

Original article:

Comparative study of cardio respiratory fitness, Body mass index (BMI), Waist to Hip ratio(W/H) in female medical students amongst two ethnic groups

Dr. Mrs. Anuya A. Joshi , * Dr.Mrs. Kanchan Wingkar ** .Dr.Anand Joshi ***

*Msc. Medical Physiology,** Prof.& HOD. Physiology.*** Prof. Physiology

Dept. of Physiology, KIMS. Karad , Maharashtra , India

Corresponding Author: Dr. Mrs. Anuya A. Joshi

Abstract:

Background: Due to dietary life style changes, physical inactivity prevalence of obesity and chronic non communicable diseases is increasing . Even though adult population suffers from cardiovascular disorders, diabetes, hypertension etc. it's roots are seen in the childhood and adolescent age. It is observed that medical students have poor fitness levels than students from non-health related disciplines. So in present study Status of obesity and cardio respiratory fitness is studied in Indian and Malaysian female medical students .

Methods: For present study 62 female Indian and 45 Female Malaysian medical students were studied randomly. Physical fitness parameters : Body mass Index (BMI), waist circumference ,Waist to hip (W/H) ratio, cardio-respiratory fitness were studied by standard method. Students were divided into four groups depending upon BMI values. Physical fitness parameters were compared between Indian and Malaysian female medical students.

Results: Indian female medical students were having more body weight , BMI and abdominal fat deposition . Indian female medical student Cardio respiratory fitness was on lower side compared to Malaysian students. While in Malaysian students obesity was not a problem but cardio respiratory fitness is on lower side compared to standard ratings. This could be because more sedentary habits as the students have to study for prolonged periods to compete the syllabus.

Conclusion: Percentage of obesity is more in Indian female medical students and cardio respiratory fitness is low compared with Malaysian students. .So there is need for Physical education and training for the medical students .

Key words : Body mass index (BMI) , Waist to hip Ratio (W/H), Cardio respiratory fitness

Introduction

Due to industrialization and urbanization, dietary life style changes, physical inactivity, environmental pollution, stress and habits like alcohol consumption and cigarette smoking, prevalence of chronic non communicable diseases are increasing like cardiovascular disorders (coronary artery diseases,

hypertension, etc) ,diabetes, obesity^{1,2,3,4}Coronary artery disease is the number one killer in United States and worldwide^{1,5} Coronary heart disease is still responsible for one of the five deaths and over 6,00,000 deaths per year in United States.43 million adults in United States have hypertension. Sedentary life style has been linked to 28% of deaths from

leading chronic diseases⁵. Among U. S. adults rates of obesity have risen from 15.9% in 1995 to 27.2% in 2009. Obesity is associated with increase prevalence of cardiovascular disorders, diabetes, hypertension .This trend has been linked to both decline in physical activity and increase caloric intake⁶.

Health is possible if person is physically fit. Physical inactivity is the important cause for reduced fitness. If we want to have a good health of the citizens, first we should know presence status of physical fitness, then after analyzing various components of physical fitness we can prepare formula for physical education and sports and it's implementation. Even though adult population suffers from cardiovascular disorders, diabetes, hypertension etc. it's roots are seen in the childhood and adolescent age⁷. It is observed that medical students have poor fitness levels than students from non-health related disciplines. Lot of research work is going on regarding status of obesity and Cardio respiratory fitness in India and all over the world.^{8,9, 10, 11, 12 13 14 15}. So in present study Body Mass Index (BMI), waist to Hip Ratio(W/H) , waist circumference and cardio-respiratory fitness, are studied in Indian female medical students and also Malaysian female medical students. Even though it is a pilot study, this will give us idea for extent of problem in India, also Indians are ethnically different from Malaysian students so because of which what are the differences between two ethnic groups can be studied,from which large scale study can be carried out to confirm the findings. Our aim was to asses level of cardiorespiratory fitness, status

of obesity in female medical students from India and Malaysia .

Materials and methods:

For the present study, 62 Indian and 45 Malaysian female medical students were selected. Students were explained detail procedure & written consent was taken. Institutional ethical committee approval was also taken before starting the study. Study was conducted in morning hours at 10 to 11.30 A.M. All the subject's history was taken & clinical examination was carried out to rule out any major illness. As study is done on healthy individuals there is no risk factor in the study

Standing height was measured in cms .Height was measured to the nearest 0.1 cm The body weight (BM) was measured to the nearest 0.1kg.Following physical fitness parameters were studied. Body Mass Index: (B.M.I.) was calculated by formula : $BMI = \text{Body mass Index} \div (\text{Height in meter})^2$

Waist to Hip Ratio (W / H Ratio):Waist was measured at naval while standing relaxed, Not pulling stomach in. Hips girth was measured over the buttocks where girth is largest. Divide Waist girth by Hip girth to calculate ratio.⁶

