



P-ISSN: 2394-1685  
E-ISSN: 2394-1693  
Impact Factor (ISRA): 4.69  
IJPESH 2016; 3(1): 122-126  
© 2016 IJPESH  
www.kheljournal.com  
Received: 02-11-2015  
Accepted: 04-12-2015

**Zahra Ranjbar**  
Department of Science &  
Mathematics, Faculty of  
Education, University Of  
Malaya, Malaysia

**Ali Hojati**  
Department of Sport  
Psychology, Faculty of Sport  
science, Tehran University, Iran

**Dr. Syed Kamaruzaman Syed Ali**  
Department of Science &  
Mathematics, Faculty of  
Education, University Of  
Malaya, Malaysia

**Correspondence**  
**Zahra Ranjbar**  
Department of Science &  
Mathematics, Faculty of  
Education, University Of  
Malaya, Malaysia

## The effectiveness of regular physical education program on obesity among elementary school students in Iran

Zahra Ranjbar, Ali Hojati, Dr. Syed Kamaruzaman Syed Ali

### Abstract

The aim of the study was to investigate the effect of regular physical education (PE) on obesity among Iranian elementary school. A quasi experimental design was for this study. Two Schools, boys and girls, in Tehran were randomly selected. 50 obese students selected from each school according purposive sampling method and divided randomly to experimental and control groups. Before starting the experiment student's BMI were measured as a pretest. Regular physical education program three times a week for 12 session were done. After the last session student's BMI were measured again as a post test data. Our findings showed the significantly differences between before and after physical education training in all of the quantitative parameters including weight and measures BMI in both genders. However, there were no significantly differences between weight and measured BMI between boys and girls after physical education training, but these parameters showed significantly changes in every group individually. Although measured BMI showed significantly differences after physical education program in both genders but the BMI percentile not change significantly. Our results suggested that friendly physical education programs at schools are effective on control weight.

**Keywords:** obesity, Iran, Elementary school, student, physical education program, BMI

### Introduction

Obesity is an important predicament in public health for the increased morbidity and mortality. Advances in technology and the use of machinery instruments reduce mobility especially in development countries (Cawley, 2012) [3].

There are many physical and psychosocial outcomes of childhood obesity. Physical outcomes include many risk factors associated with cardiovascular disease, like hyperinsulinemia, abnormal glucose tolerance, as well as increased asthma symptoms, sleep apnea, fatty liver and the development of type 2 diabetes (Mallory, 1989; Luder, 1998; Dietz, 1998; Freedman, 1999; Nowicka, 2007) [15, 14, 7, 8, 19].

Some of the psychosocial outcomes include low self-esteem, being more at risk for depression, and a variety of other social burdens (Schwartz, 2003; Koplan, 2005) [22, 12]. Many of these negative outcomes continue on into adulthood. (Must, 1992; Dehghan, 2005) [18, 6].

There were differences in the reported prevalence of obesity and overweight in Iran. About 25 million, including 61% urban and 50% rural inhabitants over 20 years in Iran are suffering from overweight and obesity and also the third of children, near 30%, are overweight or obese patients (Kelishadi, 2007; Janghorbani, 2007) [11, 10].

Genetic factors, environmental, medical, neurological and psychiatric disorders and obesity medications are effective on children obesity (Rahmani-nia, 2013) [20].

The main causes of obesity in Iran included: the lack of exercise and sports, unhealthy dietary and preferring to play computer games and watching television instead of playing and activities. Children, who watch television for five hours a day, are prone five times more than other children to become overweight and obese (Janghorbani, 2007; Rahmani-nia, 2013) [10, 20].

Therefore, Children obesity is a major problem in Iran as well as in other third world countries. Especially there are not powerful study about children obesity and physical education in Iranian schools. For solving obesity problems we should characterize the risk factors and try to organize physical education in Iranian elementary schools too. Otherwise, Children spend a significant amount of their day times at school, outside of the home there is no other environment that they are more exposed to and like it.

As a result, physical education in schools may have the potential to have a strong impact on children's physical fitness (Janghorbani, 2007; Mirzazadeh, 2009; Rahmani-nia, 2013)<sup>[10, 17, 20]</sup>. Therefore, the purpose of this research is to identify the role of physical education program, on obesity in Iranian elementary school students.

## Materials and methods

A quasi-experimental design selected for this research (Creswell, 2012)<sup>[4]</sup>. An experimental study is a type of evaluation that explores to determine whether a physical education program be effective for participants (Figure 1).

