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Original Article

Body Fat Percentage in Active and Inactive Students Using Anthropometric Parameters

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Abstract

Introduction

Complications of obesity and high fat in children are grave now and future. The aim of this research was comparing percentage of body fat in active and inactive girls using anthropometric measurements.

Methods and Materials

This research was descriptive- correlation that 144 active(n= 70) and inactive(n= 74) girls aged 8 to 10 years old were selected by random cluster sampling method and studied the relationship between percentage of body fat and anthropometric parameters and result analyzed by SPSS-18 software. Data was analyzed by descriptive statistics and inferential statistics such as Pearson's correlation coefficient to investigate the relationship between composition variables .

Results

The mean age of the subjects in this study were 8 to 10 years. Result indicated Body Mass Index (BMI) from anthropometric indexes had significant recipe with percentage of body fat in both of groups and Waist circumference to hip ratio (WHR) was significant only in inactive group ($p \leq 0.05$).

Conclusion

Students who have had at least three sessions of physical activity have been disabled pupils less% lipid. Results of this research indicated percentage of fat influenced by level of activity.

Key word: Body fat, Body Mass Index, Physical activity, Students, Waist circumference.

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Introduction

There is no doubt that the industrial life has made significant contribution to human but there have been complications that the poverty of mobility is most important that away happiness from the body and has replaced obesity risk factor. But the increasing prevalence of obesity occurred around the world whiles energy costs for labor, job activities, personal works and personal needs reduce gradually daily energy has not increased sufficiently to compensate for changes in urbanization and machinations of life. Also wrong culture of eating and turning to fast food is the most of important causes of obesity.

The hazards of overweight, high fat and obesity not only physically and physiologically, but also psychologically and socially, are important (1). High fat and obesity attack the children who are in a golden age of personality growth that its effects may never be compensated. Many of children will be indifferent, irresponsible, isolated, depressed and aimless (3). Anthropometric parameters are widely used in studies to explore the relationship between obesity and various diseases in epidemiological studies.

The most important anthropometric parameters associated with health assessment are included subcutaneous fat in different areas, Body mass index (BMI), Wait to hip ratio (WHR), Waist circumference (WC) and percentage of body fat. Acurate measurement of fat for example, packaging underwater, electric or isotopic dilution need to laboratory instrument that using these devices is costly. Thus using anthropometric factors that are inexpensive and simple are attended doctors, health and sport professionals and many studies have been done in order to normalization of body composition indexes (4, 5).

In a study Gharakhanlou and colleagues (2002) found a significant relationship between WHR and 4 risk factors of cardio-vascular (force blood sugar, Chinese hamster ovary cell expression, Tree Glistered, very low density lipoproteins) and diabetes (6). Amini (2007) reported a significant relationship between BMI and %BF in 637 married women aged 40- 18 years old (7). Skrzypozak and colleagues (2005), investigated 10216 women aged 25 to 94 and reported significant relationship between BMI and %BF (8). Nuys et al. (2005) studied 474 adolescent and reported a significant %BF, relationship to BMI and WC in both sex and reported a significant BMI and WC,s relationship to WHR(9). Martin et al. (2003) reported a significant relationship between %BF and BMI in men and women (10). Studies indicate the total prevalence of obesity in Iranian population is even more than America, England, France, Holland and Italy.

Mojibian an Ghilian (2001) studied 570 women aged 10- 65 years old in Yazd and reported prevalence of obesity based on WHR and prevalence of obesity and severe obesity based on BMI and its relation to age, 17.8% and respectively in married people and housewife 18.2% and 21.6%. They reported most prevalence was in age group

50-65 years old (11). Lameie in a study on 540 women 15 years and older in Tehran, the result of his research indicated significant association between the percentage of body fat and body mass index and between percentage body fat and waist to hip ratio and between body mass index and waist to hip ratio. There are disagreement in which of the anthropometric factors is related to percentage of fat. While many researchers have recommended measuring WHR as a simple anthropometric index for assessment of percentage of body fat and prevention of certain diseases (12).

Some researcher considered WC and other considered BMI as better indicator to determine its relationship with percentage of body fat. These differences may be due to differences in the study group (13,14). For example, researchers have measured relationship between anthropometric and percentage of fat in athletes and active individuals and researchers measured this relationship in non-athletes and those who investigated tis relationship in various ages, the relationship between anthropometric factors and percentage of fat and cardiovascular risk factors were different in various group (15- 17).

