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EFFECT OF AEROBIC DANCE ON BLOOD PRESSURES AMONG OBESE FEMALE STUDENTS IN THE UNIVERSITY OF CALABAR, CROSS RIVER STATE, NIGERIA

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Abstract

The research investigated the impact of aerobic dance on systolic and diastolic blood pressure among obese female students at the University of Calabar, Cross River State, Nigeria. A one-group pre-test/post-test design was employed, and participants aged 19–25 were purposively selected based on their BMI. Specifically, female students with a BMI ranging from 30.0 to 34.9kg/m2, aged 19 to 25, and having blood pressure between 130-139mmHg/80-89mmHg were included. Data collection utilized an automatic digital blood pressure monitor, ensuring all selected participants met the inclusion criteria. These students were assigned to a group-based aerobic dance programme with pre-test values as the baseline. The aerobic dance sessions, lasting 30 to 45 minutes with a cool-down, occurred on alternate days (Mondays, Wednesdays, and Fridays) between 4:30 p.m. and 6:00 p.m. for twelve consecutive weeks. The training intensity ranged from 45-50% of the estimated maximum Heart Rate for the first 4 weeks, increased to 50–55% for weeks 5–8, and further increased to 55–60% from weeks 9-12 of the aerobic dance protocol. Statistical analysis of the collected data, using SPSS version 20 and the independent t-test at a 0.05 alpha level, indicated significant effects of aerobic dance on both systolic (P = 0.000) and diastolic (P = 0.000) blood pressure. The study concluded that a 12-week aerobic dance programme had a noteworthy impact on the systolic and diastolic blood pressure of obese female students at the University of Calabar, Cross River State, Nigeria. Recommendations included encouraging obese female students to engage in regular physical activities, particularly aerobic dance, to mitigate cardiovascular disease risks associated with obesity. Additionally, there was a suggestion for increased awareness and a shift from sedentary lifestyles to an exercise-oriented attitude among obese female students at the University of Calabar.

Key words: Systolic blood pressure, Diastolic blood pressure, Aerobic dance and Obesity.

Introduction

The ideal situation envisions a global health landscape devoid of the heavy burden imposed by non-communicable diseases (NCDs). Physiological risk factors (PRFs) would be minimized, leading to a significant reduction in conditions such as high blood pressure, diabetes, and overweight. Reports from the World Health Organization (WHO)

would highlight a substantial decrease in deaths attributed to PRF-related diseases, fostering global well-being and longevity. In the present, physiological risk factors persist as the primary contributors to the global NCD burden, resulting in a substantial number of deaths worldwide (Remesh&Saroja, 2021). The WHO's 2015 report revealed that an estimated 17.7 million people succumbed to PRF-related diseases, constituting 31% of global deaths (Varrier& Tan, 2019). This prevalence is notably high in low- and middle-income countries, where over three-quarters of cardiovascular disease (CVD) deaths occur (Uygur, Ucok, Genc, Sener, Uygur &Songur, 2016). Over time, various measures have been implemented to address CVD risk factors, categorizing them into non-modifiable, behavioural, and physiological factors (Daniel, Nwaogu, Okoli, &Nzeribe, 2019). Initiatives have targeted smoking cessation, promotion of healthy diets, and encouragement of physical activity (Huang, Shi, Davis-Brezette, &Osness, 2015). However, despite these efforts, the persistence of PRFs remains a significant challenge (Kilkenny, Dunstan &Busingye,2017). Despite ongoing interventions, physiological risk factors persist, with conditions such as metabolic syndrome presenting increased risks of severe cardiovascular outcomes (Hashimoto, Hayashi, Yoshida & Naito, 2016; Lupafya, Mwagomba, Hosig, Maseko&Chimbali, 2016).The prevalence of high blood pressure, diabetes, and obesity continues to pose significant health challenges globally, necessitating a re-evaluation of existing strategies(Heyward, 2017; Howley, 2019).

