

**IMPACT OF AEROBIC EXERCISE PROGRAMME ON THE HEALTH-RELATED
FITNESS COMPONENTS OF SENIOR CITIZENS IN LAGOS STATE**

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Abstract

The purpose of the study was to determine the impact of aerobic exercise programme on the health-related fitness components of senior citizens in Lagos state. An experimental research design was adopted in carrying out this research. The population comprised senior citizens living in one of the Old People's Homes in Lagos state. Twenty (20) participants who gave their consent participated in the study. Two group pre-test post-test research design was adopted in the study. They were experimental and control group. Pre-test post-test measures were carried out on their resting blood pressure, resting heart rate, body mass index, handgrip strength, and knee flexibility. The experimental group went through aerobic exercise programme for a period of eight weeks, while the control group was not involved in any form of exercise. Standardized test and instruments were used in data collection and data was analyzed using the descriptive statistics of mean and standard deviation with graphical illustrations while the hypotheses were tested using the inferential statistics of independent sample t-test at a 0.05 level of significance. Four hypotheses were tested and results indicated that aerobic exercise programme have no significant effect on the resting heart rate, body mass index, handgrip strength, and knee flexibility of senior citizens in Lagos state. The study hereby recommends that older individuals engage in aerobic exercises at least twice per week as a more effective tool for keeping fit and staying healthy.

Keywords: Aerobic Exercise Programme, Health Related Fitness Components, Impact, Senior Citizens.

Introduction

Older people often have a healthy sense of pride that comes from their accomplishments which serve as a measure of fulfillment to them, their children and grandchildren. Achievements like raising healthy and happy children, being happily married or retiring from a job in good standing after years of dedicated service can be the foundation of a pleasant contentment in old age. Senior citizens are among the happiest groups of people, and they appear to be significantly happier than their middle-aged counterparts. Exercise has been known over the years to be of great value to health and as a tool for treatment and rehabilitation.

Growing old provides a sense of broader perspective and it often incline the elderly to focus much of

their efforts and energy towards improving the society and creating a better world for future generations. They cherish spending time with loved ones, pursuing passions and personal dreams, they are found to be civically and politically involved in national issues (Saverio, 2014). Despite these attributes, old age is often identified with loss of strength in the bodies of individuals, hence, halting movement in various parts of the body where strength is lost. The frailty and decreased energy associated with aging, such as difficulty in walking far distances, climbing stairs, or carrying loads or things are largely due to muscle loss, results mainly from inactivity (Karl, 2010).

Research speculated that the world population of people aged 65 years and older was over 495 million and that the number is projected to increase to 1.5 billion by 2050 (Population Reference Bureau, 2011). Nigeria has a current population of 5.8 million elderly people aged 65 years and constitutes 20.2% of Nigeria's total population (Central Intelligence Agency World Fact Book, 2016). Muscle strength gradually decreases from the 30th year until about the 50th year of life. In the 6th decade of life, an accelerated non-linear decrease by 15% has been observed, and by the 8th decade, the decrease may be up to 40%. After the age of 65 years, 30% of people experienced for at least once a year, as a result of strength lost at the lower part of the body this additionally results in a substantial impairment in the sensorimotor information exchange with a reduction in the quality of inter-muscular and intramuscular coordination (Orr, 2012).

Otinwa (2014) described exercise as repetitive bodily movements done to improve or maintain one or more of the components of health-related fitness: aerobic capacity, muscular strength, muscular endurance, flexibility and body composition. One of the best ways to keep muscles healthy and strong is through exercise. Exercise training in sedentary senior citizens may improve many neuropsychological functions, such as response time, visual organization, memory and mental flexibility (Spirduso, 2012).

Liu and Latham (2013) pointed out the importance of aerobic exercise in the maintenance and improvement of various aspects of cardiovascular function and health and strength training in the attenuation of muscle strength declines associated with normal aging. Moreover, considering that cardiovascular diseases are the major cause of death in the elders, sustaining older adults' ability to live independently as well as reducing blood pressure, plasma lipoprotein lipid profiles, and body weight via healthy lifestyle interventions are very important goals of public health, geriatrics, and gerontology. It is against this background that this study tested whether there will be any significant effect of aerobic exercise programme on the resting blood pressure, resting heart rate, body mass index, handgrip strength and knee flexibility of senior citizens in Old People's Homes in Lagos state.

