 25 participants were selected in the study. The intervention was given for twelve weeks, thrice in a week. The training time duration for every session was approximately 60 minutes with adequate rest periods in between. Post intervention data was collected for 4th, 8th and 12th week. The results showed extremely significant changes in BMI ( $p = 0.0007$ ), Weight ( $p=0.0004$ ) and Heart rate ( $p = 0.0009$ ).

**Conclusions:** The fitness training is effective in obese children.

**KEY WORDS:** Children, Obesity, Fitness training, Body Mass Index, Childhood obesity.

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### INTRODUCTION

According to WHO, obesity is defined as an abnormal or excessive fat accumulation that may impair health. Obesity is a condition describing excess body weight in form of fat [1]. Children and adolescents with a body mass index over the 85th centile for age are classified overweight and those over the 95th centile, obese. There is

a limitation of using BMI as a measure of fatness is that BMI reflects both lean and fat mass. It changes from childhood to adulthood and from boys to girls. Obesity has significant health consequences for children and adolescents, both in the short term and for their adult life [2]. First problems to occur in obese children are usually emotional or psychological [3].

Childhood obesity however can also lead to life-threatening conditions including high blood pressure, type 2 diabetes, dislipidaemia, increased risk of certain cancers, heart diseases, sleep problems, and other disorders [4,5]. Some of the other disorders would include liver disease, early puberty or menarche, eating disorders such as anorexia and bulimia, skin infections, and asthma and other respiratory problems [6]. Obese girls develop reproductive system abnormality such as early onset of puberty and menarche and polycystic ovary syndrome [7]. Obesity is a complex disorder with many associated complications, even if an obese child achieves a healthy adult weight they are still at risk of substantial morbidity. Overweight children are more likely to grow up to be overweight adults.<sup>5</sup> Obesity during adolescence has been found to increase mortality rates during adulthood [8]. Obese children often suffer from teasing by their peers as ugly, stupid, dishonest, and lazy [9,10]. Some are harassed or discriminated against by their own family [9]. Stereotypes abound and may lead to low self-esteem and depression [11].

Available prevalence shows that childhood overweight and obesity are increasing dramatically in developed and developing countries. The increasing incidence of childhood obesity raised concern in 1990, when an estimated 18 million children under the age of five worldwide were classified as being overweight (WHO, 1998). Interestingly despite this warning the incidence continues to increase [12]. Prevalence of obesity is increasing among children because of their change in lifestyle. Children born with a birth weight of  $>$  or  $=$  3 kg tended to have higher body mass index in their adolescent years and maybe consequently in their adult years [13].

Childhood obesity can be brought on by a range of factors which often act in combination [14-18]. "Obesogenic environment" is the medical term set aside for this mixture of elements [19]. Greatest risk factor for child obesity is the obesity of both parents. This may be reflected by the family's environment and genetics [20]. Other reasons may also be due to psychological factors and the child's body type. A 2010 review stated

that childhood obesity is due to today's consumerist society with easy access to energy dense cheap foods and less energy requirements in daily life [21].

Fitness training is needed to prevent secondary complications which can occur due to obesity. It is used to maintain the strength and endurance in the obese children. A physically active lifestyle as a child or as an adolescent is conducive to a healthy lifestyle and preventing diseases, whereas a sedentary lifestyle is associated with chronic disease and ill health. The obese children are physically less fit than the normal weight children as judged from the pedalling time in exercise test and from the maximum oxygen consumption related to lean body mass. Physical inactivity is an important contributing factor of childhood obesity. Regular physical activity has been associated with maintenance of optimal metabolic function and chronic disease and plays an important role in social and mental development [22-25]. In today's day to day life physical activity of children is progressively decreasing and if this occurs in synergy with an increase in EI, levels of overweight and obesity will escalate [26-27].

Physical activity is any bodily activity that enhances or maintains physical fitness and overall health and wellness. It is performed for various reasons including strengthening muscles and the cardiovascular system, weight loss or maintenance, as well as for the purpose of enjoyment. Weight loss is easier with increase in physical activity than to gain it by caloric restrictions [28]. It should be an essential part of any weight management program, side effects of dietary restriction can be avoided by increasing physical activity. It may preserve or may increase fat free mass during weight reduction; fat free mass determines resting metabolic rate, the degree of energy expended in rest, which is the greatest part of total energy expenditure. Therefore, effective weight loss is most likely to occur when a combination of diet and exercise is required. More calories are expended through physical activity. It improves psychological wellbeing and cardiovascular fitness [29], hence, it plays an important role in maintenance of weight loss [30].

Major aim of including physical activity in weight

reduction programme is increasing energy expenditure and reducing excess fat, which is best achieved by sustained aerobic exercises that use large muscle groups. It is important to drive children to do regular exercises because, the things which we inculcate during the childhood gets carried to adulthood and thus can prevent many disease like obesity, elevated blood lipids and hypertension. Many studies have been done on fitness training in disabled children. Very few studies have been done on the fitness training in obese children. Thus, the study aimed to find the effectiveness of fitness training in obese children to improve the functional activities in children and prevent the long term hazards of obesity and inactivity in children as there is increase in prevalence of obesity in childhood.

