Effects Of School Based Fitness Training On Body Mass Index Of Childhood Obesity

Umeeda Baz Ali, Dr Amna Khan, Dr Syed Abid Medhi Kazmi, Dr Sumaira Farooqui

Abstract: Introduction: The expressions overweight, obese and severe obesity pass on to an irrefutable field. Intemperance adiposity should be well thought-out an unremitting disease that has severe health consequences, impacting the majority health care professionals including cardiologists, endocrinologists, internists, family practitioners, and pediatricians. Hence, the purpose of this study was to evaluate the effects of school based aerobic training on body mass index (BMI) of obese children that can decrease the risk of cardiovascular diseases due to lifestyle modification and fitness. Methodology: A total of 45 (20 females and 25 males) childhood obese school going children aged between 8 to 14 years participated in this study. PAR-Q and You questionnaire was used for initial screening. The participants found fit for the purpose of training were given conditioning based on aerobic training protocols. At the beginning all participants were asked to perform warm up exercises following by aerobic training including jumping jacks and was performed then participants were given time to cool down. Result: The pre and post analysis suggested that eight weeks protocol based on school based aerobic training significantly reduces the BMI and heart rate of the candidates where the mean values of BMI pre training was found to be 30.82kg/m² ±2.72 that was decreased to 28.82±2.45 post training of eight weeks with a mean difference of 2±0.5. The p-value at 95% confidence interval was less than 0.05 which indicates that the results are significant. Conclusion: Aerobic training based on school fitness programs if carefully administered and persistently followed can decrease BMI in young obese children that are easy to follow.

Index Terms: Aerobic training, Cardiovascular diseases, Diabetes mellitus, Heart rate, Interval training, Obesity, School fitness.

1 INTRODUCTION

With the advent of time, and technological advancement the sedentary lifestyle has increased drastically especially among children. Worldwide at least 20 million children less than the age of 5 years were anticipated to be overweight in the year 2005 and researches on childhood obesity demonstrates a prevalence of obesity estimating from 5% to 20% in different settings [1]. Altering dietary patterns, a decline in physical activity and sedentary lifestyles are believed to contribute to the global obesity epidemic among both adults and children. Although the problem of adult obesity has already received some attention in studies in Pakistan, the topic of obesity among children has only recently gained attention. Pakistan has an estimated prevalence of childhood obesity ranges 15% to 20%. The amount of obese and overweight children in Karachi was found to be 6% and 19% correspondingly [2]. As a lower income country, Pakistan faces the double burden of communicable and non-communicable diseases and obesity is a foremost risk factor for the growing epidemic of cardiovascular diseases and diabetes mellitus [3]. Childhood obesity is the result of an interface between a multifaceted set of factors that are related to the surroundings, ecological and genetic effects like the family, school and community [4]. Recent physical activity guidelines suggest that adolescents of 13–17 years must involve their selves in 60 minutes of moderate-to-vigorous physical exercises on daily basis, and also advises to chip in vigorous physical activity (VPA) for three days in a week [5]. Being too thin or overweight, flabby, overweight or obese throughout childhood and adolescence is coupled with undesirable health consequences throughout the course of life. These are mainly due to dietary intake and lifestyle adopted [6].

Either decreased or increased weight amongst children and adolescents is related with elevated risks of contagious health hazards and with adverse pregnancy outcomes in females of childbearing age, this association also includes maternal mortality, complications in delivery, premature birth and growth retardation at intrauterine level. Prevention and reversing of extra weight in children and adolescents is also vital and significant for so many reasons. Firstly, loss in weight and upholding after the weight is lost are difficult to accomplish. Therefore, gaining of excessive weight in early ages, childhood and adolescence is most likely leading towards lifelong increase in weight and obesity. Secondly, in childhood and adolescence being overweight or obese it is evidently remarkable that there is an association of high risks and advanced onset of chronic disorders in lives such as type 2 diabetes. Thirdly, obesity of childhood and adolescence has adverse psychological and psychosocial consequence that lowers educational accomplishments. Therefore, management of stress proves to be a novel potential strategy for combat of the diseases. Lastly, children and adolescents are more vulnerable to marketing of food than adults that give exposure to children to the foods that can increase weight needs necessary actions to protect them from any possible harm [7]. There are several contemporary issues researchers who investigated the efficiency and efficacy of an 8-week interventional program including an alliance of stress management procedures in overweight and obese children. The authors successfully showed effectiveness of a statistically momentous decrease in the body mass index (BMI) of the children and adolescents in the interventional group getting treatments, compared to those of the control group getting no treatment. In addition to loss of weight, the processes that were applied resulted in improvement of depression and anxiety symptoms and inner and outer tribulations. It also points out the importance of such treatment programs in varying routines and daily practices that unquestionably contribute to weight gain [8]. It has emerged that Television (TV) viewing has been associated with childhood obesity and also signifies a casual liaison with lifestyle disorders [9]. Therefore, has also been notorious as a most important cause of sluggishness especially in obese children and the connection between TV screening and