The effects of physiological risk factors are profound, contributing to millions of deaths annually, primarily due to coronary heart disease and stroke (Ajayi, Abayomi & Ojo, 2016). Metabolic syndrome compounds these risks, amplifying the likelihood of developing severe cardiovascular conditions (Ezema, 2018; Giampaoli, 2018).The impact extends beyond mortality, affecting the quality of life for individuals living with these conditions (Sorate, 2015; Babalola, & Ojo, 2015; Pearson, Laurora, Chu & Kafonek, 2016). The research is motivated by the need to address the pressing health challenges posed by physiological risk factors, especially among obese female students (Banfi,2016). Recognizing the escalating prevalence of cardiovascular disease risk factors, the study aims to understand the effects of aerobic dance on systolic and diastolic blood pressure, providing insights into potential avenues for intervention and prevention (Ebbert, & Jensen,2015; Ejike, Ugwu, Ezeanyika, &Olayemi, 2018).

Despite the increasing awareness of cardiovascular risks, there is a noticeable gap in knowledge regarding the effects of aerobic dance on the blood pressure of obese female students at the University of Calabar, Nigeria. This lack of specific research creates a void in understanding the potential benefits of physical activity in managing hypertension among this demographic, warranting a focused investigation. This study endeavours to contribute valuable insights into the potential effectiveness of aerobic dance in managing blood pressure among obese female students. By bridging the existing gap in knowledge, the research aspires to provide evidence-based recommendations for promoting cardiovascular health and overall well-being in this specific population at the University

of Calabar, Nigeria. Ultimately, it aims to guide future strategies and interventions for mitigating the impact of physiological risk factors on the health of the target demographic.

Methodology

This study employed a one-group pre-test/post-test design to assess the impact of an aerobic dance exercise programme on selected physiological variables among female undergraduate and postgraduate students aged 19 to 25 at the University of Calabar. The study population consisted of 40 participants, and the selection process followed a meticulous procedure:

Informed Consent and Physical Assessment Readiness: Participants were provided with an informed consent form and a Physical Activity Readiness Questionnaire (PAR-Q). Only duly filled and signed consent forms were considered, and participants who responded negatively to the PAR-Q, indicating their readiness for physical assessment, were included in the study.

Participant Selection through Purposive Sampling: Purposive sampling techniques were utilized to target female students aged 19–25. The participants' weight (in kilograms) and height (in meters squared) were used to calculate Body Mass Index (BMI). Those with BMI falling within the range of 30.0 to 34.9 kg/m² were chosen for the study. Ethical approval was secured from the research ethical committee at the School of Postgraduate Studies, Ahmadu Bello University, Zaria, providing the necessary authorization for the research.

Inclusion Criteria: Female students with BMI between 30.0 and 34.9 kg/m², aged 19 to 25 years, with blood pressure ranging from 130 - 139 mmHg/80 – 89 mmHg. Participants without underlying health risks who responded negatively to the Physical Activity Readiness Questionnaire (PAR-Q).

Data Collection: Systolic and diastolic blood pressure measurements were taken using an Automatic Digital blood pressure monitor (Andon BPM, KD-595, China). Four trained research assistants facilitated the data collection process. Participants were positioned comfortably with proper arm and back support, and feet flat on the floor. The blood pressure cuff was placed about 1 inch above the antecubital space, and readings were recorded after the monitor automatically inflated, exceeded the resting BP, and then deflated.

Aerobic Dance Exercise Programme: The training sessions occurred in the evening, between 4:30 and 6:00 pm, at the fitness laboratory of the Department of Human Kinetics and Health Education, University of Calabar, Cross River State. The aerobic dance

exercise, characterized by dance-inspired movements, was conducted with choreographed routines set to music. The exercise programme encompassed varying intensity levels, including low (45% - 50% HRmax), low to moderate (50% - 55% HRmax), and moderate to somewhat hard (55% - 60% HRmax) levels. Participants engaged in the aerobic dance programme throughout the duration of the research study. The utilised training programme schedule is as follows:

Table 1. Training Programme Schedule

Week	Intensity	Warm up/ Stretches	Aerobic session	Cool down	Total time	RPE
1ST to 4th	45% - 50% HRmax	10 min	25 min	10 min	45 min	Light
5th to 8th	50% - 55% HRmax	10 min	30 min	10 min	50 min	Moderate
9th to 12th	55% - 60% HRmax	10 min	40	10 min	60 min	Somewhat hard

Source: Yuyu&Gunen, (2020).

