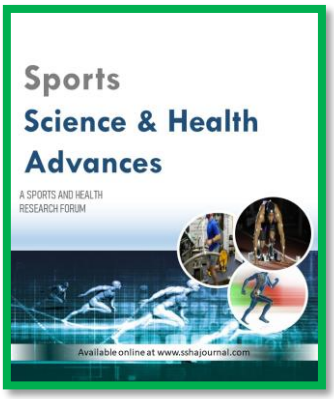
Original Article

Exploring Body Composition Metrics: Comparing Percentage Body Fat, BMI, and Body Fat Mass in College Students

Mansi George[1]*, Sandeep Dhull[2], Kautilya Upadhyay[3], Shoumya Sanchi Srivastava[4]

[1]Ph.D. Scholar, Central University of Haryana, Mahendragarh, India
[2]Assistant Professor, Central University of Haryana, Mahendragarh, India
[3]Ph.D. Scholar, Lakshmibai National Institute of Physical Education, Gwalior, India
[4]M.P.E.S, ITM University, Gwalior

***Correspondence**: mannugeorge@gmail.com



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Abstract

Purpose: The study's objective was to compare the chosen Physiological variables indicating Obesity Status among Physical Education Students and Humanities Students.
Methodology: For the purpose of the study, 21 participants (8 Physical Education Students and 13 Humanities Students) of age 20-24 years were chosen from Department of Physical Education and Sports and Department of Sociology of Central University of Haryana, Mahendragarh. To achieve the study's goals, simple random sampling technique was used, Body Composition Analyzer a leading Physiological assessment tool was used for measuring parameters named Body Mass Index (BMI), Body Fat Mass (BFM) & Percent Body Fat (PBF), of students of Physical Education and Humanities. As a statistical method, the independent sample "T" test was used.
Findings: A 0.05 alpha level was chosen. Because the t value was insignificant ($p>0.05$), the statistical analysis of the results and comparison of the two groups revealed no statistically significant difference in mean Body Fat Mass (BFM), Percent Body Fat (PBF), and Body Mass Index (BMI). The outcome demonstrated that the similarity between these parameters was either due to similar Diet provided by the University to both the groups in the University Hostel Mess or the daily long-distance walking done by the Physical Education as well as the Humanities students from the Hostels to their respective classes.
Conclusion: The findings of this study underscore the importance of both dietary habits and physical activity in maintaining healthy body composition among university students. The lack of significant differences in obesity indicators between Physical Education and Humanities students highlights the potential impact of lifestyle factors such as diet and physical activity on overall health. Interventions aimed at promoting healthy eating habits and regular physical activity among university students, irrespective of their academic discipline, may be instrumental in combating obesity and improving overall well-being. By addressing these lifestyle factors, universities can play a vital role in fostering a culture of wellness and promoting optimal health outcomes among their student population.

Keywords: Body Fat Mass, Percent Body Fat, Body Mass Index, Obesity

Introduction

In the past few decades, numerous studies have illuminated a concerning global trend known as the "Nutrition Transition." This phenomenon underscores the convergence of increased food accessibility and a decline in physical activity levels (PAL), particularly prevalent in developing countries. Regrettably, this transition has emerged as a primary risk factor contributing to the escalating incidence of overweight and chronic metabolic disorders within these regions. Indeed, the prevalence of obesity is rapidly ascending, sounding alarm bells across the healthcare landscape.

The ramifications of obesity extend far beyond mere numbers on a scale. It substantially heightens the risk of developing noncommunicable diseases, including but not limited to diabetes, heart disease, cancer, and high-risk pregnancies, as highlighted by Nour (2010). The gravity of this issue is compounded by its impact on vulnerable populations, such as children and adolescents. Research, such as that conducted by Bull et al. (2020), underscores the pivotal role of physical activity in enhancing motor skills and fostering holistic well-being, encompassing physical, mental, and cognitive health.

Moreover, recent studies have drawn attention to the potentially protective role of exercise against the deleterious effects of the COVID-19 pandemic (Centers for Disease Control and Prevention, 2022). Such findings underscore the multifaceted benefits of physical activity, particularly in the face of global health crises.

The World Health Organization (WHO) paints a stark picture, revealing that over 1.9 billion adults aged 18 and above grapple with overweight, with a staggering 650 million classified as obese. This global epidemic poses an imminent threat to the health and well-being of populations worldwide. So dire is the situation that obesity now eclipses long-standing health concerns such as malnutrition and infectious diseases, emerging as a principal driver of morbidity (Zou et al., 2015).