References:

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childhood obesity has been established in a quantity of studies across the western countries. Researchers have identified and shown in the studies that the amount of time consumed in watching TV by youngsters is foretelling of explicit behaviors and BMI in the years afterwards. It is very well-known from statistics of western epidemics that TV watching and lack of substantial activities are the main factors causative to childhood obesity [10]. Psychological factors also play role in inducing obesity [11]. Other factors include patterns of time of sleep. Studies offer verification that petite sleep interval in children is considerably associated with prospective weight gain and obesity [12]. Interestingly, previous research additionally exhibits the significant associations between traits conscientiousness, neuroticism and obesity, and between childhood intelligence and adult obesity. All indicate that more intelligent, emotionally steady and conscientious folks are probably to lead a healthier life-style and for that reason are less possibly to come to be overweight or obese. Other studies have proven that there had been sizeable associations between childhood neurological function and adult weight problems between childhood BMI and grownup obesity between maternal BMI and weight problems and between fetal and early life boom and BMI [13]. Therefore, exercise training improves cardiovascular health and muscular power along with endurance. However, it seems to have negligible impact on lipid profile or pressure of blood in obese young children. Prominently, current studies have verified that exercise training improves vascular endothelial function that is an important substitute measure to predict forth coming atherosclerotic risks in obese youngster and adolescents. The progress in vascular function in trainings happened in the dearth of changes in fractions of lipid, hemodynamic variables or sugar metabolism so exercise seems to have a unwavering advantageous effects on the vasculature in response to its presumed settlement through risk-factor alteration. Internationally several studies have been conducted considering different training protocols comprising of planned interventions, structured programs, rigorous training. The training of endurance comprises of the planned intervention course that is continual for an ample span of time having an intensity and appropriate rate that can provoke advancement in this aerobic fitness. Privileged youth sportsperson are usually observed having elevated (peak VO₂) peak of oxygen consumption as compared to the inexperienced colleagues mainly due to better maximal heart stroke volumes. VO₂ kinetic responses are faster in young trained athletes to pace changes in exercise intensity but it needs to be explored if it is because of improved oxygen deliverance or increased consumption of oxygen of the muscles. Accumulation of blood lactate in trained youth throughout sub maximal work out is poorer than the amateur youngsters and this seems because of conditioned oxidative utility in the muscles that are active. There are less evidences of published ingenious, longitudinal endurance education of elite youthful athletes. Peak VO₂ is the main element of aerobic fitness even in the broad-spectrum pediatric population on that there is plenty of data to scrutinize effects of dose-response in endurance trainings [14]. While advantageous effect on parameters of aerobic utility (e.g. VO2max) achieved with two weeks of high intensity low volume interval training in sound youth, increases the involvement oxidation of fat through sub maximal balanced exercise state but does not have any effect on the ultimate fat oxidation rate and has no effect on pressure of blood along with BMI. The insertion of High intensity interval training (HIIT) inside the school day has a reasonable effect on adolescents. There is truely a need to boost and implement techniques to interact adolescents in bodily endeavor of ample volume and depth to accrue health benefits. Although colleges are ideal settings for advertising of bodily activity, the impact of school-based interventions have been inconsistent and appear to have resulted in restricted trade to normal physical activity [15]. The significance of the premature recognition of children at risk of developing the subsequent progression to type II diabetes mellitus and diseases of cardiovascular in adult life-style should not be underestimated. Recent initiatives that include school based trainings addressing physical activity and diet that have been administered with varied accomplishment in reducing adiposity. Nevertheless, proper algorithms precise for childhood obesity are needed to permit more reasonable predictions of treatment outcomes. In recent times such an algorithm has been anticipated in adults to approximate the weight results of quantifiable health interventions accounting for compensatory changes in energy intake or expenditure [16].There are inadequate data sustaining the use of medications for the treatment of obesity and related issues, and noncompliance suggests that pharmacotherapy is not likely to be effective in long run.

