RESEARCH ARTICLE

INFLUENCE OF BODY MASS INDEX ON CARDIOPULMONARY FITNESS IN COLLEGE GOING MALES: A CROSS-SECTIONAL STUDY

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Manuscript Info	*Abstract*
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Objective: This study aimed to compare cardiopulmonary fitness between healthy obese and non-obese male college students using key physiological markers such as VO_2 max and MET scores.

Methods: A cross-sectional study was conducted with 90 male students aged 18–25 years from various colleges in Jaipur. Participants were categorized into obese (BMI ≥25 kg/m²) and non-obese (BMI 18.5–22.9 kg/m²) groups based on Asia-Pacific BMI criteria [2]. VO_2 max and MET scores were measured using a bicycle ergometer and cardiopulmonary exercise testing (CPET) [3].

Results: Non-obese participants demonstrated significantly higher VO_2 max and MET scores compared to their obese counterparts. A strong negative correlation ($r = -0.815$) was found between BMI and both cardiopulmonary parameters.

Conclusion: Cardiopulmonary fitness is significantly reduced in obese college students, suggesting the urgent need for early lifestyle interventions and structured fitness programs [6].

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Introduction:-

Obesity, characterized by excessive fat accumulation, contributes substantially to global morbidity and mortality [1]. The escalating prevalence of obesity in young adults, particularly in India, poses severe risks for cardiometabolic disorders such as hypertension, diabetes, and cardiovascular disease [2, 4].

Cardiopulmonary fitness, an indicator of cardiovascular and respiratory efficiency, is commonly evaluated using VO_2 max and MET scores [3, 5]. These physiological markers serve as strong predictors of cardiovascular risk and all-cause mortality [6]. Understanding how obesity affects these parameters in the young adult population is essential for designing targeted preventive strategies [7].

Methods:-

This study recruited 90 healthy male college students aged 18–25 years from Jaipur. Participants were grouped as obese (BMI ≥25 kg/m²) or non-obese (BMI 18.5–22.9 kg/m²) using Asia-Pacific classification [2]. Informed consent was obtained. Students with chronic illness or physical impairments were excluded. The study was approved by the institutional ethics committee.

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Cardiopulmonary Assessment:
CPET was performed using a bicycle ergometer connected to the Cardiovit CS 200 system. VO_2 max and MET scores were recorded. Participants were instructed to pedal until volitional exhaustion. Measurements were standardized and conducted during department hours [3].

Results:-

Table 1:- Participant Demographics and Physical Characteristics.

Characteristic	Obese (n=45)	Non-Obese (n=45)	P Value
Age (years)	21.2 ± 1.9	20.8 ± 1.7	0.26
BMI (kg/m²)	27.6 ± 1.9	21.2 ± 1.5	<0.001 **
Height (cm)	172.1 ± 5.4	171.7 ± 6.2	0.70
Weight (kg)	81.5 ± 6.3	61.9 ± 5.4	<0.001 **

Values expressed as mean ± SD. **p < 0.05 considered statistically significant.**

Table2:- Comparison of Max VO_2 (ml/kg/min) and MET Score between Obese and Non-Obese Groups.

Parameter	Group	N	Mean	Std. Deviation	Std. Error Mean	P Value
Max VO₂ (ml/kg/min)	Obese	45	30.196	4.7359	0.7060	<0.001
	Non-Obese	45	41.363	5.6230	0.8382	
MET Score	Obese	45	8.627	1.3531	0.2017	<0.001
	Non-Obese	45	11.818	1.6066	0.2395	

NOTE:P-values indicate **statistically significant** differences in both Max VO_2 and MET scores between the two groups (p < 0.001).

Table3:- Correlation between BMI and Cardiopulmonary Parameters.

Parameter	Pearson Correlation (r)	Significance (P)
VO₂ Max (ml/kg/min)	-0.815	<0.001 **
MET Score	-0.815	<0.001 **

These results indicate a strong negative correlation between BMI and both VO_2 max and MET scores, suggesting that increased adiposity adversely affects aerobic capacity.

Discussion:-

The study confirms that obesity is associated with diminished cardiopulmonary efficiency [4, 7]. VO_2 max and MET scores, both key indicators of aerobic fitness, were considerably lower in obese participants [5]. These findings align with previous literature suggesting excess adiposity impairs oxygen delivery and energy metabolism [8].This has broader implications for cardiovascular health risks in later life. Given that college years often shape lifelong health habits, interventions during this period are vital [6, 9].

Limitations:-

1. Limited to male students aged 18–25 from a single geographic region.
2. Excludes females and older age groups, limiting generalizability [7].

Future Directions:-

1. Broader studies involving both genders and multiple regions.
2. Longitudinal designs to assess fitness trends over time [9].
3. Integration of structured fitness and dietary programs into college curricula [1, 4].

Conclusion:-

Obesity significantly lowers VO_2 max and MET scores among college students, demonstrating a clear inverse relationship between BMI and cardiopulmonary fitness [5, 6]. These findings underscore the necessity for early preventive measures and policy-level interventions aimed at reducing obesity and promoting physical health in young adults [1, 9].

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