AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.15 (2), May-August, 2025 https://ajemates.org

A COMPARATIVE ANALYSIS OF SELECTED CARDIOVASCULAR FUNCTIONAL CAPACITY OF VOLLEYBALL PLAYERS AND NON- ATHLETES IN NNAMDI AZIKIWE UNIVERSITY. AWKA

Okafor, Ngozi C, Emehara, G.O, & Ananomo, L.E. & Uzor, T. N.
Department of Human Kinetics and Sports Science, Nnamdi Azikiwe University, Awka
Email: ngoochy19@gmail.com

ABSTRACT

The focus of this study is to compare a selected cardiovascular functional capacity (CVFC) of volleyball players and Non- athletes in Nnamdi Azikiwe University Awka. Three research questions and three null hypotheses guided the conduct of this the study. A causal comparative research design was used for the study. 30 male students constituted the population of the study. The population were drawn from 15 male university volleyball players and 15 none athletes who volunteered to participate in the study. No sample was used because the population was manageable. The instrument for data collection were VO2 Analyzer, sphygmomanometer with stethoscope, stadiometer and body weighing scale. The researcher did not carry out any validation of the instruments because they are standardized test instruments. Data was analyzed using descriptive and inferential statistics. The t-test, mean and standard deviation were used in the statistical analysis. The findings of this study reveal that athletes had a higher mean oxygen consumption (VO2) rate of than non-athletes. The findings also revealed that athletes had a higher mean systolic blood pressure of than non-athlete. Athletes had a higher mean diastolic blood pressure of than non-athletes among others. The study concluded and recommend that both youths and adults should engage in regular physical activities or exercise for healthy living. Active participation in sports can prevent obesity and keep the body in good functioning.

Keywords: Cardiovascular functional capacity, Volleyball players, Non-athletes, University.

Introduction

Cardiovascular functional capacity often referred to as cardiorespiratory fitness (CRF), is a key indicator of overall cardiovascular health and physical fitness (American Heart Association {AHA} 2013). It reflects the ability of the cardiovascular and respiratory systems to deliver oxygen to working muscles during prolonged exercise and the body's capacity to utilize that oxygen efficiently. The assessment of functional capacity reflects the ability to perform activities of daily living that require sustained aerobic metabolism without undue fatigue. The integrated efforts and health of the pulmonary, cardiovascular, and skeletal muscle systems dictate an individual's functional capacity. Physical functional capacity of a body is largely determined by capabilities of cardiovascular system

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.15 (2), May-August, 2025 https://ajemates.org

functional state, of which affects all types of individual's activities. Maximal oxygen consumption ($VO_{2\ max}$) reflects the ability of the lungs, blood, heart, muscles and organ systems to transport and utilize O_2 via the aerobic metabolic pathways. $VO_{2\ max}$ is considered the best measure of cardiorespiratory fitness (American Heart Association, 2016).

Systolic (SBP) and diastolic blood pressure (DBP) which are another variable for measuring cardiovascular functional capacity is the top number in blood pressure reading, representing the pressure in your arteries when your heart beats and pumps blood out. A healthy systolic blood pressure is generally considered to be less than 120mm Hg and diastolic 80mm Hg. Hypertension is currently defined as systolic blood pressure greater than or equal to 130 mm Hg or diastolic blood pressure greater than or equal to 80 mm Hg (American Heart Association and American Heart Association Guidelines, 2017).

Volleyball is a popular game requiring power, agility and high speed. It is a high skill game requiring adequate levels of physical fitness since the competitive load involves substantial energy expenditure. A high level of maximal oxygen uptake is critical for achievement of high physical body capacity. The amount of oxygen that an athlete requires depends on athlete's level and exercise intensity. Trained individuals have better exercise economy and more efficient oxygen use. By engaging in regular sports or exercise, maintaining a balanced diet, and adopting healthy lifestyle habits, individuals can enhance their cardiovascular functional capacity and physical fitness and enjoy a higher quality of life and performance.