2 METHODOLOGY
A pre-post study design was conducted among 45 school going students aged 8 to 14 years were selected for the study. The selected participants were then taken to the fitness centers of community based schools by taking assent and consent from parents/guardian as well as the students through convenience sampling technique.

2.1 INCLUSION/ EXCLUSION CRITERIA
Students fulfilling the Grade I (BMI 26 to 30) and II (BMI 31 to 35) criteria were selected for the study where as any participant suffering from asthma, diabetes type I, metabolic disorder and any other activity that hinders the activity of the students were excluded from the study.

2.2 INTERVENTION PROTOCOL
A total of 45 obese children were selected after initial screening using a PAR-Q and You questionnaire. All those participants found fit were measured for Body Mass Index (BMI) by using the standardized protocols at day 1 and after completion of the training protocol after 6 weeks.

Aerobic Training

Warm Up
Initially all the participants were asked to perform warm up exercises for a duration of 10 minutes that included stretching exercises of calf and hamstrings for 5 minutes and walking with intensity where heart rate increases to +10 beats from resting level, followed by conditioning exercises.

Running
Participants accompanied by the trainer were given the instructions to stand in a walking position on the ground with hands at the sides while keeping shoulders relaxed. On the verbal cue the participants started running with an exercise intensity of 60%-80% of maximum heart rate (MHR) with a maximum duration of 15 minutes with intermittent rest period.

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Jumping Jacks
Running was followed by performing the jumping jacks after the rest period. Participant was asked to stand upright with their legs together, arms at their sides. Then bend the knees slightly, and jump into the air. As they jump, spread their legs to be about shoulder-width apart and stretch the arms out and over the head. Then jump back to starting position. The candidate was then instructed to repeat exercise at the intensity of 60% to 80% of MHR for the duration of 15 minutes with intermittent rest period.

Cool Down
The process of cool down involves a post conditioning resting period of 10 minutes during which the patients were asked to sit on a chair and performed deep breathing exercises. During a cool down process, participants’ vitals; pulse rate; oxygen saturation and blood pressure were monitored. The session of cool down continued till the patient pulse rate reaches to the resting pulse rate that was recorded before the start of the training.

2.3 TERMINATION OF EXERCISE
The exercises were prematurely ended if at any time during the session patient perceived exertion reaches to 8 than the therapist terminated the exercise or when the readings of oximeter falls below 90% during training.

2.4 ETHICAL CONSIDERATIONS
The study was conducted in accordance with the guidelines of Belmont report for the Ethical decision making related to all trials which includes human subject keeping confidentiality into consideration.

3. RESULTS
Almost 56% were males (n=25) and 44% were females (n=20) with a mean±SD 11±1.8 years, and BMI 30.82±2.72 kg/m2 at baseline respectively. The pre and post analysis suggested that eight weeks of school based aerobic training significantly reduces the Body Mass Index of the participants plummeted to 28.82±2.45 with a mean difference of 2±0.5 after eight weeks of training with a mean difference of 2.0±0.5 as shown in figure 1. Similar results were obtained for heart rate (HR) with 74±2.2 beats per minute at baseline significantly reduced with a mean difference of 3.0±1.0 as shown in table 1.

