

CARDIO RESPIRATORY EFFICIENCY OF AGRICULTURE STUDENTS IN RELATION TO THEIR BODY MASS INDEX

Bahadur Singh,

PhD Scholar, Department of Physical Education

Sri Guru Granth Sahib World University, Fatehgarh Sahib, Punjab, India

Abstract

The purpose of this study to find out the difference in cardio respiratory efficiency among undergraduate agriculture students on the basis of their Body Mass Index (BMI). Forty female undergraduate agriculture students were selected for this study by purposive sampling technique from Punjab Agriculture University, Ludhiana. The age of the subjects was ranged between 18 to 22 years. Selected variable of cardio respiratory efficiency and Body Mass Index (BMI) were measured by 12 mints run/walk test developed by Cooper (1968) and with Quetelet index (Adolphe Quetelet, 1830) respectively. As per the objective of the study, Descriptive statistics and comparative statistics (ANOVA) was employed by 'SPSS Version-23'. The results showed that there was an insignificant difference between undergraduate agriculture students of Punjab Agriculture University in their cardio respiratory efficiency on the basis of their Body Mass Index (BMI).

Index Terms: Physiology, Cardio Respiratory Efficiency, Body Mass Index.

INTRODUCTION

Recent inactive life style and defective food habits are leading to development of early life obesity (Norman et al., 2005). People are disposed to develop cardiovascular diseases and other long-lasting diseases at young age of their life because of early life obesity (Krauss et al, 1998). The journey from early life obesity to cardiovascular disease will be evident by slow regression of their cardiorespiratory efficiency. Cardiorespiratory efficiency denotes to the capacity of the circulatory and respiratory system to supply oxygen to skeletal muscles during sustained physical activity. VO₂max is the maximum capacity to transport and utilize oxygen during incremental exercise. It is also known as aerobic capacity, which reflects physical fitness of a person. As VO₂max is an accepted measure of cardiorespiratory efficiency (Andersen et al, 1971; Astrand et al, 2003; Shephard et al, 1966 & Banerjee et al, 1982), it is used in this study to estimate the same. This study is designed to evaluate cardio respiratory fitness in terms of VO₂max and its relation with body mass index in young healthy male subjects. This will alert them at proper time to take necessary action and will also help to plan the type of exercise suitable for their health need.

AIM OF STUDY

The aim of the present study was to find out the difference in cardio respiratory efficiency between undergraduate agriculture students on the basis of their Body Mass Index (BMI). It was hypothesized that there will be no significant difference in cardio respiratory efficiency between undergraduate female agriculture students of Punjab on the basis of their Body Mass Index (BMI).

MATERIAL AND METHODS

Forty undergraduate agricultures (10 under-weight, + 10 normal-weight + 10 over-weight + 10 obese) were selected for this study by purposive sampling technique from Punjab Agriculture University, Ludhiana. The age of the subjects was ranged between 18-22 years. They were classified as underweight (Below 18.5), normal weight(18.5 -24.9), over- weight (25 - 29.9) and obese (30 & above) according to classification based on Body Mass Index (BMI) (Center for Disease Control and Prevention, USA). Selected physiological variables of cardiorespiratory efficiency and Body Mass Index (BMI) were measured by 12 mints run/walk test developed by Cooper (1968) and with Quetelet index (Adolphe Quetelet, 1830) respectively.