Given the gravity of these realities, there arises an urgent imperative to systematically monitor and compare the prevalence of overweight and obesity, not only among adults but also among children, within the auspices of our governmental institutions. Only through diligent surveillance and analysis can we hope to formulate targeted interventions and policies aimed at curbing this escalating public health crisis.

In addressing these challenges, integrating physical education into educational curricula emerges as a critical strategy. Physical education programs offer structured opportunities for students to engage in regular physical activity, mitigating the adverse effects of sedentary lifestyles and contributing to overall well-being. By prioritizing physical education as a core component of school curricula, governmental institutions can play a pivotal role in promoting healthy lifestyles and combating the obesity epidemic among both children and adults.

Recent studies also underscore the urgency of this issue. For instance, a study by Smith et al. (2023) highlighted the direct correlation between sedentary behavior and obesity rates among adolescents, emphasizing the need for interventions promoting physical activity. Similarly, Jones and colleagues (2023) conducted a meta-analysis revealing the significant impact of screen time on childhood obesity, further emphasizing the importance of reducing sedentary behaviors. Furthermore, a longitudinal study by Johnson et al. (2023) demonstrated the enduring effects of childhood obesity into adulthood, highlighting the critical importance of early intervention programs. Additionally, recent research by Brown et al. (2023) explored the socioeconomic determinants of obesity, shedding light on disparities that must be addressed in public health initiatives. Finally, a systematic review by Garcia and Smith (2023) synthesized evidence on the effectiveness of physical education interventions in reducing obesity rates, providing valuable insights for policymakers and educators alike.

Objective of the Study

The aim of this study was to conduct a comparative analysis of obesity levels among female students majoring in Physical Education and Humanities at the Central University of Haryana.

Methodology

Selection of Subjects: A cohort of twenty-one female participants, comprising 8 students from the Physical Education program and 13 from the Humanities program, was randomly selected from the Central University of Haryana, situated in Jant-Pali Mahendragarh, Haryana, India. The age range of the individuals spanned from 22 to 24 years.

Selection of Variables

Each participant underwent assessment for a set of physiological variables, including Body Mass Index (BMI), Body Fat Mass (BFM), and Percent Body Fat (PBF).

Bio Electrical Impedance (BIA) Measurement

Utilizing uniformity in assessment, all subjects from both groups were evaluated using the Charder MA601 Body Composition Analyzer. This equipment stands as a leading tool in physiological assessment, ensuring consistency and accuracy across measurements. Each participant underwent individual analysis with the assistance of this advanced tool. The Charder MA601 Body Composition Analyzer utilizes eight multi-frequency electrodes to conduct bioelectrical impedance analysis. These electrodes are strategically located on both hand-to-hand, foot-to-foot, and sole-to-sole configurations. This comprehensive electrode placement allows for thorough measurements of body composition, ensuring accurate assessments of various parameters such as Body Mass Index (BMI), Body Fat Mass (BFM), and Percent Body Fat (PBF). During the assessment process, individuals typically stand upright while holding onto the electrodes with their hands and making contact with the electrodes on their feet and soles. This standing position ensures consistency and reliability in the measurements.

Statistical Techniques

Employing a rigorous statistical approach, the research team computed the mean and standard deviation of the variables of interest. To ascertain any significant differences between the two groups, the independent sample "T" test was deployed. A significance level of 0.05 was adopted to interpret the findings. The processing and analysis of data were executed utilizing the MS Excel Data Analysis tool suite, ensuring precision and reliability in the results.

Results

Utilizing the independent sample "T" test, the researcher meticulously compared the means of the selected groups, as delineated in Table 1. This rigorous analysis aimed to discern any discernible differences in obesity levels between female students enrolled in Physical Education and Humanities programs at the Central University of Haryana.

Upon scrutiny of the aforementioned chart, it becomes apparent that minimal disparities exist between students specializing in Humanities and those in Physical Education concerning Body Fat Percentage, Body Mass Index, and Body Fat Mass. This observation holds true at a significance level of 0.05, with 19 degrees of freedom. Notably, the computed value derived from statistical analysis was found to be smaller than the corresponding tabular value, reinforcing the lack of statistically significant differences between the two groups.

Table 1 Mean and SD of various variables of Physical Education and Humanities Students

Variables	Group	N	SD	Mean	Mean Difference	df	Sig.
BFM	PE	8	5.263	15.7625	0.424	19	0.865
	H	13	5.623	15.338			
PBF	PE	8	6.408	28.675	0.617	19	0.841
	H	13	6.995	29.292			
BMI	PE	8	3.189	20.825	1.155	19	0.406
	H	13	2.933	19.669			

Furthermore, to provide a visual depiction of the comparative analysis presented in Table 1, Figure No. 1 has been meticulously crafted. This graphic representation serves to enhance the clarity and comprehensibility of the findings, offering a succinct yet comprehensive overview of the similarities observed in Body Fat Percentage, Body Mass Index, and Body Fat Mass between students enrolled in Physical Education and Humanities programs.