Due to the physiological and psychological problems resulting from obesity, childhood obesity should be seen as a wake-up call to live today and tomorrow, and explored strategies to deal with it seriously. Therefore detection, treatment and prevention of overweight and obesity in children should be in line with the primary aims to be considered in childhood and adolescence and children health has not endangered in the future. It is possible to determine body composition and percentage of children's fat. Because women are more vulnerable to change in body composition and also various factors such as the growth and level of activity are affected on these parameters, This study has been implement to provide a clear picture of the issues and design and given the risks of body composition abnormalities in individual and society health, the problem that arises here is: what is the relationship between body composition variables e.g. BMI, WHR, WC and percentage of body fat? The researcher sough to answer is: How much the relationship between some anthropometric parameters (BMI, WC, and WHR) and percentage of body fat in active and inactive girl students?

Methods and Materials

This research was correlation- descriptive and population was 4860 student aged 8- 10 years old in Education District Yazd province in November 2013 to November 2014 year and sampling size included 144 that have been estimated using determining sample Morgan table. In this study the results were confidential and at the end of the study were given to their parents.

First selected 5 schools were selected by random cluster sampling; then Physical Activity Questionnaire (Deborah, 1995) was distributed, that is for assessment of activity or inactivity in young people and its reliability and validity has been demonstrated in children and adolescents. Its

validity is 0.80. After collecting the questionnaire and calculating score, people who had higher scores classified in the active group (n= 70) and those with lower scores were in inactive group and the rest were excluded. After obtaining a referral from the department of Yazd province education department and coordination with the director and teachers, the researcher attended school and tested students. The measurement were as follow:

First height, their waist and hips were measured by meter and then their weight was measured by weight and then place of measurement characterized by marking the limps and subcutaneous fat thickness was measured by caliper. All relevant and required measurements done during rotation three times. Height was measured by a tape attached to the wall, this means that samples with legs stuck together while the knees, hips, shoulders and headrest along a vertical line, head was straight and arms were placed on either side were free. After the tangent to the top of the head with a ruler, measures of height were recorded by 50 cm resolution. To measure body weight, subjects were measured with minimal clothing without shoes by 150 pound, SOEHNLE German balance with an accuracy of 1 kg. That is to increase the accuracy in measuring, person was weight tree times.

Harpandan Caliper made in Japan was used for measuring subcutaneous fat. For measuring subcutaneous fat, first about 2 cm above the stance taken by thumb and forefinger and put the caliper on the stance and after 2 seconds. The number of caliper's analog dial recorded. To measure subcutaneous fat, all measurements were performed on the right side of the body. Measurements were repeated 2 times and if the difference is greater than 2 mm, for the third time measurements performed and the average of two numbers that were closer together were recorded. In addition, the distance between each measurement was 15-20 seconds and determines the body fat percentage was by the formula: 5 + (triceps skinfold thickness and legs sum) × 0.61 = percentage of fat. For triceps skin fold measurements, a layer vertically down the middle of the posterior arm and elbow in the middle of the last process in the case that the hands were in anatomical position, was measured by calipers and to measure the thickness of subcutaneous fat, a vertical layer got in the prominent environmental point on the middle leg. To determine this point, subject was placed his right foot on a stool that the angle of the femur and tibia were 90.

Then the inner part of the leg with the big considerations in the measurement of subcutaneous fat was noted, was measured and body mass index (BMI) was calculated by dividing height on weight in kg m. After the measurement of waist circumference to hip, waist circumference to hip ratio (WHR) calculated by dividing waist circumference to hip in cm. waist circumference was measured using a tape at the end of conventional tail without abdominal muscle contractile around the navel in the standing position (18) and for measurement of hip circumference, maximum hip circumference measured by a tape, so that the tape was

placed completely in horizontal around the limb. Finally data was analyzed by descriptive statistics and inferential statistics for example Pearson's correlation coefficient to investigate the relationship between composition variables . Confidence level for all tests was considered 95 % .

Results

The means and deviations of variables in active and inactive children are shown in (Table.1).

Table 1: Weight mean and deviation, Height, Body mass index, Waist to hip ratio, Triceps skinfold thickness, Leg skinfold thickness and fat percentage (%BF) in active and inactive children

Variables	Deviation		Mean	
Variables	Inactive	Active	Inactive	Active
Weight(kg)	9.103	6.48	32.59	27.72
Height (cm)	8.655	9.06	136.16	136.80
BMI	2.943	1.818	17.61	14.62
WC	7.59	6.83	66.18	59.77
WHR	0.047	0.055	0.87	0.85
Tricept skinfold thickness	3.067	2.535	14.59	10.04
Leg skinfold thickness	4.27	2.51	18.00	12.73
Fat percentage	4.15	2.67	24.86	18.89

Based on the result of the Pearson's correlation coefficient, there was a significant relationship between fat percentage and BMI (r= 0/593, P= 0.000) and WC(r= 0/331, P= 0.005) in active children n.