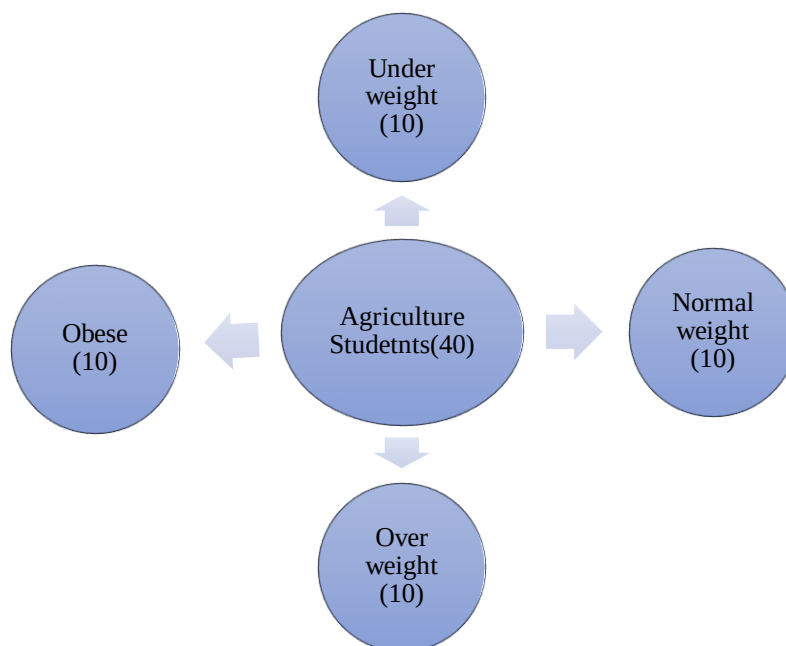


FIG.-I DESCRIPTION OF SUBJECTS

PROCEDURE

All the participants were informed in details about research protocol and the basic characteristics of the study. No special motivation technique was used to motivate the students before data collection. All the participants executed the same protocol under the same circumstances and were guided by researcher.

Statistical Technique

Descriptive statistics i.e., mean and standard deviation were calculated. As per objective of the study, one-way analysis of variance (ANOVA) was applied to find out the difference between various groups. All tests were employed with the help of SPSS-software version 23. Level of significance was set at 0.05.

RESULTS

TABLE-1
DESCRIPTIVE STATISTICS MEAN, SD AND F- VALUES OF CARDIO-RESPIRATORY VARIBALE

Group Name	Mean	SD	f-Value
Under Weight	1460.5	210.61	.369
Normal Weight	1376.5	304.59	
Over Weight	1339.5	106.83	
Obese	1299.7	158.34	

SD = Standard Deviation

*Significant at 0.05 level

Table no. 1 shows the mean and standard deviation of for cardio-respiratory variable for underweight, normal weight, over- weight and obese groups are 1460.5 ± 210.61 , 1376.5 ± 304.59 , 1339.5 ± 106.83 and

1299.7 ± 158.34 respectively. It also shows that p-value ($p = .369$) is more than 0.05 which means that there exists an insignificant difference between underweight, normal weight, over- weight and obese female

undergraduate agriculture students in case of cardio-respiratory variable.

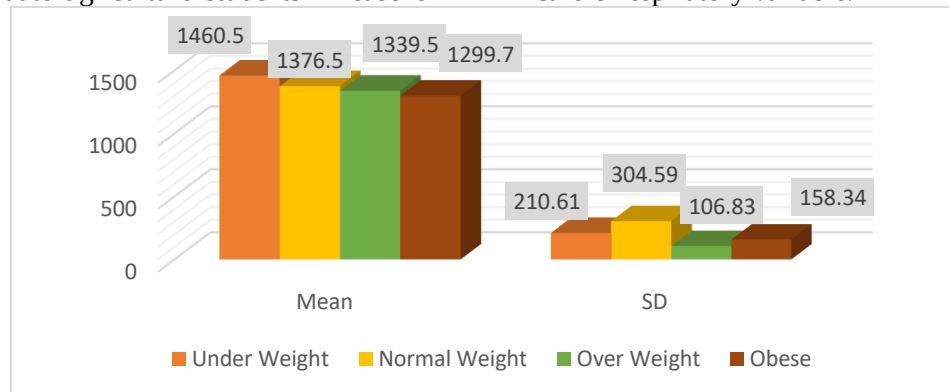


FIG. II GRAPHICAL REPRESENTATION OF DESCRIPTIVE STATISTICS FOR CARDIORESPIRATORY EFFICIENCY

DISCUSSION

In the present study, the assumption was that there will be no significant difference in cardio respiratory efficiency among undergraduate agriculture students on the basis of their Body Mass Index (BMI). The result showed that there was an insignificant difference between underweight, normal weight, over- weight and obese female agriculture students in case of cardio respiratory efficiency. The findings of the study are supported by the study conducted by Barry et al. (2018) who found that there was insignificant difference in cardio respiratory efficiency between firefighters of two different fire departments of Midwest .

Conclusion

The present study concluded that female agriculture students do not differ in case of

cardio respiratory efficiency on the basis of their BMI .

Conflict of interest

The authors declare no potential conflicts of interest with respect to research, authorship and/or publication of this article.

Acknowledgement

The authors want to acknowledge all participants who participated in this study and their teachers who gave permission for data collection.

Copyright and Permission Statement

We confirm that the materials included in this chapter do not violate copyright laws. Where relevant, appropriate permissions have been obtained from the original copyright holder(s). All original sources have been appropriately acknowledged and/or referenced.