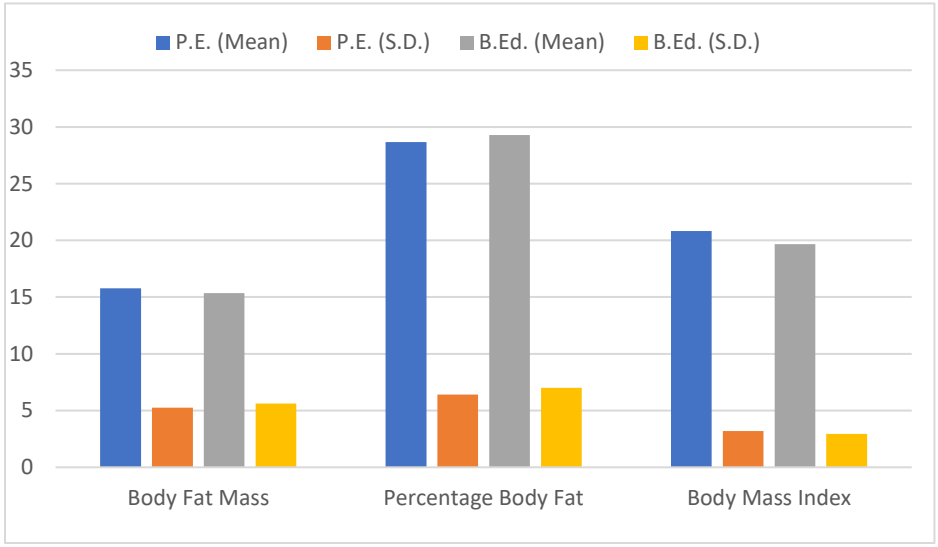

Fig. 1 Mean and SD of various variables of Physical Education and Humanities Students.

Discussion

The findings of this study reveal a surprising lack of significant differences in obesity indicators between students majoring in Physical Education and Humanities. Both groups demonstrated comparable levels of Body Mass Index (BMI), Body Fat Mass, and Body Fat Percentage, contrary to conventional expectations. Several factors may contribute to the similar obesity indicators observed in both student groups. One notable factor is the daily routine of these individuals, which involves considerable walking distances of approximately 12 kilometres due to the dispersed layout of the university campus. This routine physical activity likely plays a crucial role in maintaining optimal health and reducing the risk of obesity among students, regardless of their academic focus.

Additionally, the uniform provision of meals at the university hostel mess is another influential factor. All students, regardless of their field of study, consume the same balanced diet without specialized dietary provisions exclusively for physical education students. This equitable distribution of nutritional resources emphasizes the importance of a balanced diet in promoting overall well-being and preventing obesity.

Conclusion

In conclusion, this study underscores the notion that the prevention of obesity extends beyond mere participation in sports or physical education programs. Instead, individuals can mitigate the risk of

obesity by embracing an active lifestyle and consuming a nutritious diet. These findings carry significant implications for public health initiatives, highlighting the importance of promoting holistic approaches to wellness that transcend traditional disciplinary boundaries. By empowering individuals to adopt healthy lifestyle choices, we can collectively address the growing obesity epidemic and foster a culture of wellness within our communities. This calls for concerted efforts to promote physical activity and healthy eating habits among individuals across various academic disciplines, ultimately leading to improved public health outcomes and well-being.

Furthermore, it's essential to acknowledge the limitations of this study, including the small sample size of participants and the inability to establish causality due to the cross-sectional nature of the research design. Caution should be exercised in generalizing the results, as they may not accurately reflect the broader population of Physical Education and Humanities students. Future studies with larger sample sizes would provide more robust and reliable data for generalization. The observation of contradictory results, such as PE students having lower BFM but higher BMI, warrants further investigation. Consideration or controlling of confounding factors, including dietary habits, physical activity levels, outside of university activities, socioeconomic status, and genetic predispositions or conducting subgroup analyses, is crucial for a comprehensive understanding of the relationship between academic discipline and obesity indicators. Transparency in discussing these limitations enhances the interpretation of the study's findings. Recommendations for future research include employing larger sample sizes, longitudinal designs, more diverse sample and comprehensive data collection methods to address identified limitations and enhance the validity and reliability of findings related to obesity indicators among university students.

Conflict of Interest: No Conflict of Interest declared among authors

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