According to Uzor and Ujuagu (2020) exercise such as plyometrics may demonstrate cardiovascular strong influence on health in young student athletes which are capable of antagonizing the sympathetic effects on the heart and blood vessels independently decrease the blood pressure reducing the risk of cardiovascular diseases such as hypertension. Therefore, the present study was undertaken to compare a selected cardiovascular functional capacity of volleyball players and non- athletes in Nnamdi Azikiwe University Awka., since it has not been well established

Objective of the Study

To compare a selected cardiovascular functional capacity (CVFC) of volleyball players and non- athletes in Nnamdi Azikiwe University Awka.

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

1. There is no significant difference between oxygen consumption VO_2 rate.
2. There is no significant difference between the systolic blood pressure.
3. There is no significant difference between the diastolic blood pressure.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.15 (2), May-August, 2025 https://ajemates.org

Methods and Materials

The design of the study is a causal comparative research design. The study was carried out in Nnamdi Azikiwe University, Awka, Anambra State. 30 male students constituted the population of the study, comprising 15 male volleyball athletes and 15 male non- athletes which were purposely selected by the researcher. The researcher used 30 samples because the registered male volleyball athletes in the Awka University is 15, so she also decided to use 15 non-athletes too.

Participants

30 male students aged 18-30 years constituted the population of the study. The population were drawn from 15 male university volleyball players and 15 none athletes who volunteered to participate in the study. No sample was used because the population was manageable. Athletes were verbally told of the study's guidelines at the outset, and their fitness agreement was sought before they could take part in it.

Instruments

The instrument for data collection in this study included:

VO2 Analyzer, sphygmomanometer with stethoscope, stadiometer and body weighing scale. The instruments are standardized test instruments and have been validated and supported by the American Heart Foundation-AHA, Canadian Cardiovascular Society Guidelines, and American Medical Association in 2023. Also has been tested and approved reliable by world health organization (WHO), international organization for standardization (ISO) and others agencies. Researcher also tested the instruments several times to ensure accuracy and was confirmed reliable before using it for the research.

Sphygmomanometer with stethoscope was used to determine systolic and diastolic blood pressure. Standard Stadiometer was used to measure the participants' height. The height scale is calibrated in centimeters from 60 to 200 cm. The Calibrated Bathroom Weighing Scale was used to determine the total body weight of the participants. The weighing scale's calibration ranges from 0 to 180 kg in kilogrammes. Brian mac vo_2 Analyzer was used to determine the participants' maximal oxygen consumption (VO_{2max}) using the weight, height, physical activity rating and perceived functional ability rating.

Procedure

At arrival of the participants, the researcher took measurement of their height and weight measurements using the above-mentioned instruments in the following procedures; the individual standing upright with shoes, the body height was measured with an accuracy of 1 cm. As the participants were instructed to remove any heavy objects (like phone wrist watch shoes etc) from their body, they were lightly clothed as the body weight was measured to the nearest 0.1kg. The researcher told them to rest for 10min after that their systolic and diastolic blood pressure reading was taken. The researcher divided the 15 male volleyball players into two groups and told each group to do a 10mins warm-up

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.15 (2), May-August, 2025 https://ajemates.org

exercise and volleyball play for 10mins, after that their systolic and diastolic blood pressure reading was taken again. This was also repeated for non-athletes.

Procedure for data analysis

Data was analyzed using descriptive and inferential statistics. Research questions were analyzed using mean and standard deviation. The mean was used to determine the average scores/response. Standard deviation results were used to establish the homogeneity and heterogeneity of the scores. Hypothesis were analyzed at 0.05 alpha level using t-test for independent sample. The probability alpha level for rejecting or not rejecting the null hypotheses was 0.05 level of significance. Where the calculated value (sig-value) is equal or greater than the p-value (0.05), the null hypothesis is not rejected, but where the calculated value (sig. value) is less than the p-(0.05) the null hypothesis is rejected. The analysis was carried out using the Statistical Package for Social Sciences (SPSS) version 26.

Results

Summaries of the hypothesis testing were presented in tables to highlight the findings.

Hypothesis 1: There is no significant difference between oxygen consumption VO_2 rate.

Table 1: *t-test summary on the significant difference between oxygen consumption VO_2 rate. N=30*

Variable (Volleyball Players)	N	Mean	SD	Df	Sig. value	p-value	Decision
Athletes	15	69.01	3.45	28	0.00	0.05	Significant
Non-Athletes	15	57.65	3.40				

Data presented in Table 1 shows that from the analysis, the significant value is less than the p-value (0.00 < 0.05), hence the null hypotheses is rejected. This implies that there is a significant difference between oxygen consumption VO_2 rate.

