International Journal of Bioassays 6.9 (2017) pp. 5485-5488

Open Access
CODEN: IJBNHY
ISSN: 2278-778X
International Journal of Bioassays

Research Article

Comparison of BMI and waist-hip ratio in physically trained adults and sedentary adults

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Received: ijbio.2017.8.3; **Accepted**: ijbio.2017.8.17
Available online: 1st September 2017

Abstract: Obesity can increase the incidence of angina pectoris, myocardial infarction, hypertension and cerebrovascular diseases. This study is undertaken with the aim to evaluate the effect of physical training on BMI, Waist-hip ratio. The study was conducted on 50 male physically trained adults and 50 male sedentary adults in the age group between 30-40 years and the following parameters were evaluated BMI, Waist-hip ratio. There is statistically highly significant decrease in BMI, Waist-hip ratio, in physically trained adults as compared to sedentary adults. Aerobic exercise and games in combination causes highly significant decrease in BMI, W-H ratio. Thus, combination of aerobic exercise and games is more beneficial instead of only aerobic exercise and hence should be recommended.

Keywords: Aerobic exercise, BMI, W-H Ratio, sedentary atherosclerosis myocardial infarction.

Introduction

Obesity is one of the major health problems in our society and its prevalence is rising worldwide, reflecting increased consumption of energy dense diets high in fats and sugars, compounded by declining levels of physical activity. It is measured either as body mass index (BMI), waist size or waist hip ratio. Central obesity and overweight are the other risk factors for coronary heart disease and so exercise should ideally help to reduce central obesity and overweight[1]. BMI is measure which takes into account a person's weight and height to gauge total body fat in adults. Waist hip ratio (WHR) is a major determinant of cardiovascular risk factors. Waist-hip ratio is also an important determinant of triglyceridemia. Physically trained adults mean subjects who are doing exercise daily for half an hour at least for six months and sedentary adults are office, business workers who are not doing any active exercise.

The present study is undertaken with the aim to evaluate the effect of physical training including aerobic exercises and games on body mass index, waist-hip ratio. This study has done to know what is effect of physical training on BMI and Waist-hip Ratio in central Maharashtra in India, which is unfocused part of India regarding such study. The main objectives of the study was

1. To Study the Effect of Physical Training on BMI and waist-hip ratio in physically trained adults and sedentary adults.
2. To compare BMI and waist-hip ratio between physically trained adults and sedentary adults.

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Material and Methods

The study was conducted in 50 physically trained adults and 50 sedentary adults. This study was conducted in the department of biochemistry at Government Medical College Miraj. Institute ethical committee approval was obtained. volunteers who wished to participate in the study reported to Biochemistry department. informed written consent was taken from volunteers. It was conducted from January 2011 to December 2011. All the subjects who participated in this study ware selected by certain inclusion and exclusion criteria.

Physically trained adult's means subjects who are doing exercise daily for half an hour at least for six months. They had undergone 6 months of physical training for 45 minutes daily. the training were taken in morning time from 6 a.m. to 6.45 a.m. it included warm up section, running and any 2 games from various games like volleyball, football, cricket, handball, basketball etc. sedentary adults means they are not doing any physical exercise e.g. office, business workers

	Classification	BMI	Risk of co-morbidities
I.	Underweight	< 18.5	Low
II.	Normal range	18.5 to 24.99	Average
III.	Pre-obese	25 to 29.99	Increased
	Obese class 1	30 to 34.99	Moderate
	Obese class 2	35 to 39.99	Severe
	Obese class 3	>/ 40	Very severe

Inclusion criteria
Age groups:
A. Males between 21 to 30 years of age performing physical training.

B. Males between 21 to 30 years of age not performing any type of physical training or exercise**.**
Diet: Vegetarian
Occupation: Physically trained student's means subjects doing exercise daily for half an hour at least for 6 months. and sedentary office / business workers and medical college students
Socioeconomic status: Upper middle and lower middle socioeconomic class

Exclusion criteria
Subjects with history of
a) Smoking, drinking alcohol, tobacco chewing.
b) Diabetes mellitus, hypertension or family history suggestive of coronary heart disease.
c) Any major illness.
d) Taking drugs, which are known to affect lipid metabolism.

An evaluation of the following parameters was done in physically trained adults and sedentary adults.

Anthropometric measurements:
Measurement of height and weight
Standing heights of subjects were recorded using stadiometer with heels together and heels, calf, buttocks and preferably back touching the stadiometer. The height was measured, without footwear, to the nearest one centimeter. The weight was measured to the nearest 0.1 kg, in standing position; subjects were wearing light clothes and were bare footed.

Body mass index (BMI)
It is also known as Quetelet index (2) calculated by formula

$$BMI = \frac{\text{Weight (kg)}}{[\text{Height (m)}]^2}$$

BMI of 30 is the most commonly used threshold for obesity both in men and women. At a similar BMI, the women have more body fat than men. Large scale epidemiologic studies suggest that morbidity due to metabolic diseases. Cancers and cardiovascular diseases begins to rise when BMI >25

Waist- Hip ratio (WHR)
Waist Circumference was measured at midpoint between lower border of rib cage and the iliac crest (3). Hip circumference was measured at the maximum protrusion of gluteal muscles or at the level of greater trochanter of femur (4)

$$\textbf{WHR} = \frac{\text{Waist circumference (cm)}}{\text{Hip circumference (cm)}}$$

The circumference was measured with a measuring tape with a least count of 1 mm, when subject was in standing position and breathing normally.

