

The Effects of Aerobics Exercise Programmes on Body Composition and Some Physical Parameters for the Pre-obese Class 1 Obese Students at High School Aged 15-17

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Abstract Today, it is known that adult obesity is a result of child and adolescent obesity. For this reason, to prevent obesity in adulthood, obesity must be controlled through organising exercise habits of adolescents in addition to organising other habits. Taking the importance of physical beauty in psychology of puberty period into consideration, the effects of aerobics exercise on the obese and fighting against obesity through exercise form the basis for our study to fight against obesity through the habit of exercise. Our study was conducted on 22 male, 27 female of high school level students through 12 weeks aerobics exercise programme, 3 days a week at least, approximately 60 minutes, interval training model. This study focuses on measurements of age, weight, gender characteristics, physical composition as anthropometric measurement (subcutaneous fat, peripheral and diametric measurement), stretching test (sit-reach test), strength test (hand dynamometer), standing long jump, vertical jump, sit-up and push-up.

Keywords Obesity, Exercise, Body Composition

1. Introduction

People need self-confidence to live a healthy, peaceful and happy life. When the people are healthy and fit their self-confidence increases. Being aesthetically and physically fit makes people happy. (38)

Puberty is defined as a transitional period between childhood and adulthood accompanied by personal development of all dimensions, and changes in social context. In this period, the physical changes of adolescent, who is having changes in many aspects, is much faster than other development periods except from babyhood. (39).

Adolescence is a period in which the individual has anatomic and physiological changes and developments at maximum level, and sometimes has some problems in adapting to these changes (6).

WHO (World Health Organisation) consider adults between Body Mass Index of 18,50 and 24,99; children and adolescents between Body Mass Index of 15 and 85 percentile as normal weighed. Body Mass Index (BMI) is the weight-for-height which is commonly used for over-weight and obese classification of adults. The weight-for-height is calculated through dividing the weight in kilograms by the square meter of the height (kg/m^2). According to BMI definition of WHO, the ones with the BMI of 25 and more are overweight, and the ones with BMI of 30 and more are obese. As BMI is the same for adults of all age groups and both gender, appraised in population-level, BMI provides the most practical measurement of overweight and obesity (36).

“Overweight” is defined by World Health Organisation (WHO) as abnormal or excessive fat accumulation that presents a risk to health. Obesity is considered as the condition of excessive overweight that may impair health. Body fat measurement, weight, BMI (Body mass index), height, skinfold thickness, and waist-hip measurement, muscle-mass measurement plays an important role in clinical examination of obesity. According to the criterion of WHO; for adults, waist measure of over 102 for males, over 82 for females poses a risk. (5) For over 15 years now, the population having a $\text{BMI} > 30 \text{ kg/m}^2$ has increased with 50%, and still on increase. (23)

Obesity rate is progressively increasing all around the World especially in developed Western countries and developing countries. Another important point is that obesity, which is thought to be an illness seen in older ages, has also been in increase among childhood and adolescence (20). Body weight exercises are mostly suggested to the

individuals of this period (6).

Obesity trends have been at the alarming rate for over years. International Obesity Commission stated in its 2003 report that the incidence of obesity and overweight focuses on the ages 5-17 worldwide (15). 53% of the adult population in EU countries is overweight, and 16.7% of them are obese. In 17 of 26 EU countries, obese and overweight prevalence is over 50%. These percentages are very low in France, Italy, and Switzerland. However, it is on heavy increase (27).

According to the preliminary study report of "Turkiye Nutrition and Health Research", which was conducted by Hacettepe University Health Sciences Faculty Department of Nutrition and Dietetics, and Ankara Numune Training and Research Hospital in 2009, the obesity rate was found out as 8.2 % (erkek 9%, kız 7.3 %) between the ages 6-18 (34).

Yet, according to the data of 2013 Health Statistics Yearbook 2013, among the individuals over the age of 15 in Turkiye, overweight rate is 39% in males and 30% in females; and overweight prevalence is 17.2% (32).

The studies to decrease the Obesity Prevalence in Turkiye have started with Ministry of Health Fighting Against Obesity Campaign.