REFERENCES

1. *All About Adult BMI*. (2022, June 3). Centers for Disease Control and Prevention. https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html
2. Andersen, K. L., Shephard, R. J., Denolin, H., Varnauskas, E., & Masironi, R. (1971). *Fundamentals of exercise testing*. World Health Organization.
3. Astrand, P. O., Rodahl, H., Dahl, H., & Strömme, S. B. (2003a). *Textbook of Work Physiology: Physiological Bases of Exercise*. Human Kinetics.
4. Banerjee, P., Chatterjee, S., Chatterjee, P. K., & Maitra, S. (1982). Maximal Oxygen Uptake in Boys. *Indian Journal of Medical Research*, 75, 380–386.
5. Barry, A. M., Dicks, N. D., Landin, K. D., Walch, T. J., Hackney, K. J., & Lyman, K. J. (2018). The Relationship Between Firefighters' Physical Activity Levels and Cardiorespiratory Fitness. *Medicine & Science in Sports & Exercise*, 50(5S), 499–500. <https://doi.org/10.1249/01.mss.0000536724.74807.df>
6. Cooper, K. H. (1968). A Means of Assessing Maximal Oxygen Intake. *JAMA*, 203(3), 201. <https://doi.org/10.1001/jama.1968.03140030033008>.
7. Eknoyan, G. (2007). Adolphe Quetelet (1796 1874) The Average Man and Indices of Obesity. *Nephrology Dialysis Transplantation*, 23(1), 47–51. <https://doi.org/10.1093/ndt/gfm517>
8. Heiberger, R. M., & Neuwirth, E. (2009). One-Way ANOVA. *R Through Excel*, 165–191. https://doi.org/10.1007/978-1-4419-0052-4_7.
9. Krauss, R. M., Winston, M., Fletcher, B. J., & Grundy, S. M. (1998). Obesity. *Circulation*, 98(14), 1472–1476. <https://doi.org/10.1161/01.cir.98.14.1472>
10. Norman, A. C., Drinkard, B., McDuffie, J. R., Ghorbani, S., Yanoff, L. B., & Yanovski, J. A. (2005). Influence of Excess Adiposity on Exercise Fitness and Performance in Overweight Children and Adolescents. *Pediatrics*, 115(6), e690–e696. <https://doi.org/10.1542/peds.2004-1543>
11. Shephard, R. J. (1966). World Standards of Cardiorespiratory Performance. *Archives of Environmental Health: An International Journal*, 13(5), 664–672. <https://doi.org/10.1080/00039896.1966.10664637>
12. Jaafaru Sani Mohammed, Abdulrahman T Ahmed, Mandeep Singh, Malathi Hanumanthayya, Syeda Wajida Kazmi, Mamata Chahar, Hussein Riyadh Abdul Kareem Al-Hetty, Hanan Mahmod Hulail, Mohammed Qasim Alasheqi, Ahmed Hussein Zwamel, Evaluating the role of bromelain in diabetes management: a systematic review of research evidence and mechanisms of action, *Journal of Pharmacy and Pharmacology*, Volume 77, Issue 7, July 2025, Pages 884–896, <https://doi.org/10.1093/jpp/rgaf021>
- 13.
14. Abdalkareem Jasim S, Singh M, Al-Dhalimy AMB, Zwamel AH, Jawad IA, Shalaby NS. The Impact of Chronic Exercise on Cognitive Function: An Overview of Reviews. *Iran J Psychiatry*. 2024;19(4):463-472. <https://ijps.tums.ac.ir/index.php/ijps/article/view/3895>
15. Alameri AA, Ghanni MU, Ali A, Singh M, Al-Gazally ME, Almulla AF, Alexis Ramírez-Coronel A, Mustafa YF, Gupta R, Obaid RF, Gabr GA, Farhood B. The Effects of Curcumin on Astrocytes in Common Neurodegenerative Conditions. *Mini Rev Med Chem*. 2023;23(22):2117-2129. doi: 10.2174/1389557523666230502143131. PMID: 37132107.
16. Alameri AA, Ghanni MU, Ali A, Singh M, Al-Gazally ME, Almulla AF, Alexis Ramírez-Coronel A, Mustafa YF, Gupta R, Obaid RF, Gabr GA, Farhood B. The Effects of Curcumin on Astrocytes in Common Neurodegenerative Conditions. *Mini Rev Med Chem*. 2023;23(22):2117-2129. doi: 10.2174/1389557523666230502143131. PMID: 37132107. <https://pubmed.ncbi.nlm.nih.gov/37132107/>
17. Jaafaru Sani Mohammed, Abdulrahman T Ahmed, Mandeep Singh, Malathi Hanumanthayya, Syeda Wajida Kazmi, Mamata Chahar, Hussein Riyadh Abdul Kareem Al-Hetty, Hanan Mahmod Hulail, Mohammed Qasim Alasheqi, Ahmed Hussein Zwamel, Evaluating the role of bromelain in diabetes management: a systematic review of research evidence and mechanisms

