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The relationship between waist to stature ratio & physical fitness index in adult males

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Abstract

Introduction: PFI (physical fitness index) which is defined as ability to carry out daily tasks with vigour and alertness without undue fatigue. Anthropometric parameters like BMI, Waist circumference, WSR (waist to stature ratio), WHR (waist to hip ratio) reflects the fatness of an individual & they all correlate well with the body fat percentage. Though the obesity is going to decrease the exercising capacity. As WSR is a predictor of obesity, we correlated WSR with PFI.

Aim: The present study was conducted to study the relationship between waist to stature ratio with physical fitness in adult males.

Materials & Methods: 80 sedentary men (18-40 years) were included in the study. Anthropometric parameters like height, weight, Waist circumference, were measured. BMI, WSR were calculated, Physical fitness index of each subject was recorded by Modified Harvard step test.

Results: Out of 80 subjects 40% were obese, 25% were overweight, and 30% had normal BMI whereas 6% were underweight. & 40% of study subjects had WSR >0.5. PFI significantly ($p<0.05$) decreased in subjects with WSR > 0.5 when compared with the subjects of normal WSR.

Conclusion: The present findings indicate that elevated WSR is more strongly inversely related to physical fitness index.

Keywords: Harvard step test, PFI, BMI, Waist to stature ratio

Introduction

The pattern of diseases is now showing a changing trend with the non-communicable, lifestyle based diseases like diabetes, hypertension and obesity accounting for significant morbidity worldwide. Obesity is now becoming a major concern in all age groups. According to World Health Organization BMI greater than or equal to 25 is overweight and greater than or equal to 30 is obesity. India's current National Family Health Survey indicates that more than 20 percent of urban Indians are overweight or obese [1].

There are various anthropometric parameters like BMI (body mass index) Waist circumference (WC), WHR (waist to hip ratio) & WSR (waist to stature ratio). Many studies concluded that these anthropometric parameters indicates the body fatness of an individual [2, 3] many studies showed that WSR alone is a better indicator of adiposity than WC [4, 5].

Physiological fitness implies the capacity for skilful performance and rapid recovery. The physical fitness index measures the physical fitness for muscular work and the ability to recover from the work. Many studies correlated PFI with BMI & body fat percentage [6, 7] & found that PFI decreases with increased BMI.

Aim

To study the relationship between waist to stature ratio with physical fitness in adult males

Materials & Methods

80 aged between 18-40years were recruited from two fitness centres. Subjects were informed about the study & informed written consent was taken. The anthropometric measurements included weight, height, WC, WHR & WSR following the recommendations of the World Health Organization [1]

- **Height (in centimeters):** This was measured with subject standing without their shoes, nearest to 0.1 centimeter.
- **Weight (in kilograms):** The subjects were weighed in standardized machine nearest to 0.1 kilogram
- **Waist circumference**: was measured at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest.
- **Waist to stature ratio** was calculated as follows

$$\text{WSR} = \frac{\text{Waist circumference in cms}}{\text{Height in cms}}$$

Physical Fitness Index

Physical fitness index of each subject was recorded by using modified Harvard step test with step height 40 cms. The observer calls the rhythm, at the signal “start” stopwatch is started, metronome is turned on. The subject places one foot on the platform and later the other, and immediately steps down, bringing down first the same foot which he placed up first. All subjects were stopped at 5 minutes. When the subject successfully completes the test, recovery time starts counting. He is made to sit quietly on a chair or lie on the cot. Beginning exactly one min after he stops, the radial pulse was taken. Three readings were taken during this recovery phase.

The first reading was from 1 minute to 1 minute 30 seconds after the exercise, the second reading was from 2 minutes to 2 minutes 30 seconds after the exercise and the third reading from 3 minutes to 3 minutes 30 seconds after the exercise.

The Physical Fitness Index is calculated by using following formula [8]

$$PFI = \frac{\text{Duration of exercise in seconds x 100}}{\text{2 x Sum of the three half minute post exercise pulse counts}}$$

Statistics

SPSS 16.5 version of statistical package was used for analysis of the data. Descriptive statistics and t test and analysis of variance was used.

Results

Majority of our study population (52.5%) were between 21-30yrs of age group, very few (12.5%) were below 20yrs (Table 1). Most of the subjects (55%) had WSR more than 0.5 & categorised to group 1. Remaining 45% of subjects had normal WSR (<0.5) categorised to group 2 (table 3).We found that PFI in group 1(81.23) was significantly (p<0.05) less than group 2(90.03) described in table 3. Majority of the study subjects (73.5%) had fair PFI only few (5%) had excellent PFI (Table 4)

Table 1: Age Wise Distribution Of Study Population

Age Groups (In years)	Study group n=80
<20	8 (10%)
21-30	44 (55%)
31-40	28 (35%)

Table 2: Variables among Study Population

VARIABLES	
HEIGHT(cms)	161.32±5.13
WEIGHT(kg)	68.8± 4.65
BMI (kg/m^2)	26.39± 1.17
WC(cms)	88.85±7.13
WHR	0.85± 2.07
WSR	0.54±4.00

WC – waist circumference, WHR – Waist to hip ratio, WSR – weight to stature ratio

Table 3: Comparison Of Pfi In 2 Different Groups

	Group 1 Wsr (>0.5) n=44	Group 2 Wsr (<0.5) n=36	t value
PFI	94.4±6.20	101.2±5.82	6.56 *

Table 4: Pfi Rating According To Modified Harvard Step Test

PFI ratings		Study subjects (%) n=80
Excellent	> 115	5
Good	103-115	11.25
Fair	91-102	73.75
Poor	<91	10

Discussion

The main finding of the study was that higher the WSR lower the physical fitness index, as WSR is a direct measure of individual's fatness. It is known that overweight and obese individual exhibit lower levels of physical fitness.A faster heart rate was observed in the group with lower physical fitness. [9] Caloric intake was directly related to measure the fitness and inversely related to fitness [10].

Increased BMI was significantly associated with lower cardio-respiratory fitness [11]. So the heart rate of subjects with high WSR returned to the baseline late when compared to the subjects with normal WSR.

Studies have shown that short and long term beneficial effects of a combined dietary-behavioral-physical activity intervention among obese children [12]. These results highlight the importance of multidisciplinary programs for treatment of childhood obesity and emphasize their encouraging long term effects.

The Harvard test is a submaximal fitness test, as it predicts cardiovascular fitness (endurance) from the rise of heart rate during moderate exercise, rather than exercise to exertion. This makes it a very popular fitness test with health clubs, schools and colleges [8].

Many studies have studied the effect of different intensities of aerobic exercises on PFI & showed that high intensity exercise are better than low intensity exercise in improving PFI [13, 14].

Conclusion

So we should encourage obese / overweight people to undergo high intensity aerobic training to reduce their body fat percentage, BMI & also to improve their aerobic fitness & Physical fitness index.

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