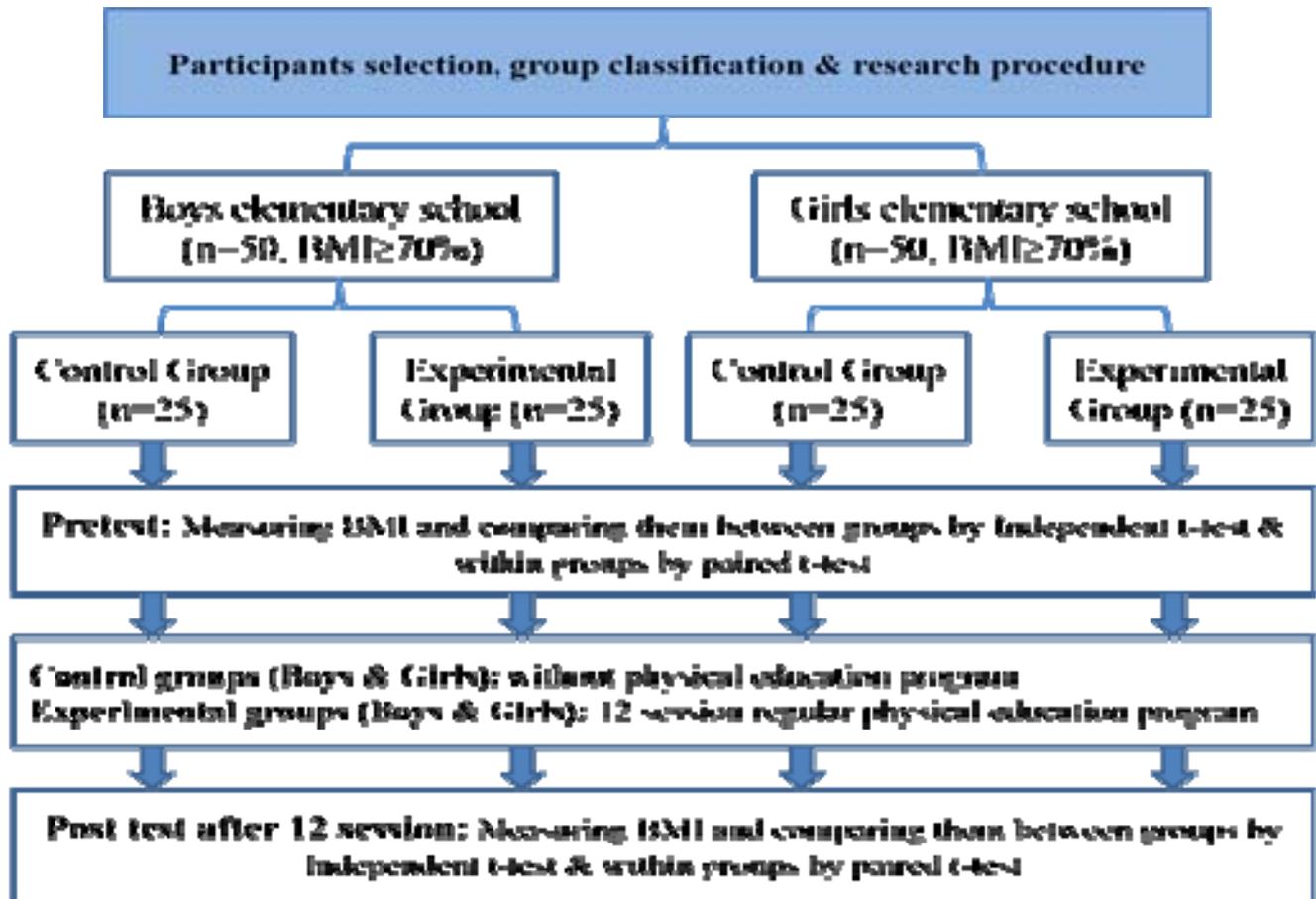


Fig 1: Design and procedure

In this research two elementary schools selected randomly from Tehran. 100 obese students by age 8 to 12 selected according purposive sampling method by measuring Body Mass Index (BMI), which can be calculated according to the following:  $BMI = \text{Weight (kg)} / (\text{Height (m)})^2$ . The BMI was rounded to the nearest hundredth unit and was then plotted on the BMI for age charts for boys and girls ages 2-20 (Hosseini, 2013)<sup>[9]</sup> to determine BMI percentile.