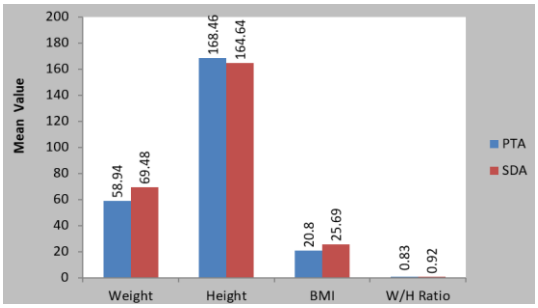
Statistical analysis
The present study is of comparative type. Statistical Technique is Purpose Random Sampling. the data were analyzed by SPSS software and presented by percentage, mean and standard deviation. Unpaired t test was applied as test of significance, wherever applicable

Results

Table 1. Comparison of anthtropometric parameters in physically trained adults and sedentary adults

	Physically trained adults		Sedentary adults			Significance
	MEAN	S.D.	MEAN	S.D.	t 'test'	
Body weight(kg)	58.94	6.70	69.48	6.69	7.87	P<0.001 Highly significant
Height(cm)	168.46	7.98	164.64	4.61	2.93	P<0.004 Highly significant
BMI(kg/sqm)	20.80	1.97	25.69	2.13	11.91	P<0.001 Highly significant
Waist-hip ratio	0.83	0.04	0.92	0.07	7.62	P<0.001 Highly significant

Table 1 shows statistically highly significant (P< 0.01) decrease in body weight, height, BMI, Waist-hip ratio in physically trained adults as compared to Sedentary adults.



Graph 1: Multiple bar diagram showing comparison between mean body weight between physically trained adults and sedentary adults.

Discussion

In our study Analysis of parameters in physically trained adults showed decrease in body weight, BMI, waist-hip ratio as compared to those with sedentary adults. This decrease in values in physically trained adults is statistically highly significant (P< 0.001) canoy D noted that waist circumference and waist-hip ratio as indicators of abdominal adiposity are positively related to coronary heart disease in men and women independently of BMI and conventional coronary heart disease factors (5) Paul D *et al.,* had estimated Total cholesterol, TG, LDL, HDL, lipoprotein lipase level, body weight and % body fat in sedentary males before and after exercise training(6). Deborah Rohm Young *et al.,* noted that significant association physical activity level and cardiovascular risk factor exists. Higher levels of physical activity are related to lower BMI, low % body fat, higher level of HDL-C, lower level of BP and lower resting pulse rate (7).

Deborah L. Heim *et al.,* examined the relationship between abdominal obesity (waist/hip ratio) and HDL cholesterol level. He concluded that increased exercise was associated with a lower waist/hip ratio and higher HDL cholesterol appears to be mediated through percentage body fat (8). Irwin M L *et al.,* studied that regular exercise such as brisk walking results in reduced body weight and body fat among overweight and obese pre-menopausal females (9).

Blair *et al.,* concluded that low physical fitness is an important risk factor in both males and females. Higher level of physical fitness appears to delay all causes of mortality primarily due to cardiovascular disease (10). So the present study shows comparable results with those of Canoy D., Paul D *et al.,* Our results are also supported by Deroah L. Heim *et al.,* Thus in sportsman due to the regular training and exercise sympathetic activity is increased and there are high levels of circulating catecholamines in the blood. This is responsible to cause increased in lipolysis of triglyceride in the adipose tissue to supply more fatty acids for working muscles (11). the supply of free fatty acids for the synthesis of triglyceride in adipose tissue is made available by the lipoprotein lipase enzyme in the capillary endothelium of adipose tissues. The activity of this enzyme is found to be increased causing increased breakdown of triglycerides from blood which is reflected as reduction in triglyceride level of the blood of a person performing regular exercise (12). Testosterone levels of untrained subjects after 15 to 20 minutes, Testosterone increases the formation of HDL (13)

In our study, it is observed that in physically trained adults there is highly significant decrease in body weight, BMI, W/H ratio. During exercise, there is more lipolysis as result of release of different hormones. Because of more lipolysis more free fatty acids are now available to supply energy for exercising muscles. So, there is reduction in body weight, BMI, W/H ratio.

The distribution of adipose tissue in different anatomic depots also has substantial implications for morbidity. Specifically, intra-abdominal and abdominal subcutaneous fats have more significance than subcutaneous fat present in the buttocks and lower extremities. This distinction is most easily made by determining the waist –hip ratio.

A ratio (WHR) > 0.9 in women and > 1 in men is abnormal. Many of the most important complications of obesity, such as insulin resistance, diabetes, hypertension, hyperlipidemia and hyperandrogenism in women are linked more strongly to intra-abdominal and upper body fat than over all obesity. The mechanism underlying this association is unknown but may relate to the fact that intra-abdominal adipocytes are lipolytically more active than those from other depots. Release of free fatty acids into the portal circulation has adverse metabolic actions, especially on the liver (14).

Conclusion

Aerobic exercise and games in combination causes highly significant decrease in BMI, W-H ratio. Thus combination of aerobic exercise and games is more beneficial instead of only aerobic exercise and hence should be recommended.

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Cite this article as:
Satish Ambadas Pawar. Comparison of BMI and waist-hip ratio in physically trained adults and sedentary adults. *International Journal of Bioassays 6.9 (2017) pp. 5485-5488.*
DOI: http://dx.doi.org/10. 21746/ijbio.2017.9.3

Source of support: Nil.
Conflict of interest: None Declared