



Study of correlation of efficacy in six-minute walk test among overweight, normal weight and underweight MBBS students.

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Abstract

Background: Alarming increase in prevalence of obesity in young medicos is putting them at the risk of poor health 6-minute walk test is an easy test for functional fitness. It helps to discover robustness among overweight, normal, and underweight groups **Objective:** To study the correlation of cardiorespiratory parameters distance in underweight, normal weight and overweight medical trainees using 6-minute walk test **Method:** 6-minute walk test was carried out in 15 underweight, normal and overweight individuals. before and after test cardio and respiratory variables were compared in the above three groups **Result:** showed a significant relation in borg scale in underweight, normal weight and overweight medical trainees **Conclusion:** 6 – minute walk test study showed prevention of overweight and underweight by resorting to lifestyle modifications such as inculcating fitness and practicing balanced diet thereby preventing possible cardiovascular risks

Keywords: 6MWT; BMI; Overweight; Underweight; Medical Students; Cardiorespiratory Fitness.



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INTRODUCTION

Assessing the risk for the presence of major CVD risk factors in young adults is of particular importance since it would allow us to promptly identify persons at high risk for development of clinical CVD later in life (1). Young adults between the ages of 18–25 are in a period of 'transition' from adolescence to adulthood (2). Until recently, it was perceived that obesity mostly affected middle age adults. However, a steadily increasing trend of obesity among young adults, especially college and university students, is becoming evident (3). Modest associations between improvement in weight status by indulging in physical fitness and academic achievement are noteworthy. Fitness is defined as a physiological state of well-being that reduces the risk of hypokinetic disease and enables one to complete the task of daily living (4). A converging body of literature indicates that markers of aerobic exercise capacity, both maximal and submaximal, are positively related to children's academic achievement as well as intellectual and cognitive abilities (5) Interventions promoting physical activity and reducing sedentary behaviours are considered crucial for addressing childhood obesity and improving overall health outcomes in children, even if long-term studies on hard endpoints are lacking (6). Efforts to encourage

healthy lifestyle changes for youth are imperative to combat the rise in childhood obesity and promote better health. The six-minute walk test (6MWT) is a sub-maximal exercise test used to assess aerobic exercise capacity and functional performance. It measures the distance an individual can walk in six minutes and is commonly used to assess the impact of various conditions on physical function (7).

It has demonstrated significant prognostic value in various medical conditions, such as chronic heart failure (8) or primary pulmonary hypertension (9). The 6MWT is widely utilised, even in school-aged children (10, 11, & 12). It has also been employed in obese patients, where it is associated with body composition (13, 14) and performance after a weight reduction programme (15) or bariatric surgery (16). Even in obese children, 6MWT showed good reproducibility (17). Interestingly, the 6MWT distance (6MWT-D) performed by obese children was, on average, 14% less than the distance that normal-weight children walked (18). In haemodynamics, the Rate Pressure Product (RPP) is an index of myocardial oxygen consumption and is proportional to the workload of the heart. It is calculated by multiplying

the systolic blood pressure (SBP) by the heart rate (HR). This measure is used to estimate the myocardial (heart muscle) work and reflects the energy consumption of the myocardial muscle. It has been shown to have prognostic value in various adult populations, including in predicting cardiovascular events and mortality (19)

OBJECTIVE:

1.To observe 6-minute walk distance in underweight, normal weight and overweight medical trainees.

To study the correlation of cardiorespiratory parameters distance in underweight, normal weight and overweight medical trainees using 6-minute walk test.

MATERIALS AND METHODS

Study Design: Medical students from first to final year MBBS of Vydehi institute of Medical Sciences who are willing to participate will be briefed about the study. The study will be an Observational cross-sectional study

Inclusion criteria:

- Adults aged above 18 years
- Medical students willing to provide informed consent

Exclusion criteria:

- Medical students who are not willing to provide informed consent

Study protocol

We designed a preliminary Questionnaire tailored to the study objectives. The study began only after obtaining clearance from Vydehi Institutional Ethics committee

Anthropometric measurements weretaken in clinical physiology lab. A Stadiometer and calibrated balance were used to measure height and weight. Body mass index was calculated as weight/height²(kg/m²). Students were classified as overweight, normal weight and underweight using Indian height weight chart of global health care India (20). Rest brachial blood pressure and heart rate were determined. Students were invited to perform six-minute walk test where they will be encouraged to walk at normal pace for six minutes aiming to cover as much distance as possible After

completion of six-minute walk test BP and heart rate were measured. The RPP were calculated by multiplying SBP and HR.

Statistical analysis

Data was entered MS Excel and analysed using SPSS version 23

Independent Sample t-test

The sample size was calculated by using G* power software for independent sample t-test.

The formula is:

$$n = \frac{z(z_1 - \frac{\alpha}{z} + z_1 - \beta)^2 \alpha^2}{d^2}$$

Where:

- $Z_{1-\alpha/2}=1.96$ $Z_{1-\alpha/2}=1.96$ (Standard normal score at 95% level of confidence)
- $Z_{1-\beta}=\text{Power}$ $Z_{1-\beta}=\text{Power}$
- σ = Standard deviation of average of both the groups (from related article)
- d = Clinically significant difference: Minimum mean difference between 2 groups

Based on the findings from previous literature by Iais Lima Pelouze et al.

(2023):

The mean and standard deviation of both the groups is **10.99 ± 3.89** and **7.95 ± 2.20**

At 95% level of confidence and 90% power with standard effect size is 1.26, so the minimum sample size in each group is **15**, overall, **45**.