Hypothesis 2: There is no significant difference between the systolic blood pressure.

Table 2: *t-test summary on the significant difference between the systolic blood pressure. N=30*

Variable (Volleyball Players)	N	Mean	SD	Df	Sig. value	p-value	Decision
Athletes	15	128.46	8.70	28	0.16	0.05	Not significant
Non-Athletes	15	124.06	7.97				

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.15 (2), May-August, 2025 https://ajemates.org

Results shown in Table 2 reveals that from the analysis, the significant value is greater than the p-value (0.16 > 0.05), hence the null hypotheses is not rejected. This implies that there is no significant difference between the systolic blood pressure.

Hypothesis 3: There is no significant difference between the diastolic blood pressure.

Table 3: *t-test summary on the significant difference between the diastolic blood pressure. N=30*

Variable (Volleyball Players)	N	Mean	SD	Df	Sig. value	p-value	Decision
Athletes	15	83.53	8.91	28	0.16	0.05	Not significant
Non-Athletes	15	78.20	11.21				

Data presented in Table 3 shows that from the analysis, the significant value is greater than the p-value (0.16 > 0.05), hence the null hypotheses is not rejected. This implies that there is no significant difference between the diastolic blood pressure

Discussion

The findings of this study reveal that Athletes had a higher mean Oxygen consumption (VO_2) rate of 69.01 than non-athletes in Nnamdi Azikiwe University, Awka. This finding conforms with Junior, Souza, Magini and Martins (2018), who found that even practicing sports with different characteristics, the athletes from both groups have similar indices of oxygen consumption. Nevertheless, the anaerobic threshold between the two groups did not present the same similarity, suggesting higher predominance of anaerobic metabolism during exercise in the indoor soccer athletes. The finding further agrees with Astorino, Willey, Kinnahan, Larsson, Welch and Dalleck (2018) who found that thirty subjects (mean (SD) age and VO_{2max} 26.9 (9.8) years and 3.4 (0.8) litre/min respectively) were separated into three groups: endurance trained (ET; n = 9), recreationally active (Rec; n = 11), and strength/sprint trained (STR; n = 10). During three separate visits, subjects completed incremental treadmill exercise during which breath by breath gas exchange data were obtained. Body composition was measured using a three site skinfolds model. Force production of the knee extensors and flexors was assessed using isokinetic dynamometry. VO_{2max} was significantly higher (p,0.05) in the ET group vs STR and Rec. The change in VO_2 ($DV^{\cdot}O_2$) at VO_{2max} was not different (p.0.05) in the ET group (33.0 (27.3) ml/min) compared with the Rec group (30.3 (24.1) ml/min) and the STR group (44.4 (23.8) ml/min). No correlations (p.0.05) were evident between $DV^{\cdot}O_2$ at VO_{2max} and VO_{2max} (r = 0.05), fat-free mass (r = 0.12), and muscular strength (r = 20.12). The incidence of a plateau in VO2 at VO_{2max} (correlation data) is not due to factors related to training status or physical

fitness of subjects, but is altered by analysis and interpretation of gas exchange data.

The corresponding null hypothesis reports a significant difference between oxygen consumption VO_2 rate of volleyball players and Non- athletes in Nnamdi Azikiwe University, Awka. This aligns with the findings of Jorgić, Puletić, Okičić and Meškovska (2021) who found that adaptations to training that increase maximum oxygen consumption can be divided into two groups; the first group increases the amount of oxygen that is supplied to the muscles, while the other increases oxygen utilization by the muscles.