Before starting the research, we should explain all of the project progress for students and their parents as well as teachers because we need to all of the collaboration and accompaniment. Participants with a BMI greater than the 70<sup>th</sup> percentile are organized as overweight or obese and classified in to experiment and control groups randomly (McCambridge, 2006; Hosseini, 2013)<sup>[16, 9]</sup>.

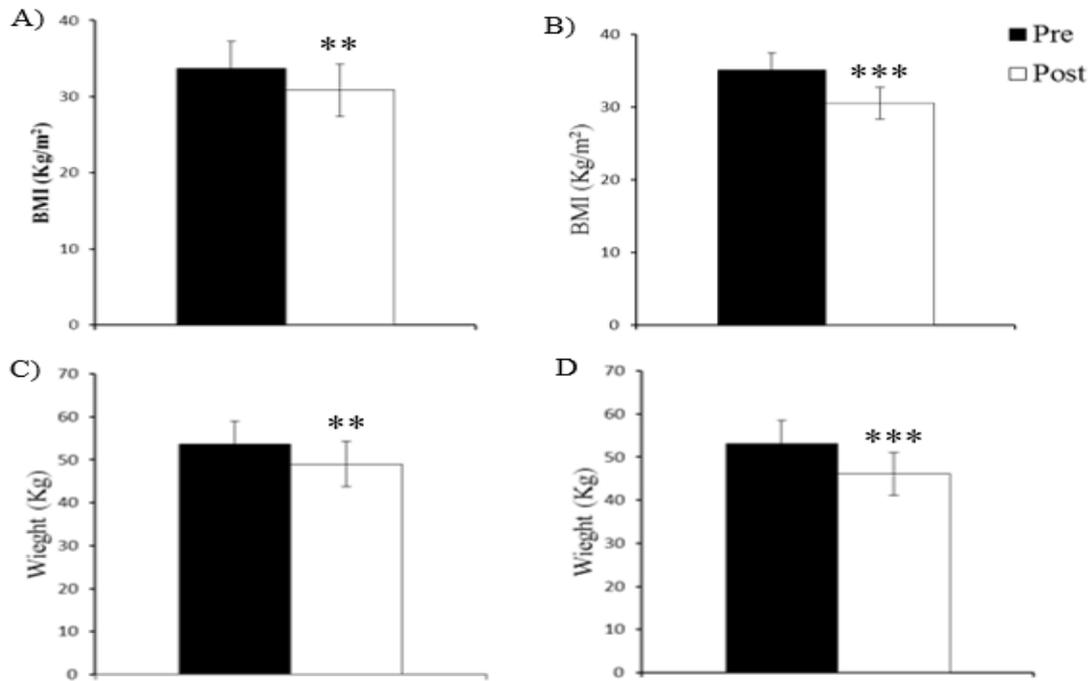
Physical Education (PE) program: Physical education (PE) program were performed for 60 minutes on three days a week until 12 sessions in experimental group that contained: Warm up (Stretch (3 min), Jogging (2 min), Running (5 min)) Aerobic exercise (Sit and up, Sit and reach, Pull up, Sweden

swimming, Agility, Butterfly, Pronation, Rotation for 20 min) and Badminton, volleyball and basketball (30 min).

Statistical analysis: We compared to quantitative data between experiment and control groups (both of them boys and girls) by using independent t-test analysis and within every group by using paired t-test. Before starting experiment pretest data were collected and analyzed between control and experimental group after 12 session post test data were calculated and analyzed again. In every group pretest and post test data were analyzed by using paired t-test. All of the data were reported by mean  $\pm$  Standard deviation.

## Results

Our data showed that both of the girls and boys were interest to have regular physical education program in school. After one month regular physical education obese girls were shown significantly weight lost (paired t-test,  $P < 0.01$ , Figure 2C) and their measured BMI also decreased significantly compared before training (paired t-test,  $P < 0.01$ , Figure 2A).