**MATERIALS AND METHODS**

A total of 30 participants were selected. All the participants were screened and 25 participants were selected as per the inclusion and exclusion criteria. There were 4 participants who refused to participate in the study as they were not comfortable in performing exercises, so 21 (5 Girls and 16 Boys) participants with mean age 8.166±2.652 were taken in the study. The purpose of the study and procedure was explained to the parents and teachers. An informed written consent was obtained from the parents. Procedure was explained to the participants in detail. The BMI was calculated before and after the treatment protocol. Height and weight of the children were taken for calculating BMI. BMI was calculated as per the formula-

$$\text{BMI} = \text{Weight (kg)} / \text{height (m}^2\text{)}$$

Then 3 min step test was performed by asking the participants to climb up the step and climb down along with the beep made by the metronome. The pulse rate of all the participants was measured before and after training. The intervention was given for twelve weeks, thrice in a week. The training time duration for every session was approximately 60 minutes with adequate rest periods in between. Post intervention data was collected on 12th week. Data was collected and analysed with Graphpad Instat by using paired t test.

**RESULTS**

The pre and post intervention data of weight was calculated. Pre-test weight Mean value was 21.30 and Standard deviation was 2.82. Post-test weight Mean was 20.88 and Standard deviation was 2.63. p = 0.0004 respectively, which showed extremely significant changes after intervention (Table 1). While pre and post intervention data of BMI represents, pre-test BMI Mean was 21.30 and Standard deviation was 2.82. Post-test BMI Mean was 20.88 and Standard deviation was 2.63. p = 0.0007 respectively, which showed that there is extremely significant changes in children with increased BMI (Table 2). The assessment of pre and post intervention data of Heart-rate showed pre training Heart-rate Mean 99.76 and Standard deviation was 11.38. Whereas post training Heart-rate Mean was 92.85 and Standard deviation was 7.49. p = 0.0009 respectively, which shows that there were extremely significant changes (Table 3).

**Table 1:** Comparison of Pre-test and Post-test weight in obese children.

	Pre-test Weight	Post-test Weight	p value	t value	Result
Mean ±S.D	40.80±15.26	40±14.82	0.0004	4.25	Extremely Significant

**Table 2:** Comparison between Pre-test and Post-test BMI value in obese children.

	Pre-test BMI	Post-test BMI	p value	T Value	Result
Mean ± S.D	21.29 ± 2.82	20.88 ± 2.63	0.0007	4.001	Extremely significant

**Table 3:** Comparison of Pre-test and Post-test Heart-rate value in obese children.

	Pre-test Heart rate	Post-test Heart rate	P Value	t value	Result
Mean±S.D	99.76±11.38	92.85±7.49	0.0009	3.886	Extremely significant

**DISCUSSION**

Obese children have sedentary life which has maximum physical inactivity. Physical inactivity is an important contributing factor of childhood obesity. Obese child lacks in moderate to

vigorous physical activity, has less confidence in their ability to overcome barriers to physical activity [31-33]. Activity recommendations are generally defined in terms of the volume of activity. It is important that obese children should gain experience in all areas of physical activity and for all components of health related physical fitness. For such obese adolescent children physical activity intervention programs are planned to increase perceptions of physical activity, self-efficacy among obese children [34,35]. For reduction of breathlessness, anxiety, weight loss and body fitness; obese children should be prepared for aerobic training exercises in groups or individually. Aerobic training has low to high intensity physical activity. It works according to max HR, BMI and weight and shows extreme significant changes in the same. Exercise training is very effective on various system of the body such as cardiovascular function, respiratory system and on metabolism. Reduction in body weight and fatness can result in decreased arterial pressure, lower plasma triglyceride and cholesterol concentrations and a general improvement in cardiovascular function. There is no known data which can indicate at what percent body fat significant improvement expected in respiratory system.

The children with age group of 7-16 years were included and fitness training was given. The results of the study was found to be extremely significant with difference in the data which was collected in pre training and post training and this suggests that fitness training is effective in obese children. It has been shown that aerobic exercises for the adolescent with obesity is designed in such a way to increase energy expenditure, increase negative energy balance and to exclude sedentary life style [36,37]. To induce proper aerobic training the heart rate was evaluated at proper interval. Ebbeling, et al. mention an average HR 60% -70% of estimated HR i.e. 220-age [38] and there was no change in training intensity. This does not create an overload during the programme, which is important for obtaining a training result [39].

Few studies found that there is no improvement in gas exchange until subjects were within 130% of "ideal weight". There is a significant effect of regular intense and prolonged exercise on

metabolism such as lowering of plasma insulin concentrations, without much effect on glucose tolerance. Thus there is still further scope for the study to find the effect of fitness training in children with obesity [40].

## CONCLUSION

The study concludes that fitness training is effective in obese children. It will be effective in improving quality of life of children with obesity. The cardiovascular may show improvement through the fitness program.

**Conflicts of interest: None**

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