Methods and Procedures

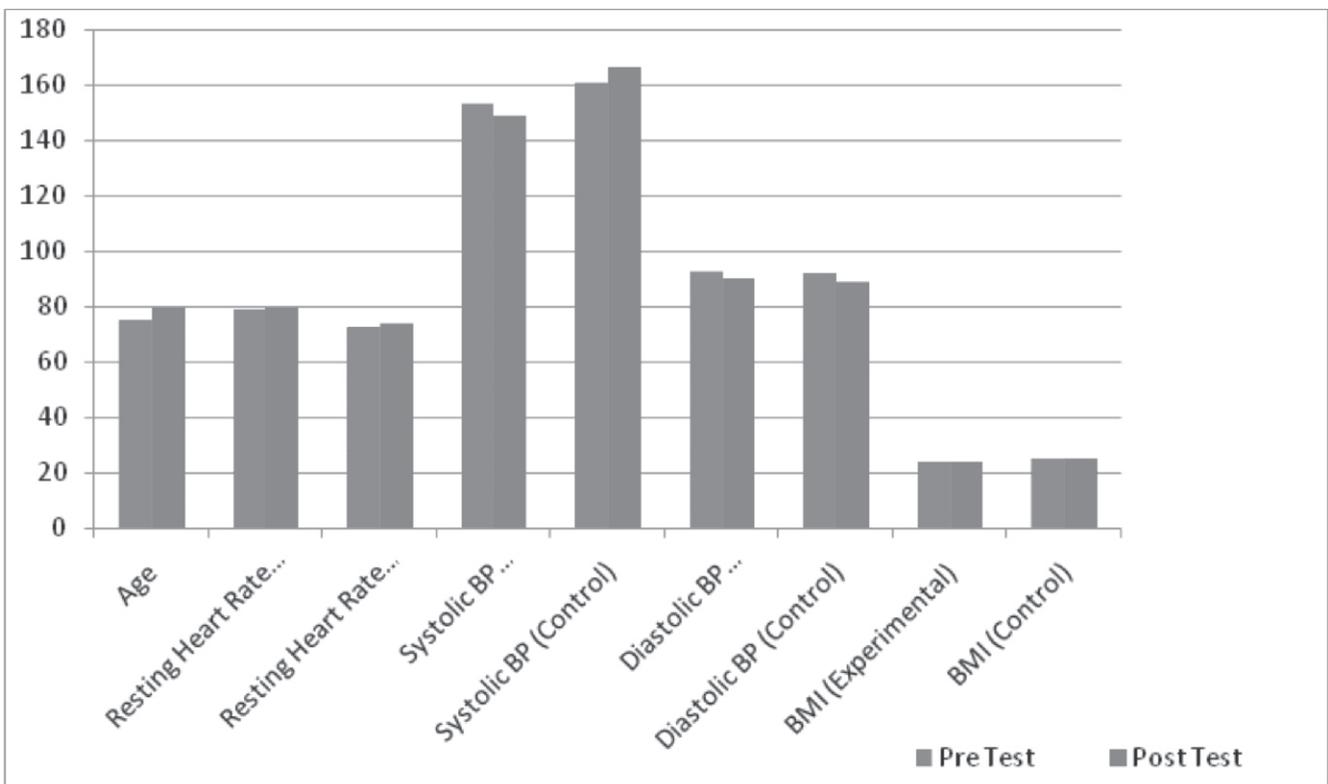
The experimental research design was adopted which involved two groups of participants. Group A was the experimental group that participated in the eight weeks graded aerobic dance exercise programme (3

times per week) for 30minutes, while group B was the control group that did not participate in the exercise programme. The aerobics exercise programme was in low intensity considering the age and the fitness levels of the participants. The groups were selected using the simple random sampling technique.

The population comprised senior citizens living in Old People's Homes in Lagos state. Twenty (20) apparently healthy senior citizens who volunteered and gave consent from the Old People's Home, Sabo-Yaba, Lagos state were the participants with ten of them each assigned to experimental and control groups respectively. Purposive sampling technique was adopted to ensure that those volunteers were certified clinically healthy by a medical doctor. Research instruments and equipment used for the study were Physical Activity Readiness Questionnaire (PAR-Q), self-developed informed consent form, data entry forms, sphygmomanometer (blood pressure and resting heart rate), weighting scale (for weight), stadiometer (for height), handgrip dynamometer (for hand grip strength) and flexible goniometer (for knee flexibility). Pretest and posttest measurements of the resting blood pressure, resting heart rate, body mass index, handgrip strength and knee flexibility of senior citizens was taken before and at the end of the 8 weeks programme respectively.