Statistical Analyses:The study employed descriptive statistics, including means, standard deviations, and standard errors of the means, to analyse key variables—systolic blood pressure and diastolic blood pressure. A t-test statistic was utilized to assess significant differences in the effects of aerobic dance between baseline and post-test mean values for these variables. To explore the overall impact of a 12-week aerobic dance intervention, a one-way measures analysis of variance (ANOVA) was conducted. This analysis focused on examining interactions among baseline, 4th, 8th, and post-test values of the variables. In instances where the F statistic indicated significance, a Scheffe post hoc test was employed to pinpoint specific points of difference. Throughout these statistical analyses, an alpha level of 0.05 was set, providing the threshold for determining statistical significance. This criterion guided the decision-making process for accepting or rejecting the null hypothesis.

Results

Over a 12-week training period, data were gathered to investigate the impact of Aerobic Dance on the systolic and diastolic blood pressure among obese female students at the University of Calabar, Nigeria. The parameters assessed during this training period included systolic and diastolic blood pressure. The subsequent presentation outlines the results of the conducted tests.

Table 2: Result of Demographic Characteristics of Participants

Variables	Weeks	N	Mean	Std. Dev.
SBP (mmHg)	Base line	40	132.33	2.246
	Week 4	40	130.23	1.271
	Week 8	40	129.20	1.742
	Week 12	40	125.80	2.893
DBP (mmHg)	Base line	40	81.85	.975
	Week 4	40	80.55	.597
	Week 8	40	80.40	.496
	Week 12	40	79.80	.687

Source: Test conducted in 2023 by the researcher

Sub-hypotheses I: There is no significant effect of aerobic dance on Systolic Blood Pressure of obese female students in the University of Calabar, Nigeria.

Table 3: One Way ANOVA Statistics on the effects of aerobic dance on Systolic Blood Pressure of Obese female students in the University of Calabar, Nigeria.

Systolic Blood Pressure	Sum of Squares	Df	Mean Square	F	p- value	Decision
Between Groups	889.425	3	296.475	65.645	.000	Rejected
Within Groups	704.550	156	4.516			
Total	1593.975	159				

Source: Test conducted in 2023 by the researcher

Table 3 above shows the one- way ANOVA analysis of the effects of aerobic dance on Systolic Blood Pressure of Obese female students in the University of Calabar, Nigeria. The result revealed that there is a significant effect of aerobic dance on systolic blood pressure among obese female students in the University of Calabar, Nigeria. This is because the calculated p-value of 0.000 is lower than the 0.05 alpha level of significance. With this, the null hypothesis which states that There is no significant effect of aerobic dance on systolic blood pressure of obese female students in the University of Calabar, Nigeria is rejected.

Table 4: Scheffe Post Hoc Test on Pairwise comparison of mean levels of Systolic Blood Pressure among Obese female students

(I) week	(J) week	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Baseline	week 4	2.100	.475	.000	.76	3.44
	week8	3.125	.475	.000	1.78	4.47
	week12	6.525*	.475	.000	5.18	7.87
week 4	baseline	-2.100	.475	.000	-3.44	-.76
	week8	1.025	.475	.204	-.32	2.37
	week12	4.425	.475	.000	3.08	5.77
week8	baseline	-3.125	.475	.000	-4.47	-1.78
	week 4	-1.025	.475	.204	-2.37	.32
	week12	3.400	.475	.000	2.06	4.74
week12	baseline	-6.525*	.475	.000	-7.87	-5.18
	week 4	-4.425	.475	.000	-5.77	-3.08
	week8	-3.400	.475	.000	-4.74	-2.06

*. The mean difference is significant at the 0.05 level.

The result of the *post hoc* test revealed that measurement at the onset (base line) was significantly different from the observation at the termination of the exercise in the 12th week. Between the 4th, 8th and 12th week no significant difference was observed in the Systolic Blood Levels.

Sub-hypotheses II: There is no significant effect of aerobic dance on diastolic blood pressure of obese female students in the University of Calabar, Nigeria.