Exercise is an important means in treatment of obesity (39). Exercise is a subset of physical activity that is planned, structured, repetitive (11) and purposeful in the sense that improvement or maintenance of physical fitness is the objective (33).

The purpose of exercise is to regulate distribution of oxygen, and metabolic process, developing strength and endurance, decreasing body fat and improving muscle-joint movements. All these benefits are necessary for good health, and everyone should include a routine exercise programme to daily life (25). The benefit of exercise programme on health is the weight- loss (30).

"Exercise can be the most effective solution for weight loss. The weight- loss of the ones trying to lose weight only through diet is 28% fat-free body mass and it is only 13% fat-free body mass for the ones who has an exercise programme in addition to diet. With the decreased calorie intake, exercise provides more weight loss compared to that of only diet, and also the muscle mass is protected. The most important of all is that exercise provides longer term weight-loss maintenance. That's why exercise should also be included in losing weight programmes. Exercise increases energy expenditure, and at the same time decreases fat-free tissue loss caused by energy-restricted diets.

Aerobic exercises are the ones in which the body burns calories with maximum use of oxygen (31). They are done for longer periods with less strength. Aerobic exercise can be considered as a set of low-intensity, longer period activities making use of large muscle groups. "Aerobic exercise programmes are based the organism's burning as much oxygen as possible" (3). "They are defined as planned and structured body movement resulting in increased

oxygen and calorie expenditure. Walking, jogging, swimming, and attending aerobic classes can be part of the weight- loss and weight control programme." (10, 30)

Aerobics exercises are systems developed for strengthening physical condition that increases body oxygen capacity. It was determined in Canada that sedentary life is effective on BMI of adolescents, and sedentary way of living increases weight (14). It's known that physical activity has an important role in preventing and the treatment of obesity (4).

The studies on aerobics exercise indicate increase in repeated standing vertical jump height (3, 19, 22), standing-jumping forth (7); and decrease in measurements of subcutaneous fat (2) and BMI (17,28).

Although gaining weight causes many physical, mental, and social problems for all ages, in adolescence when physical appearance matters the most, it is regarded by the adolescents as a physical problem. Although the adolescents approve the importance of physical activity, they can't just form a habit.

Insufficient exercise and stagnant life-style are among the most important factors causing obesity both in childhood and adolescence (25).

The purpose of this study is to raise awareness in physical activities and exercise on the pre-obese and obese students according to the findings of the measurements, aged 15-17, and to form a habit. It is aimed to reintegrate them as successful, happy, and socially positive individuals having self-confidence on their physical appearances.

2. Materials and Methods

The study was conducted on sedentary and voluntary 17 male, 27 female Trade Vocational High School students aged 15-17 in Ankara Yenimahalle region, with their parental permission. The participants had no previous programmed physical activity experience. A set of aerobics exercise and jogging model programme for the sedentary obese was conducted through 12 weeks, 3 days a week for 60 minutes a day. Pulse check, resting, intensity and duration of the exercise are all organised appropriate for the subjects' age groups and aerobic levels. It was aimed that the average intensity of the exercise is appropriate for 60 - 70% of maximal oxygen consumption and 120-150 pulse/min. as criteria (8, 9, 37). As the stages of the exercise, within the first stage, taking the participants' having no previous regular exercise experience, a very slow running for the very first 10 minutes (warm-up), and then with an increase in intensity, 10-minute jogging was implemented. At the second stage, 30-minute play, aerobics exercises-bounce, jumping, ascending and descending stairs, slalom running diagonal running, push-up, sit-up, and pair-work were carried out. At the final stage, with a decrease in intensity of the exercise, 10-minute decrease in pulse and respiration frequency, stretching, and recovery were carried out.