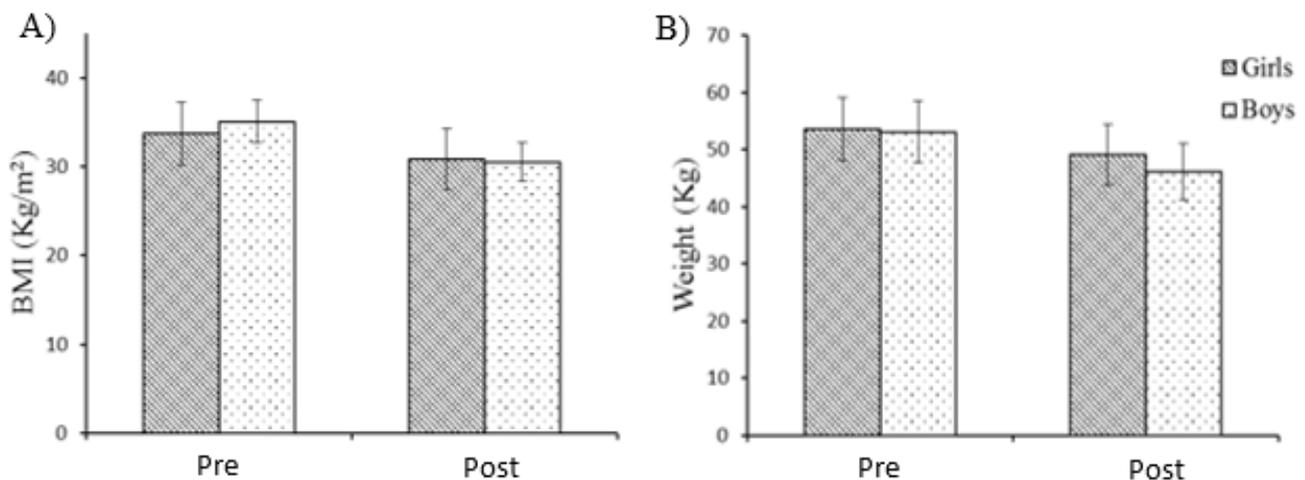


**Fig 2:** A) girls measured BMI compared between before and after physical activities program. Paired t-test results showed significantly differences at level  $P < 0.01$  (\*\*). B) Boys measured BMI compared between before and after physical activities program. Paired t-test results showed significantly differences at level  $P < 0.001$  (\*\*\*). C) Girls measured weight compared between before and after physical activities program. Paired t-test results showed significantly differences at level  $P < 0.01$  (\*\*). D) Boys measured weight compared between before and after physical activities program. Paired t-test results showed significantly differences at level  $P < 0.001$  (\*\*\*). Data presented as mean  $\pm$  SD.

Also, obese boys showed similar results after one month physical education program. Lost weight were significant in compared before training (paired t-test,  $P < 0.001$ , Figure 1D) and also measured BMI were showed significantly decreases too (paired t-test,  $P < 0.01$ , Figure 2B). But there were not significantly different between BMI percentiles after training in both girls and boys. Their BMI percentiles were more than 85 percentile as the same before training.

As mentioned above all of the participants were 8-12 years old and mean of their height was  $126.55 \pm 8.096$  for girls and  $123.24 \pm 8.0912$  for boys (Independent t-test, NS). Our findings showed that there were not significantly different between lost weight and measured BMI in both group's boys and girls (Independent t-test, NS, Figures 3A and 3B). Despite the weight and BMI of boys and girls students compared to before the study declined significantly, but there was no

significant difference between two genders. It seems that physical activity has the same effects on boys and girls students. Our findings showed the significantly differences between before and after physical education training in all of the quantitative parameters including weight and measures BMI in both genders. However, there were no significantly differences between weight and measured BMI between boys and girls after physical education training, but these parameters showed significantly changes in every group individually. Although measured BMI showed significantly differences after physical education program in both genders but the BMI percentile not change significantly. Likewise, according BMI percentile references all of the participants were obese after one month physical education program in this study.



**Fig 3:** A) girls and boys measured BMI compared between before and after physical activities program. Independent t-test results showed there were no significantly differences. Data presented as mean  $\pm$  SD. B) girls and boys measured weight compared between before and after physical activities program. Independent t-test results showed there were no significantly differences. Data presented as mean  $\pm$  SD.

## Discussion

Our research presents one of the recent evidence showing that physical education at elementary schools helps to reduce obesity. In this research we experienced that enjoyable physical activities at school can motivate students to be more active and happier. They like to stay at school for more times and leave sedentary activities. BMI index, as measured in the current study, does appear the effective and significantly role of physical activities on children weight status. A more detailed discussion follows.

Our results revealed that regular physical education program are associated with lower levels of childhood obesity among children ages 8 to 12 years old. This result is intuitive because children spend significant portions of their lives in school, particularly during daylight hours. Physical activity is the key components that have effects on individual's weight and schools have a critical role.