Cardio respiratory Fitness (VO2 max) : 3 minute step test to evaluate heart rates after the exercise was used.. Step test began after a demonstration and practice period. Following Material was used for the test_: 16.1/4 inch 3 steps Gymnasium benches, Stop watch and Metronome. Girls were asked to perform twenty two complete step-ups per minute, regulated by a metronome at 88 beats/minute. Subjects performed each stepping cycle to a four step cadence. "Up-Up-Down-Down". After the completion of stepping

students remain standing, while pulse rate was measured for 15 seconds, 5 – 20 seconds into recovery. Recovery heart rate was converted to beats/minute (measured heart rate for 15 seconds x 4). Vo2 max was calculated by a formula. $Vo_2 \text{ max} = 65.81 - (0.1847 \times \text{step test pulse rate (beats/minute)})$.⁶

Statistical methods used :

Mean & standard deviation was calculated for all the parameters in Indian and Malaysian students. Unpaired 't' test was applied to find out level of the significance

Observations and Results:

TABLE:1 Showing percentage of students in various BMI groups of Indian and Malaysian medical students.

BMI groups	Medical students		Total
	Indian	Malaysian	
Underweight (<18.5)	3 4.8%	12 26.7%	15 14.0%
Normal weight (18.5 - 24.99)	38 61.3%	24 53.3%	62 57.9%
Overweight (25 - 29.99)	16 25.8%	7 15.6%	23 21.5%
Obese (>=30)	5 8.1%	2 4.4%	7 6.5%
Total	62 100.0%	45 100.0%	107 100.0%

TABLE:2 Showing Comparison of various physical fitness parameters Studied in Indian and Malaysian students.

Medical Students		Waist circumference. Cm	Waist to Hip ratio.	VO2 Max ml/kg/Min.	BMI
Indian	N	62	62	62	62
	Minimum	58	.70	31.28	17.17
	Maximum	105	.95	48.44	32.87
	Mean	79.36	.7995	40.0271	23.8161
	Std. Deviation	10.126	.05280	4.12794	4.28752
Malaysian	N	45	45	45	45
	Minimum	57	.65	35.15	16.21
	Maximum	94	.86	49.56	30.92
	Mean	72.87	.7591	42.0409	21.8484
	Std. Deviation	9.438	.05265	3.33134	3.93785
Unpaired 't' test	t value	3.370	3.912	2.696	2.424
	P value	0.001	<0.001	0.008	0.017

- A) Indian students values of waist circumference & waist to Hip Ratio and BMI values were significantly higher compared to Malaysian students (P value < 0.001) I.
- B) In Indian students VO2 max values were significantly reduced compared to Malaysian students (P value < 0.05)

Discussion:

It was observed that compared to Malaysian students Indian students were having significantly increased BMI values (P<0.05) (.Table. No 2) Increased BMI is associated with increased incidence of coronary artery disease, Hypertension ,diabetes etc . Waist circumference and waist to hip ratio values were significantly increased in Indian students compared to Malaysian students. (P<0.001) (. Table. No 2).

Patterning of body adipose tissue independent of total body fat alters health risk from obesity in children, adolescence and adults. Increased health risk from fat deposition in the abdominal area (central or android type of obesity).Fat stored in this area increases the risk for heart diseases and glucose intolerance. Waist circumference alone or waist to hip ratio predicts central obesity. Waist to hip ratio should be less than 0 .8 for women and 0.95 for men. In our study both Indian and Malaysian students were

having these values within normal limits. However values of Indian students were significantly increased, compared to Malaysian students.

In our study Vo₂ max values were significantly reduced in Indian students compared to Malaysian students. (P<0.001) (Table. No 2) Increase in oxygen consumption occurs during exercise. Increase in intensity of exercise increases oxygen consumption. Further increase in intensity of exercise oxygen consumption reaches plateau i.e. not much increase in oxygen consumption. It is called as maximum oxygen uptake, maximal aerobic power, aerobic capacity, vo₂ max. Vo₂ max provides a quantitative measure of a person's capacity for aerobic ATP resynthesis, this makes the Vo₂ max an important determinant of the ability to sustain high intensity exercise for longer period. Low level of cardio-respiratory fitness is a strong independent predictor of increased risk for both cardiovascular diseases and all cause mortality.⁶ There is inverse relation between BMI and Vo₂max.^{11,12} Type of exercise training, age, gender, body composition decides or affects the Vo₂ max values. In our study age and gender parameters are same so ethnic differences,

differences in physical activity and body composition are probably the factors for observed differences. In present study in both the groups Vo₂ Max values were within normal limits. However When values of cardio respiratory fitness were compared with standard rating, like - poor, fair, average, excellent and good. Vo₂ max values of Indian and Malaysian students were average. Indian female medical students were having more body weight and BMI, abdominal fat deposition is also more and cardio respiratory fitness was on lower side compared to Malaysian students. While in Malaysian students obesity was not a problem but cardio respiratory fitness was on lower side compared to standard ratings. This could be because changed dietary habits and sedentary lifestyle. Medical students have to study for prolonged periods to complete the syllabus which may be reason for negligence for sports and exercise.^{15,16,17.}

Conclusion:

So there is need for Physical education and training for the medical students There is need of implementation of sports and related activities to medical students so as to control the obesity and maintain physical fitness standards

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