Table 5: One Way ANOVA Statistics on the effects of aerobic dance on Diastolic blood pressure of Obese female students in the University of Calabar, Nigeria

Diastolic Blood Pressure	Sum of Squares	Df	Mean Square	F	p-value	Decision
Between Groups	89.400	3	29.800	58.846	.000	Rejected
Within Groups	79.000	156	.506			
Total	168.400	159				

Source: Test conducted in 2023 by the researcher

Table 5 above shows the one- way ANOVA analysis of the effects of aerobic dance on DBP of Obese female students in the University of Calabar, Nigeria. The result revealed that there is a significant effect of aerobic dance on DBP among obese female students in the University of Calabar, Nigeria. This is because the calculated p-value of 0.000 is lower

than the 0.05 alpha level of significance. With this, the null hypothesis which states that There is no significant effect of aerobic dance on DBP of obese female students in the University of Calabar, Nigeria is rejected.

Table 6: Scheffe Post Hoc Test on Pairwise comparison of mean levels of DBP among Obese female students

(I) week	(J) week	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Baseline	week 4	1.300*	.159	.000	.85	1.75
	week8	1.450*	.159	.000	1.00	1.90
	week12	2.050*	.159	.000	1.60	2.50
week 4	baseline	-1.300*	.159	.000	-1.75	-.85
	week8	.150	.159	.828	-.30	.60
	week12	.750	.159	.000	.30	1.20
week8	baseline	-1.450*	.159	.000	-1.90	-1.00
	week 4	-.150	.159	.828	-.60	.30
	week12	.600	.159	.003	.15	1.05
week12	baseline	-2.050*	.159	.000	-2.50	-1.60
	week 4	-.750	.159	.000	-1.20	-.30
	week8	-.600	.159	.003	-1.05	-.15

*. The mean difference is significant at the 0.05 level.

The observed difference in the mean level at base line was significantly different from the level at week 4, week 8 and week 12 of the training, there was no significant difference observed in the Diastolic Blood Pressure levels. Between the 4th week 8th week and 12th week of the training,

Discussions

This research was conducted with the primary goal of evaluating how aerobic dance influences systolic blood pressure (SBP) diastolic blood pressure (DBP) in obese female students at the University of Calabar, Nigeria. Employing a one-way repeated measures ANOVA, the results revealed significant differences in systolic blood pressure (SBP) between the two stages examined, leading to the rejection of the null hypothesis. Importantly, the findings indicated a substantial reduction in SBP levels after participating in aerobic dance, compared to the baseline measurements.

This observed reduction in SBP is consistent with the outcomes reported by Remesh and Saroja (2021), Varrier and Tan (2019), and Uygu et al. (2016), who all investigated the effects of aerobic dance on physiological variables, including blood pressure, in various populations. Specifically, the study echoed the positive impact of aerobic dance on

lowering SBP, as highlighted in the research by Daniel, Nwaogu, Okoli, and Nzeribe (2019), particularly in the context of managing hypertension during pregnancy.

Furthermore, the investigation delved into the effects on diastolic blood pressure, revealing a significant decrease after 12 weeks of aerobic dance training. While this finding contradicted the results of Huang et al. (2015), it aligns with the observations made by Daniel, Nwaogu, Okoli, and Nzeribe (2019), Mayen et al. (2016), and Hashimoto et al. (2016) in diverse studies involving different populations, including pregnant women and obese children. The study also underscored the potential of aerobic dance in addressing comorbidities associated with diseases like Type 2 Diabetes Mellitus (T2DM) and kidney disorders, reinforcing the perspective presented by (Ajayi, Abayomi, &Ojo, 2016).

Moreover, the research affirmed the role of aerobic dance as an effective tool in reducing SBP, supporting the assertions made by Howley, (2019). and Ezema et al. (2013). Additionally, the study demonstrated that, regardless of intensity, aerobic dance had a significant impact on both SBP and DBP. This aligns with broader research indicating that modifying exercise intensity can mitigate the risk of chronic diseases, as highlighted by Sorate (2015). This study provides comprehensive insights into the positive effects of regular group-based aerobic dance over a 12-week period on both systolic and diastolic blood pressure in obese female students. The results contribute valuable information to the potential preventive and rehabilitative aspects of aerobic dance in managing chronic diseases.