Studying the age, height, weight, gender variables of the participants; physical composition as anthropometric measurement (subcutaneous fat), peripheral and diametric measurement (hip, breast, waist, arm, calf), stretching test (sit-reach test), strength test (hand dynamometer), standing long jump, vertical jump, sit-up and push-up tests were focused. The weights of the participants were measured by Holtain Measure of 0.01 sensibilities, and heights were measured by Angel Electronic bascule of 0.01 sensibility. "Some of the fat is gathered under skin in obesity. Measurement of skinfold thickness should be done to identify subcutaneous fat tissue. Measured by caliper; triceps, biceps, subscapula and supriliac skinfold thicknesses are used to calculate body fat of adults." (24). To measure body fat percentage, Holtain Caliper of 0.02mm sensibility with 10 g/sgmm pressure from every angle, was used. The subjects were measured standing from the right-side. Two measurements were made from each part and average value was calculated via during method.

3. Results

Here are the anthropometric pre-post scores, comparison in terms of gender, and comparison of pre-post performance scores of experimental group, members of which can be defined as obese or pre-obese according to measurements, with no previous experience of exercise.

For all variables, a meaningful difference was found between the pre and post scores both in females and males. Although there is an increase in height, a meaningful decrease was found in other variables. Studying the score-gender relation, there is significant difference only in weight and body mass index in terms of gender. The decrease in males is more than that of the females.

For all variables, a meaningful difference was found between the pre and post scores both in females and males. All performance scores increased for both genders. Studying the score-gender relation, males scored better in vertical jump, standing long jump, and sit-up.

Table 1. Comparison of the pre and post anthropometric measurement scores

Gender N		Pre scores		Post scores		z	p	Score/gender	
		Mean	Std. Deviation	Mean	Std. Deviation			F	p
Height(cm)	F 27	165,74	4,61	166,30	4,66	-3,63	0,000*	2,825	0,100
	M 17	175,53	7,73	176,35	7,66	-3,74	0,000*		
Weight (kg)	F 27	78,63	13,17	73,33	12,58	-4,57	0,000*	16,015	0,000*
	M 17	104,35	14,51	96,59	13,74	-3,63	0,000*		
BMI	F 27	28,60	4,43	26,49	4,23	-4,56	0,000*	12,497	0,001*
	M 17	33,83	3,85	31,03	3,72	-3,62	0,000*		
BFP	F 27	39,47	2,07	36,57	2,10	-4,54	0,000*	1,424	0,239
	M 17	29,90	1,80	26,68	2,09	-3,72	0,000*		
Hips(cm)	F 27	114,52	10,57	107,33	10,66	-4,74	0,000*	0,531	0,470
	M 17	121,59	30,32	111,00	9,55	-3,95	0,000*		
Breast(cm)	F 27	103,37	15,25	99,96	15,11	-4,78	0,000*	3,989	0,052
	M 17	105,35	7,97	102,47	7,92	-3,01	0,000*		
Waist(cm)	F 27	88,48	9,00	84,33	9,01	-4,75	0,000*	1,131	0,294
	M 17	104,06	12,76	100,41	12,470	-3,77	0,000*		
Arm(cm)	F 27	32,41	3,86	30,19	3,65	-3,74	0,000*	0,026	0,873
	M 17	32,59	3,261	30,35	2,827	-3,82	0,000*		
Calf (cm)	F 27	64,59	6,85	61,85	6,76	-3,63	0,000*	0,982	0,327
	M 17	59,94	5,505	57,06	5,414	-3,62	0,000*		

*Meaningful at the level of 0,05

Table 2. Comparison of Pre-Post Performance Scores

Gender N		Pre		Post		z	p	Score*Gender	
		Mean	Std. Deviation	Mean	Std. Deviation			F	p
Vertical Jump(cm)	F 27	25,41	7,14	30,59	7,37	-4,58	0,000*	23,657	0,000*
	M 17	26,65	8,24	33,71	7,81	-3,64	0,000*		
Standing l. jump(cm)	F 27	133,85	33,52	140,78	33,82	-4,59	0,000*	8,078	0,007*
	M 17	141,29	37,82	149,18	37,60	-3,66	0,000*		
Right grip(kg)	F 27	28,48	3,62	31,44	3,51	-4,64	0,000*	1,082	0,304
	M 17	38,65	3,14	41,88	3,16	-3,70	0,000*		
Left grip(kg)	F 27	26,41	3,09	28,93	2,85	-4,62	0,000*	0,420	0,521
	M 17	37,06	3,45	39,41	3,20	-3,66	0,000*		
Sit-up(n)	F 27	22,26	8,24	24,89	8,16	-4,41	0,000*	35,68	0,000*
	M 17	34,59	6,46	39,82	6,01	-3,56	0,000*		
Sit-reach(cm)	F 27	25,30	6,01	27,78	6,19	-4,62	0,000*	0,498	0,484
	M 17	24,71	3,80	27,41	3,47	-3,61	0,000*		
Push-up(n)	F 27	6,89	4,04	10,78	4,29	-4,58	0,000*	0,036	0,851
	M 17	14,82	2,94	18,76	3,01	-3,79	0,000*		