Results

Results are presented as means, standard deviation, graphs and tables, on physical and physiological characteristics of participants.



The Figure 1 above shows the physical and physiological characteristics of participants in the experimental and control group for the pre-test and post test scores.

Table 1

t-test Analysis of Aerobic Exercise Programme on the Health-Related Fitness Variables of Participants

Variables	Experimental Group				t-calc	t-crit	Control Group					
	Pre-test		Post-test				Pre-test		Post-test			
	(N= 10)		(N= 10)				(N= 10)		(N= 10)			
	Mean	SD	Mean	SD			Mean	SD	Mean	SD		
SBP (mmHg)	153.3	26.31	148.9	23.22	0.42	2.10	160.5	16.24	166.1	16.56	0.76	2.10
DBP (mmHg)	92.4	14.68	89.9	17.71	0.34	2.10	91.9	7.95	88.8	14.90	0.58	2.10
HR (bpm)	78.50	15.97	79.40	11.56	0.14	2.10	72.5	8.26	73.7	6.16	0.37	2.10
BMI (kg/m ²)	23.90	5.52	23.89	5.11	0.005	2.10	24.83	3.53	24.83	3.70	0.003	2.10
RHS (kg)	13.14	5.70	13.89	4.58	0.32	2.10	11.1	5.91	10.59	6.51	0.18	2.10
LHS (kg)	12.8	5.91	14.2	6.05	0.52	2.10	8.75	7.43	9.05	7.28	0.09	2.10
RKF (kg)	59.9	10.20	60.3	11.32	0.083	2.10	46.6	10.12	47.2	10.73	0.13	2.10
LKF (kg)	59.6	10.65	60.7	10.88	0.23	2.10	46.6	11.12	46.0	10.50	0.12	2.10

- M = Mean
- SD = Standard Deviation (mmHg)
- SBP = Systolic Blood Pressure (mmHg)
- DBP = Diastolic Blood Pressure (mmHg)
- HR = Heart Rate (Bpm)
- BMI = Body Mass Index (kg/m²)
- RHS = Right Handgrip Strength (kg)
- LHS = Left Handgrip Strength (kg)
- RKF = Right Knee Flexibility (kg)
- LKF = Left Knee Flexibility (kg)

*Significant at 0.05 level

The table above shows that the t-calc values are lesser than the t-crit values at 0.05 level of significance for the tested variables. Therefore, the null hypotheses are accepted. These imply that aerobic exercise programme have no significant effect on the resting blood pressure, resting heart rate, body mass index, handgrip strength and knee flexibility of senior citizens in Lagos state.

Discussion

According to the test results presented above, findings have shown that aerobic exercise programme has no significant effect on the resting blood pressure of senior citizens in Lagos state. This finding is in line with the meta-analysis of training studies in persons aged 60 and older conducted by Huang, Gibson,

Tran, and Osness (2005). Booth, Laye and Roberts (2011) also observed that changes in cardiorespiratory fitness throughout life alter the rate of mortality even in individuals older than 70 years. These studies agreed that aerobics exercise of higher intensity elicited the improvement in cardio fitness of individuals aged 60 and above.

Based on the results of the study, aerobic exercise programme has no significant effect on the resting heart rate of senior citizens in Lagos state. This finding agrees with that of Akinbiola, Adeniran and Ogunlade (2018) who believed that engagement in aerobics exercise significantly improves the heart rate of participants over an eight weeks period. Lin, Wu, Tarr, Zhang, Michael and Lowell (2012) discussed that there are marked individual differences in the effects of age. For example, some 80-year-old individuals may have cardiac function that is as good as that of the average 40-year-old individual. Under resting conditions, the heart rate does not change significantly with age.

Findings from this research have shown that aerobic exercise programme has no significant effect on the Body Mass Index of senior citizens in Lagos state. This is in line with Chau, Cho, Jani and Jeor (2008) study which concluded that unlike weight management goals for younger adults, who may want to lose weight aggressively, the goal for older adults should be to stabilize weight while avoiding further weight gains.

The result of hypothesis testing revealed that aerobic exercise programme has no significant effect on the handgrip strength of senior citizens in Lagos state which does not share the view of Anthony (2008) who affirmed that human survival depends on the capacity to engage in a sustainable physical activity as a result of the type of form of aerobic exercise used by them. Experts agreed that aerobic exercises should be supplemented with strength developing exercises at least twice per week.