- of action, Journal of Pharmacy and Pharmacology, Volume 77, Issue 7, July 2025, Pages 884–896, <https://doi.org/10.1093/jpp/rgaf021>
18. Mandeep Singh Nathial, Analysis of set shot in basketball in relation with time to perform the course and displacement of center of gravity, American Journal of Sports Science, Vol.2 Issue.5 pp: 122-126 (2014). Retrieved from <https://www.sciencepublishinggroup.com/journal/paperinfo.aspx?journalid=155&doi=10.11648/j.ajss.20140205.13>
 19. Alameri AA, Ghanni MU, Ali A, Singh M, Al-Gazally ME, Almulla AF, Alexis Ramírez-Coronel A, Mustafa YF, Gupta R, Obaid RF, Gabr GA, Farhood B. The Effects of Curcumin on Astrocytes in Common Neurodegenerative Conditions. Mini Rev Med Chem. 2023;23(22):2117-2129. doi: 10.2174/1389557523666230502143131. PMID: 37132107.
 20. Singh, M., Kadhim, M.M., Turki Jalil, A. et al. A systematic review of the protective effects of silymarin/silibinin against doxorubicin-induced cardiotoxicity. Cancer Cell Int 23, 88 (2023). <https://doi.org/10.1186/s12935-023-02936-4>
<https://cancerjournal.biomedcentral.com/articles/10.1186/s12935-023-02936-4>
 21. Singh, M., Kour, R., & Kour, A., A collaborative diversified investigation of respective responses of sports person coaches and organizations on criminalization of doping. International Journal of Health Sciences, 6(S3), 11295–11310. <https://doi.org/10.53730/ijhs.v6nS3.8641>
 22. Singh, A., & Singh, D. M. (2013). PROMOTION OF RESEARCH CULTURE – ENHANCING QUALITY IN HIGHER EDUCATION. International Journal of Behavioral Social and Movement Sciences, 2(2), 202–208. Retrieved from <https://ijobsms.org/index.php/ijobsms/article/view/152>
 23. SINGH, M., & SINGH SIDHU, A. (2016). A COMPARATIVE STUDY OF BODY COMPOSITION AND RELATIVE HEALTH STATUS AMONG RESIDENT AND NON-RESIDENT STUDENTS IN DIFFERENT SCHOOLS OF J&K. International Journal of Behavioral Social and Movement Sciences, 5(3), 08–13. Retrieved from <https://ijobsms.org/index.php/ijobsms/article/view/320>
 24. Singh Nathial, D. M. (2012). ANALYZING THE CREDIT BASED SYSTEM IN PHYSICAL EDUCATION. International Journal of Behavioral Social and Movement Sciences, 1(3), 172–176. Retrieved from <https://ijobsms.org/index.php/ijobsms/article/view/37>
 25. SHARMA, N. P., & SINGH, M. (2014). SENIOR AGE GROUP RELATIVE EXERCISES AND IMPACT ON THEIR LIFESTYLE. International Journal of Behavioral Social and Movement Sciences, 3(04), 78–82. Retrieved from <https://ijobsms.org/index.php/ijobsms/article/view/246>
 26. CHAND PURI, P., MISHRA, P., JHAJHARIA, B., & SINGH, M. (2014). COORDINATIVE ABILITIES OF VOLLEYBALL IN DIFFERENT AGE GROUPS: A COMPARATIVE STUDY. International Journal of Behavioral Social and Movement Sciences, 3(3), 56–68. Retrieved from <https://ijobsms.org/index.php/ijobsms/article/view/228>
 27. Yasmin Basheer Ahmed, Saade Abdalkareem Jasim, Yasser Fakri Mustafa, Beneen Hussein, Thoraya Mahbas Diwan, Mandeep Singh, The effects of propolis supplementation on lipid profiles in adults with metabolic syndrome and related disorders: A systematic review and meta-analysis of randomized controlled trials, Human Nutrition & Metabolism, Volume 37, 2024, 200276, ISSN 26661497, <https://doi.org/10.1016/j.hnm.2024.200276>. (<https://www.sciencedirect.com/science/article/pii/S266614972400038>)