In other words there was a positive significant relationship between anthropometric factors (BMI and WC) and percentage of body fat in active children, body fat percentage increases with increasing BMI an WC however the results of Pearson correlation coefficient associated with WHR and body fat percentage we find that the p- value calculated (r= -0/113, P= 0.346) is greater than the significant level, then we can say that there is a significant correlation between WHR and body fat percentage in active children. The increase or decrease in WHR did not increase or decrease the percentage of body fat.

According to the Pearson's correlation coefficient, there is a significant correlation between percentage of body fat and BMI (

r= 0/677, P= 0.000) and WC (r= 0/527, P= 0.000) and WHR(r= 0/470, P= 0.000) in inactive children, percentage of body fat increases with increasing indexes.

(Table.1) shown the result of Pearson's correlation for the association between body fat percentage and anthropometric factors in inactive children (BMI, WHR, and WC).

Discussion

The finding showed that there was a significant correlation between anthropometric factors and body fat percentage in active student. The result of pearson's correlation coefficient for determining the relationship between body fat and anthropometric parameters showed that BMI and WC have a positive significant correlation with percentage of body fat index in active student. Also there was no significant correlation between WHR and body fat percentage and increasing or decreasing in WHR doesn't influence on increasing or decreasing in body fat. Ibrahim (1999) studied athlete women aged 18 t0 33 years old and found a significant correlation between body fat percentages by skinfold thickness and BMI and WC that is consistent with present research (19). In other research, Dolatabadi (2000) found a significant correlation between BMI and body fat percentage in students aged 8 to 12 years old that its findings were consistent with present research (20). Also these results are consistent with the results of Hamedinia and Kalling's researches (21, 22).

Result of Sabri and kalling's researches are consistent with results of present research (22-24), because the researchers showed that WC is associated with body fat percentage. Tylor studied girls and boys aged 3 to 18 years old found a significant correlation between BMI and body fat that the amount of relationship depend on children's age and consistent with finding of present research (25).

Also, finding indicated a significant correlation between some anthropometric factors and body fat in inactive children. The result of Pearson's correlation coefficients for the relationship between body fat and anthropometric factors indicated BMI has most association with body fat before puberty. It was shown that WC and WHR factors have a significant correlation with body fat and for determining of body fat percentage can use these anthropometric indexes that results of this section of research is consistent with Asrdik's research that studied 60 obese and 60 normal subjects an he found a significant correlation between WC and body fat(26). Also Lindsey studied subjects aged 5- 19 and found a significant correlation between BMI and body fat that is consistent with this research.

Conclusion

The results showed that students who have had at least three sessions of physical activity have been disabled pupils less% lipid. Considering that the prevalence of cardiovascular risk factors in obese and now most cardiovascular disease is the leading cause of death in most CPM plan to modify lifestyle through proper training, nutrition and physical activity patterns can be a good

idea to promote good health and maintain a healthy weight and body composition students. The findings of this research indicated the relationship between anthropometric parameters with body fat percentage is influences by activity levels.