Findings from this research concluded that aerobic exercise programme has no significant effect on the knee flexibility of senior citizens in Lagos state. However, this is not in line with Andrea (2014) who discussed that other health benefits of fitness activities are reduction of pain and stiffness, increase in strength and flexibility; improvement of glycemic control; builds bone density and reduces falls risk especially in older adults; reduction of cardiovascular risk by improving lipid profile and overall fitness; strengthens back and abdominal muscles to reduce stress on the spine; reduces waistline invariably decreases the incidence of high blood pressure.

Conclusion

This study established that aerobic exercise programme has no significant effect on the resting blood pressure, resting heart rate, body mass index, handgrip strength and knee flexibility of senior citizens in Lagos state. This could be as a result of the low intensity exercise (for 30 minutes, 3 days in a week) carried out and the age of the participants involved. Another factor lies in the fact that majority of the respondents were sedentary in nature at the old people's homes hence they might need a longer period of time to experience any significant changes. However, it was noted that based on mean scores, the

experimental group performed better than the control group, this shows the benefit of aerobics among adults.

Recommendations

It is recommended that balance, flexibility, resistance or strength developing exercises should be encouraged among older individuals alongside aerobic exercises at least three times per week as participation in all is necessary for full health benefits. The key to fitness is to perform the four dimensions of exercise regularly and increase the level of intensity over time.

References

- Akinbiola, O. O. Adeniran, S. A. & Ogunlade, O. (2018). Effects of an 8-week intermittent aerobic exercise on the electrocardiogram and physiological parameters of institutional security personnel in Nigeria. Retrieved on the 12th of March 2019 from <https://oapub.org/edu/index.php/ejep/article/view/2010>
- Andrea, C. (2014). Exercise and Diabetes. Portsmouth Hampshire; Diabetes Research and Wellness Foundation. Anthony, C. M. A. (2008). *The Pain-free Programme: A Proven Method to Relieve Back, Neck, Shoulder and Joint Pain*. US; John Willey and Sons.
- Booth, F., Laye, M., & Roberts, M. (2011). Lifetime sedentary living accelerates some aspects of secondary aging. *Journal of Applied Physiology*. 111 (5): 497-504.
- Chau D., Cho L., Jani P., & Jeor S. (2008). Individualizing recommendations for weight management in the elderly. *Curriculum of Opinionated Clinical Nutritional Metabolic Care*. 11 (10), 27-31.
- Central Intelligence Agency World Fact book (2016). Nigeria Demographics Profile. Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/> on 26th May, 2017.
- Huang, G., Gibson, C., Tran, Z., & Osness, W. (2005). Controlled endurance exercise training and VO_{2max} changes in older adults: a meta-analysis. *Prevalent Cardiology*. 8: 217-225.
- Karl, J.A. (2010). Age-related changes in the structure and function of skeletal muscles. *Clinical Experimental Pharmacological Physiology*, 34:1091–1096.
- Liu, C.J. & Latham, N.K. (2013). Progressive resistance strength training for improving physical function in older adults. *Cochrane Database of Systematic Reviews*. (Issue 3) Art. No.: CD002759. DOI: 10.1002/14651858.CD002759.pub2.
- Lin, J., Wu, H., Tarr, P. T., Zhang, C. Y., Michael, L. F. & Lowell, B. B. (2012). Transcriptional Co-Activator PGC-1 Alpha Drives the Formation of Slow-Twitch Muscle Fibres. *Nature*, 418, 797-801.
- Orr, R. (2012). Efficacy of progressive resistance training on balance performance in older adults a systematic review of randomized controlled trials. *Sports Medicine*, 38:317–343.

- Otinwa, G. O. (2014). Exercise as a Medicine in the Management of Mild Mental Health Disorders; In: Danladi Musa & Ademola, O.A. (ed). *Journal of Nigerian Association of Sports Science & Medicine*. 14: 1-10.
- Population Reference Bureau (2011). Life Expectancy and Graying of Society. *2011 world population data sheet*. Washington, DC: Retrieved from <https://saylordotorg.github.io> on 26th May, 2017.
- Saverio, R. O. (2014). Adverse events reported in progressive resistance strength training trials in older adults: 2 sides of a coin. *Archeology Physiological Medical Rehabilitation*, 91:1471–1473.
- Spirduo, K. (2012). Dose-response relationship of resistance training in older adults: a meta-analysis. *Medicine, Science, Sports and Exercise*. 42:902–914.