*meaningful at the level of 0,05

4. Discussion and Conclusions

There have been studies on continuation of being overweight at adulthood, which basically started at childhood. A study showed that 26-41% of fat children at preschool age, and 42-63% of fat children at school age went on keeping fat at adulthood (24). Having the parameters of stretching, vertical jump, shuttle, and push-up was foreseen in physical activity of obesity and Eurofit. Also in our study, a meaningful difference at the level of $p < 0.05$ was also seen in the aerobics exercise programme based on these parameters.

De Vito and others conducted a study on primary school students in Italy, in 1999. It was seen that daily physical activity span and obesity were inversely related. That is, a decrease in the span caused an increase in the incidence of obesity (12). Elgar, F.J. and others' study on adolescents stated that sedentary lifestyle is effective on BMI, and sedentary lifestyle leads to gaining weight (14). Uskan and others studied the risk factors of obesity, and found out that a time-span of play less than 2 hours a day caused a meaningful increase in BMI measurements (35). Our study has also shown that physical activity decreases the incidence of obesity. It was also seen in our study that aerobics- exercise programmes lead to decrease in the incidences of obesity.

The study of "Changes in the Physical Composition" was conducted by Kaya. H.& Özçelik. O. on a group of students at the ages of 18-19. A difference was observed in female and male participants' Body Fat Percentage. Body fat percentage measurements of sedentary participants who had no exercise, posed a risk in terms of obesity. A decrease in the capacity of aerobics was seen (21). Our study has shown that aerobics exercise lead to decrease in measurements of

weight and body fat percentages. Therefore the study has stated the importance of aerobics exercise in fighting against obesity.

It was seen that body mass index decreased in the study of Ahmet Ergün ve S.Fuat Erten (16), Monteiro and others (26), and this study presented. Therefore, there has been seen parallelism between BMI findings of the above-mentioned studies and this study.

The most effective exercise form in exercise therapy is "Aerobics exercise" which provides the rhythmic training of big muscle groups for specific periods of time. The more the span and the frequency of the exercise, the better the effects received. In this way, meaningful decreases can be achieved in measurements of weight (29). Emine Aksoy ve Nihan Çakır found a meaningful difference in the relationship of physical activity, body mass index (BMI), and body composition. Our study also overlaps these findings. (1)

It was asserted that aerobics exercises decrease body fat and weight, and subcutaneous fat (13,18), aerobics exercises were stated to be effective in this respect (23). All the variables in the study have also been found in this study, and aerobics exercise is seen to be effective in all measurements, so supports the findings of this study. It can also be said that aerobics exercise can regulate obesity-related physical illnesses (28). It is argued that aerobics exercise must be programmed in fighting against obesity (30). In this challenge, the aerobics exercise should be for longer periods with rehearsals, at medium level. It has been seen there was meaningful difference in BMI (Body mass index), BFP (Body fat percentage), and weight. It was also found effective in the parameters (such as strength, jumping strength, flexibility, quickness, etc.).

5. Suggestions

- Aerobics exercise and its importance should be taught to people as well as the obese.
- Aerobics exercise should be a fun activity! (such as play, music, dance, rhythm, and group work)
- Children should be educated in terms of their physical development starting from little ages.
- Obese children and adolescents should be guided thoroughly.
- Aerobics exercises should be accompanied by the exercise experts.
- The progress in aerobics exercise programme should be observed.

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