Conflict of interests: None

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References

1. Conley D, McCabe BJ. Body Mass Index and Physical Attractivene ss: Evidence From a Combination Image-Alteration/List Experiment. Sociol Methods Res 2011; 40(1): 6-31.
2. Tomaszewski Krzysztof Mazurek, Anna Czajkowska, Anna Kęska, Joanna Tkaczyk. Relationship between the percentage of body fat and surrogate indices of fatness in male and female Polish active and sedentary students. Journal of Physiological Anthropology 2014, 33:10.
3. Rajabi H. Obesity in childhood, adolescence and the role of exercise in it. Journal of Growth 2000;14: 38-40.
4. Farbakhsh F, Shafieezade T, Ramezankhani A, Mohammadalizade A, Shadnush M. Study of body mass index and demographic-social factors among Tehran's females 15-44 years old. Pajouhesh Dar Pezeshki 2009; 31(2):133-9.
5. Ajita Jiwanjot. Overweight and Physical Activity as a Measure of Age at Menarche in Females. American Journal of Sports Science and Medicine 2014;2(1): 32-4.
6. Gharakhanlou R. Guinea AA, Pyghvn, Abdul. Standardization of waist to hip ratio in men over 40 years of Ahwaz and its association with cardiovascular risk factors – vascular. Olympic 2002;22(10): 59-72.
7. Amini R. A Comparison between bioelectrical impedance analysis and body mass index methods of determination of obesity prevalence in Ahvaz women. Eur J Clin Nutr 2007: 1(4): 478-82.
8. Skrzypozak M, Szerd A. Polanski - camera, R, Skrzypules. Assessment of the BMI, WHR and W/hit with pre-and women. Anthropology 2007; 70: 3-13.
9. TORIOLA OM, MONYEKI MA. Healthrelated fitness, body composition and physical activity status among adolescent learners: The PAHL study. AJPHERD 2012: 4(1): 79.
10. Martinezed-Abundrs E. Association of a adiposity assessed by means of near infrared with the cell function, insulin resistance a lepton concentration in non-obese subjects Exploratory study. J Diabetes and its Complications 2003; 15(4):181-4.
11. Mjybyan M, Ghylyan Z. Exercise, and treatment of diseases (translated Aleppo Chi, Farzin, Askari convent). Tehran; of hope. 2001;3(14):12-17.
12. Gayyny AA, Rajabi H, Hamedi Nia M,. Open A. Principles of exercise science and fitness. Vivian H. Hey Luke. Publications of Tehran. Physical Naja; 2004.
13. Pyghvn N. Standardization of waist-hip ratio in men over 40 years of Ahwaz and its association with cardiovascular risk factors - diabetes and cardiovascular disease. Master's thesis. University. Faculty of Physical Education and Sports Science; 2002.
14. Shkrvsh B. Lifestyle. Exercise and Health. The second congress of sport. Tehran: Publications Office of the Department of Physical Education 1999; 12: 67-86.
15. Ziaee V, Fallah J, Rezaee M, Biat A. The relationship between body mass index and physical fitness in 513 medical students. Tehran Univ Med J 2007; 65(8): 79-84 .
16. Saidi E. Estimate the relationship between body fat and body size measurement results Vrzshkarvghyrvrzshkar women. Moving Journal 2000;6: 95-102.
17. Astrup A; D. L. Hansen. Colundsgaardunds. Toubro; what do pharmacological

approaches to obesity management offer linking pharmacological mechanisms obesity management agents clinical practice .EXP. Chin. Diabetes 1998; 106 : 29-34.
18. Yousefi A. Venus evaluated the relationship between anthropometric measures and IQ and age at menarche, Journal of Obstetrics, Gynecology and Infertility 2000; 3 (6-5): 21-9.
19. Ibrahim KH. Compare credit Qd- by weight and standard formulas for estimating the ideal weight for women, non-athletic Vrzrshkar. Harakat journal. 1999; 3:10-13.
20. Dolatabadi H. The validity of body mass index and body fat percentage of male students aged 8-12 years. Master's thesis. Tehran University, Faculty of Physical Education and Sports Science; 2000.
21. Hamedinia M, Rezai S. Relationship between physical activity and body fat with cardiovascular risk factors in the faculty of Tarbiat Moallem University of Sabzevar; 2004;11(3):34-40.
22. Calling S. Effect of body fatness and physical activity on cardiovascular risk: Risk prediction using the bioelectrical impedance method, Scandinavian journal of public Health 2006 : 6(34):568-75.
23. Sabri N. Sermes Y, Kazil S, Zencir M. Correlation of abdominal fat accumulation and liver steateosis: importance of ultrasonographic anthropometric measurements. European journal of ultrasound 2001; 14(2-3):121-8.
24. Jia WP, Lu JX, Xiang KS, Boa YQ, Lu HJ, Chen L. Prediction of abdominal visceral obesity from body mass index, waist circumference and waist-hip ratio in Chinese adults: receiver operating characteristic curves analysis. Biomed Environ Sci 2003; 16(3):206-11.
25. Taylor RW, Jones IE, Williams SM, Goulding A. Body fat percentages measured by dual-energy X-ray absorptiometry corresponding to recently recommended body mass index cutoffs for overweight and obesity in children and adolescents aged 3-18 y. Am J Clin Nutr 2002;76(6):1416-21.
26. Srdić B, Stokić E, Polzović A. Relations between parameters which define quantity and distribution of adipose tissue. Med Pregl 2003; 56(5-6):232-6.
27. Lindsay RS, Hanson RL, Roumain J, Ravussin E, Knowler WC, Tataranni PA. Body mass index as a measure of adiposity in children and adolescents: relationship to adiposity by dual energy x-ray absorptiometry and to cardiovascular risk factors. J Clin Endocrinal Me tab 2001; 86(9):4061-67.