The findings of this study found that athletes had a higher mean systolic blood pressure of 128.46 than non-athletes in Nnamdi Azikiwe University, Awka. On the other hand, Athletes had a higher mean diastolic blood pressure of 83.53 than non-athletes. This conforms with the finding of Caselli (2017) who found that multivariate logistic regression analysis showed that family hypertension history (odds ratio 2.05; 95% confidence interval 1.21 to 3.49; p [0.008) and body mass index (odds ratio 1.32; 95% confidence interval 1.23 to 1.40; p <0.001) were the strongest predictors of hypertension. Therapeutic intervention included successful lifestyle modification in 57 and required additional pharmacologic treatment in 3 with essential hypertension. Secondary hypertension was treated according to the underlying disorder. After a mean follow-up of 18 – 6 months, all hypertensive athletes had achieved and maintained optimal control of the blood pressure, without restriction to sport participation. In conclusion, the prevalence of hypertension in athletes is low (3%) and largely related to family history and overweight.

The hypothesis found that there is no significant difference between the systolic and diastolic blood pressure of volleyball players and non-athletes in Nnamdi Azikiwe University. This study corroborates with the findings of Carlén, Eklund, Andersson, Carlhäll, Ekström and Hedman (2022), which found that the maximum SBP (SBP max) and the SBP/W slope were compared to the predicted values. In total, 27 athletes (59% men) were included; mean age, 40 ± 10 years; mean VO_{2max}, 50 ± 5 mL/kg/min. The mean SBP/VO2 slope was 29.8 ± 10.2 mm Hg/L/min, and the mean SBP/W slope was 0.27 ± 0.08 mm Hg/W. Compared to the predicted normative values, athletes had, on average, a 12.2 ± 17.6 mm Hg higher SBP max and a 0.12 ± 0.08 mm Hg/W less steep SBP/W slope ($p < 0.01$ and $p < 0.001$, respectively). In conclusion, the higher SBP max values and the less steep SBP/W slope highlight the importance of considering work rate when interpreting the SBP response in endurance athletes and suggest a need for specific normative values in athletes to help clinicians distinguish physiologically high maximal blood pressure from a pathological blood pressure response.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.15 (2), May-August, 2025 https://ajemates.org

Conclusion

Based on the findings of this study, it was concluded that;

Athletes had a higher mean Oxygen consumption (VO_2), mean systolic blood pressure, and diastolic blood pressure than non-athletes in Nnamdi Azikiwe University, Awka. It was concluded that there is a significant difference between oxygen consumption VO2 rate of volleyball players and non-athletes; there is no significant difference between the systolic blood pressure of volleyball players and non-athletes; also reported that there is no significant difference between the diastolic blood pressure.

REFERENCES

American Heart Association (2013). cardiovascular health and physical fitness. https//www.ahajournals.org/doi/10.1161/01.cir.0000437741.48606.98

American Heart Association (2016). Cardiorespiratory fitness statement. Prog cardiorespiratory dis. Doi: 10.1016/CIR. PMID: 38387825

American College of Cardiology & American Heart Association Guidelines, (2017). Guideline for the prevention, detection, evaluation and management of high blood pressure. A resources for practicing clinicians, PMID: 29357396

Astorino, Willey, Kinnahan, Larsson, Welch and Dalleck (2018). Elucidating determinants of the plateau in oxygen consumption at vo2max. Br j Sports Med.

Carlén, A., Eklund, G., Andersson, A. Carlhäll, C.J., Ekström, M. and Hedman, K. (2022). Systolic Blood Pressure Response to Exercise in Endurance Athletes in Relation to Oxygen Uptake, Work Rate and Normative Values. *Journal of Cardiovascience Developmental Diseases,* 9, 2-10. https://doi.org/10.3390/jcdd9070227.

Caselli, S. (2017). Prevalence and management of systemic hypertension in athletes. *The American Journal of Cardiology*. 1616-1621. http://dx.DOI.org/10.1016/j.amjcard.2017.02.011.

Junior, E.C.P.L., Souza, F.D.B., Magini, M. and Martins, R.A.B.L. (2018). Comparative study of the oxygen consumption and anaerobic threshold in a progressive exertion test in professional soccer and indoor soccer athletes. *Rev Bras Med Esporte*, 12(6), 290-292.

Uzor T. N & Ujuagu, N. A. (2020). Optimizing University athletes' cardiovascular health using lower and upper body plyometric training. The International Journal of Science and Technolege vol. 8 (5 63-70

Uzor, T. N. (2022). A Comparative study of muscular leg speed and power of female Hockey and Basketball players: the Progress. Human Nature Research Publisher. Vol.3 (1) 1-7.