Conclusions

The study sheds light on the significant positive impact of a 12-week aerobic dance programme on the blood pressure profiles of obese female students at the University of Calabar, Nigeria. The findings, supported by statistical analyses, reveal a noteworthy reduction in systolic blood pressure (SBP) levels compared to baseline measurements. This aligns with existing research, indicating that aerobic dance contributes to lower SBP, corroborating similar outcomes observed in various studies focused on different populations and contexts. Moreover, the investigation extends its scope to diastolic blood pressure (DBP), demonstrating a substantial reduction after the 12-week aerobic dance training period. This underscores the versatility of aerobic dance in influencing both systolic and diastolic aspects of blood pressure regulation. While some dissenting studies were noted, the overall consistency of our findings with a body of literature supports the efficacy of aerobic dance in positively impacting blood pressure metrics.

The study further emphasizes the potential role of aerobic dance as a valuable tool for managing comorbidities associated with conditions like Type 2 Diabetes Mellitus (T2DM) and kidney disorders. These insights align with broader perspectives on the

preventive and rehabilitative aspects of aerobic dance, offering a holistic approach to improving cardiovascular health. The outcomes of this research contribute to the growing body of evidence highlighting the benefits of regular aerobic dance participation. As we conclude, it is essential to recognize the potential of aerobic dance not only in reducing blood pressure but also in promoting overall well-being. Further research and longitudinal studies are encouraged to deepen our understanding and refine recommendations for the integration of aerobic dance into holistic healthcare practices.

Recommendations

Sequel to the study findings and beyond, the following recommendations were proffered:

- **Integration into Health Programmes:** Encourage the integration of aerobic dance programmes into health and wellness initiatives, both at educational institutions and within community health programmes. This could provide a proactive approach to addressing cardiovascular health concerns among various demographic groups.
- **Longitudinal Studies:** Support and conduct longitudinal studies to explore the sustained effects of aerobic dance on blood pressure and cardiovascular health. Long-term investigations will provide a clearer understanding of the durability of the observed benefits and potential implications for chronic disease prevention.
- **Diverse Population Groups:** Extend research efforts to include diverse population groups, encompassing different age ranges, genders, and fitness levels. This would contribute to a more comprehensive understanding of how aerobic dance impacts various demographic profiles, ensuring the generalizability of findings.
- **Multidisciplinary Approaches:** Encourage multidisciplinary collaborations between health professionals, dance instructors, and researchers to design and implement aerobic dance programmes that are not only enjoyable but also tailored to enhance cardiovascular health. Integrating expertise from different fields can lead to more effective and sustainable interventions.
- **Health Education Programmes:** Develop educational programmes that emphasize the cardiovascular benefits of aerobic dance. Promote awareness among healthcare providers, educators, and the general public about the positive impact of regular dance participation on blood pressure, emphasizing its role in preventive health strategies.
- **Public Health Policies:** Advocate for the inclusion of dance-based physical activities in public health policies. This may involve collaboration with policymakers to recognize and support initiatives that promote aerobic dance as a viable and enjoyable means of improving cardiovascular health.
- **Accessibility and Inclusivity:** Ensure that aerobic dance programmes are designed to be inclusive, considering accessibility for individuals with varying fitness levels and physical abilities. This inclusivity can enhance participation rates and promote the health benefits of aerobic dance across diverse populations.

- **Further Mechanistic Studies:** Support mechanistic studies to delve deeper into the physiological mechanisms behind the observed blood pressure changes. Understanding the specific pathways through which aerobic dance influences cardiovascular health can provide insights for targeted interventions and personalized healthcare.
- **Promotion of Physical Activity:** Advocate for the broader promotion of physical activity, including aerobic dance, as an essential component of a healthy lifestyle. Collaborate with public health campaigns and educational institutions to emphasize the importance of regular physical activity for overall well-being.
- **Continued Research and Innovation:** Foster an environment of continued research and innovation in the realm of dance-based interventions. Explore new modalities, techniques, and technologies that can enhance the effectiveness and accessibility of aerobic dance programmes for diverse populations.

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