Descriptive analysis of all the explanatory and outcome parameters werebe done using mean and standard deviation for quantitative variables, frequency, and proportions for categorical variables. The level of significance will be set at $p < 0.05$. The relationship between categorical data was examined using one way ANOVA test. The statistical analyses was performed using SPSS (version 23; IBM Corp, Armonk, NY, USA) and R (version 4.2.0 R Foundation For statistical Computing)

RESULTS

The study was undertaken for assessing the correlation of cardiorespiratory parameters distance in underweight, normal weight and overweight medical trainees using 6-minute walk test yielded the following results:

Age distribution of study subjects with mean age+/- SD ranges in normal weight group 4.5+/-2.69(18-23 years), in over weight group 4+/-3.6(18-23 years) and underweight group 3.5+/-1.7(18-23 years) respectively (in table no.1 and 2).

- In Table no 3 Comparison of baseline values of hemodynamic parameters between underweight, overweight, and Normal weight at baseline showed p value greater than 0.05 indicated there is no significant difference among the groups

Table no. 1: Age distribution of study subjects

Age in Years	category						Total	
	Normal		Overweight		Underweight			
	N	%	N	%	N	%	N	%
18-19	5	10.4%	6	12.5%	5	10.4%	16	33.3%
20-21	7	14.6%	8	16.7%	5	10.4%	20	41.7%
22-23	6	12.5%	2	4.2%	3	6.3%	11	22.9%
>23	0	0.0%	0	0.0%	2	2.1%	1	2.1%
Total	18	37.5%	16	33.3%	15	29.2%	48	100.0%
Mean+/-SD	4.5+/-2.69(18-23 years)		4+/-3.6(18-23 years)		3.5+/-1.7(18-23 years)			

Table no. 2 Gender wise distribution of study subjects

		category						Total	
		Normal		Overweight		Underweight			
		N	%	N	%	N	%	N	%
gender	F	7	14.6%	6	12.5%	12	25.0%	25	52.1%
	M	11	22.9%	10	20.8%	3	4.2%	23	47.9%
Total		18	37.5%	16	33.3%	15	29.2%	48	100.0%

Table no 3: Comparison of baseline values of hemodynamic parameters between underweight, overweight, and Normal weight at baseline

Parameter	Underweight		Normal weight		Overweight		P value
	Mean	SD	Mean	SD	Mean	SD	
SBP	115	5.82	109	7.92	111	8.97	0.071
DBP	78	4.73	75	5.15	76	8.02	0.441
HEART RATE	79	8.02	78	9.92	73	6.14	0.103
Spo2(%)	98.6	0.90	97.9	0.77	98.2	1.12	0.095

Table no 4: Comparison of mean heart rate between underweight, overweight, and Normal weight at different time point

time	Underweight		Normal weight		Overweight		P value
	Mean	SD	Mean	SD	Mean	SD	
baseline	115	5.82	109	7.92	111	8.97	0.071
immediate	99	8.47	100.9	13.24	101.3	9.12	0.798
30 sec	89.9	7.90	93.5	11.18	91.5	8.90	0.635
1 min	84.1	9.09	88.6	13.13	84.2	9.09	0.514
2 min	85.2	13.17	83.3	13.20	85.6	13.17	0.832
5 min	85.1	11.83	83.6	11.41	85.15	11.84	0.051

- In Table no 4 comparison of mean heart rate between underweight, overweight, and Normal weight at different time point showed p value greater than 0.05 indicated there is no significant difference among the groups

Table no 5: Comparison of mean SBP, DBP and Spo2 between underweight, overweight, and Normal weight at baseline and immediately after 6-minute walk test using ANOVA TEST

ANOVA

		Sum of Squares	df	Mean Square	F	P value
SBP (mm of Hg)	Between Groups	335.118	2	167.559	2.803	0.071
	Within Groups	2690.361	45	59.786		
	Total	3025.479	47			
DBP	Between Groups	65.764	2	32.882	0.833	0.441
	Within Groups	1776.049	45	39.468		
	Total	1841.812	47			
SpO2 (%)	Between Groups	3.765	2	1.882	2.48	0.095
	Within Groups	34.152	45	0.759		
	Total	37.917	47			

- In Table no 5 Comparison of mean SBP, DBP and Spo2 between underweight, overweight, and Normal weight at baseline and immediately after 6-minute walk test using ANOVA TEST showed p value greater than 0.05 indicated there is no significant difference among the groups

Table no. 6 comparison of Borg scale and 6 min walk distance between underweight, normal weight and overweight at baseline

	underweight		Normal weight		Over weight		P value
	Mean	SD	Mean	SD	Mean	SD	
Borg Scale	6.4	0.87	6	2.17	7.6	1.29	0.0021
6 min walk distance	418.7	56.59844	474.2	56.59284	422.8	56.59284	0.0249

- In Table no. 6 comparison of Borg scale and 6 min walk distance between underweight, normal weight and overweight medicos at baseline showed highly significant p value 0.021 and 6-minute walk distance showed 0.0249 among underweight, normal weight and overweight medicos which was highly significant at the baseline

DISCUSSION

Productive association of cardiorespiratory health and intellectual strength especially thinking ability and study performance has been documented in preadolescent children's groups. (5) Nonetheless such studies in young adult medical population have been a rarity. In a study by Sonali Uikey et al showed functional activity of overweight children is less in comparison to normal weight children in consistent with results of our study. (21) The main findings of the study by giontella A et al(22) showed that obese children group covered lesser distance when compared to normal counterparts in 6-minute walk test whereas in our study we included an underweight group in addition to normal weight along with overweight groups and maximum distance was covered by normal weight group in comparison with underweight and overweight groups. In a study by

Dehghan H et al (23).RPE was higher in overweight and obese participants than those with normal participants similar to the findings in our study

CONCLUSION

Young medicos with overweight and underweight covered less distance in comparison to their normal counterparts indicating corrective mediation to improve physique thereby preventing possible later complications

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