This study showed that school based physical education program can be motivating children to be more active. Our data showed that physical education program at school have strong effects on children activities especially obese students during one month and also these effects are the same for both genders.

There are many studies about children obesity and important factors that are effective on weight control (Atlantis, 2006) [1]. Overweight prevalence among children and adolescents is increasing and unfortunately most of the obese child will be obese adult. Therefore, we need to find an appropriate solution to address the obesity problem. Schools have critical role in this case because children and adolescents spend more times a day in schools.

It seems that education strategies can be effective on changing students lifestyle and behavioral. Physical education program can be helping us for reduce obesity and solve children obese problem. Education has very wide aspects; it can be effective on people lifestyle, culture and habits. One of the education's tools is motivation. Teachers have very important role to motivate students and change their life ways. In this case one of the effects of education is making obese students be more active and motivate them to change eating habits and lifestyle. For this purpose many studies focused on physical education programs and their effects on children and adolescent obesity (Story, 1999; Schwartz 2003; Dehghan, 2005; Koplan, 2005; Nowicka, 2007; Singh, 2008) [23, 22, 6, 12, 19, 21].

This study expands on work done by Datar and Sturm that examined the importance of physical education and focused only on children in elementary school and first grade (Datar, 2004) [5]. Our Study, in contrast, looks only at physical education, but covers the period from 8-12 years old. The finding that showed physical education is significantly associated with childhood obesity.

In another research Leatherdale and his colleagues showed the association between sedentary behavior, physical activity and obesity in elementary school students. Interventions to reduce obesity by increasing physical activity levels may not be effective if levels of sedentary behavior remain high. Also, sedentary behavior may moderate the relationship between physical activities and overweight (Leatherdale, 2009) [13]. Our data showed that enjoyable physical education program could be increase student's activities automatically because elementary school students have very good responses to motivational programs.

According to the 2008 Physical Activity Guidelines produced by the U.S. Institute of Health and Human Services the current physical activity for children and adolescents is 60 minutes of

moderate to vigorous activity daily. Generally the pattern of physical activity among children and adolescents is more similar to interval type training, consisting of random very short bursts of vigorous intensity activity, often less than 15 seconds in duration, incorporated into other varied moderate and light activity (Bailey, 1995) [2]. As the same previous studies in this experiment we selected 60 minutes duration for physical activity.

Increasing physical activity is commonly recommended to treat childhood obesity and maintain a healthy weight status (Atlantis, 2006) [1]. A review published by Atlantis and Barnes found that aerobic exercise consisting of approximately 180 minutes per week of moderate to high intensity were effective for reducing body fat in overweight childhood and adolescents (Atlantis, 2006) [1]. We got the same results in this experiment 180 minutes physical activity per week can be effective on lost weight in both genders.

In this study physical education program for three times a week could be reduced BMI and weight in girls as well as in boys group. There are no significantly differences between lost weight and BMI of boys and girls. Maybe our research duration was short and during this short time we did not observe significant differences. It is obvious that one month physical education program is not sufficient for making specified changes in BMI percentiles and lifestyle. Longer training should be more effective than one month physical activities.

Our purpose in this research was studying the physical education program effectiveness on children obesity. We selected simple physical activities that all of the students participated and doing exercise three times a week until one month. Measured BMI was the index of obesity in our experiments. BMI was calculated before and after training.

Our findings showed that physical education can make lost weight after one month in both genders. Implication from the findings reported that school physical education is effective on lost weight in elementary school students. Also, when students enjoyed from school environment and physical education program they prefer to leave sedentary activities and participate in group teams. In the other word physical education make motivate students to be more active and happier.

## Conclusion

Obesity and overweight are the main public health problems all over the world among different groups of age. It is required to address to overweight or obesity and nutrition in health promotion strategies for increasing the value of children health. This study has shown the prevalence of overweight and obesity was low among elementary schools children in Iran. This study demonstrated that doing physical activities three times a week were associated to obesity and could be reducing children obesity significantly.

Our work shows increasing physical activity could be reduce BMI in both genders. School based physical education programs could be make friendly environment that is enjoyable for all of the students. They preferred to stay more times at school and participate in physical activities instead of staying at home and watching television. Our results suggested that friendly physical education programs at schools are effective on lifestyle, eating habits and control weight.

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