<table>
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<th>Table 1: The pre-post analysis of Body Mass Index and Heart Rate using Wilcoxon Signed Ranks Test among school going students</th>
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4 DISCUSSIONS
The key purpose of this research was to examine the effects produced by aerobic exercises on BMI in which we used the safest interventions including running and jumping jacks. The results were significant. Similar studies have been done with changes in intensities as exercise is one important factor through which we can achieve our desired body shapes and for this purpose one study showed that high intensity interval training was done to understand effects of exercise on the overall fitness of children and their body responses to exercises. The researcher identified that if we keep intensity high with intermittent intervals we can achieve our desired results [17]. Among initial studies that found out if aerobic exercises are superior to traditional conditioning it is observed in one of studies that through aerobic exercises weight loss can be acquired and the result showed significant changes in body composition during the whole time period of training in those who were given treatment and the other groups of children acquired weight who were in control group and those who were given traditional treatment [18] same as our study. Along with aerobic exercise as choice of treatment it is also important to know the response in terms of epidemiology. Obesity in children has several contributing factors and epidemiology is one of the factors that contribute in childhood obesity. A piece of work summarizes that it depends where one lives as in countries where life is not fast as compared to developed countries where people skip breakfast to reach their destinations are more prone to have junk snacks later and it causes obesity in subjects living there [19]. Unfortunately, our focus was not on diet but we did make sure that participants have had something 2 hours prior intervention. The evidences of a study comprehensively examined the impacts of exercise trainings on obese children as it is one of leading cause of obesity in adulthood and in turn other metabolic diseases and their findings showed that BMI does get affected by exercise if not other parameters [20]. Although childhood obesity is not directly associated with cardiovascular co morbidities still studies have investigated the effects of obesity on vascular functions. Few studies have discussed about childhood obesity in relation to vascular health. Childhood obesity is one of the crucial factors that influence later cardiovascular health and risks. High adiposity itself drives cardiovascular co morbidities and this risk is mediated by other metabolic disorders. It varies from individual to individual but the risks are more or less present [21]. In our study we have also observed that heart rate was comparatively higher before intervention as compared to after exercise program. One study discusses that researchers perhaps have identified the relation of child obesity to cardiac fitness but evidences are not clear related to impact of exercise on heart rate, blood pressure, blood lipid levels and.
glycemic control [22]. One study presumes that gender differences impacts on body composition [23]. Another research says that these risks can be prevented if children change their exercise habits and lifestyle. He concludes that along with exercise children’s eating habits and their desire to be fit can help in this regard. We do have several guides but the grass root realities differ and it varies from person to person. A research was conducted in which the actual weight and the perceived body weight differed markedly among children. It was inferred that when candidates were told about their actual weight they tend to be more focus in shaping their bodies [24]. In our study we have not seen any perceived body shape by children. They were well aware that they are overweight. An additional researcher researched on impact of aerobic training on intracellular adhesion molecule and vascular adhesion molecule levels and his results were significant that after high intensity training the levels were lowered [25] so we kept maximum heart as intensity parameter and results showed astounding changes. Obesity in children is a risk of attaining early signs of atherosclerosis and to reverse it, aerobics on daily basis can improve the signs of early morbidity of cardiac related concerns and shows betterment in candidates who have received aerobic trainings [26]. The result of this study also showed significant changes in BMI. Weight in majority of participant was decreased and their endurance was increased as heart rate after the intervention was lower than pre training indicating bradycardia due to adaptation of exercise in individuals. Other factors were not possible to examine as our focus was mainly on the impact of aerobic exercises in school physical activity timings but the significance of aerobics have shown that consistent training perhaps sustain the fitness in children.

5 CONCLUSION
Childhood obesity is a foremost public health concern and has apparent consequences of cardiovascular disorders in children and adults. The consequences will speed up the inception and boost the prevalence of cardiovascular diseases and measures with massive effects on social and health care systems. There are undeniable evidences that low cardiac risks maintained over the period of life augment cardiovascular diseases. Hence, consider, awareness, prevention, and intervention in youngsters particularly in obese children seem discreet. As an alternative of the conventional focus on preventing cardiac diseases that principally targets and focuses adults, an attention on prevention and cure of heart issues has been anticipated that perhaps swing the target to the total lifespan beginning with children and adolescents. Principal in the efforts must be ecological and communal alterations that make certain optimistic health behavior patterns that avert childhood obesity For the reason that childhood obesity and related cardio metabolic risk presently tracks impeccably into later life, exponentially speeding up cardiac problems, effective and sustainable obesity interventional strategies are immediately required and should be beleaguered toward youth. Catering childhood obesity must be a top precedence for health care providers and health policy makers.

REFERENCES


