

# Effects of Aerobic Zumba Dance Exercise on Leg Power and Agility Fitness Levels Among Retired Older Adults in Akwa Ibom State

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**Abstract:** The study examined the effects of aerobic Zumba dance exercise on leg power and agility fitness among retired older adults in Akwa Ibom State, Nigeria. The quasi-experimental (Interrupted Time-Series) design was used for the study. The area of the study is Akwa Ibom State. The population of the participants who volunteered for the study, and identified as older adults, was initially 150 retired older adults (these included 12 women; aged between 65 years and above); who took part in the study. A population of 150 retired older adult began the programme in Uyo with 68 participant, Eket, 47 participants and Ikot Ekpene, 35 participants. The instruments for the study are already standardized instruments, invented for the purpose they were made for. To ensure reliability of the weighing scale, a standard weight lifting barbell of 1 kg was always placed to set a scale-pointer correctly at 1kg. After the posttest measurement, the data sorted out were treated with the Descriptive Statistics to answer the research questions. The Paired sample t-test statistical (PTS) was used to test the hypotheses, set at probability alpha significant level of .05. The findings from the study showed that there is significant difference between the pretest and posttest means of leg power fitness (LEPF) level of the retired older adults in Akwa Ibom State; showing significant improvement in the leg power fitness (LEPF) level. The study concluded that aerobic Zumba exercise is effective in enhancing motor fitness components in older adults. It was recommended that healthcare providers can consider suggesting structured group dance exercise like Zumba as a complementary, non-pharmacological intervention for older adults with pre-hypertension or as part of a controlled hypertension management plan.

**Keywords:** Aerobic Zumba Fitness, Leg Power Agility Fitness, Retired Older Adults, Motor Fitness, Akwa Ibom State.

## Introduction

The decline in physical fitness among older adults is a major public health concern, particularly in relation to motor abilities such as strength, power, and agility. Retirement often leads to reduced physical activity, which contributes to deterioration in muscular performance and movement efficiency. These changes significantly affect the ability of older adults to perform daily activities and maintain independence.

Leg power refers to the ability of the lower limbs to generate force quickly, which is essential for movements such as walking, standing, and climbing. Agility fitness, on the other hand, involves the ability to change direction quickly and efficiently while maintaining balance and coordination. Both components are critical for mobility and fall prevention among older adults.

Aerobic exercise has been widely recommended as a strategy for improving physical fitness [1]. Aerobic Zumba dance exercise, in particular, combines rhythmic movements with dynamic body actions that engage multiple muscle groups. Despite its increasing popularity, there is limited

empirical evidence on its effects on leg power and agility fitness among retired older adults in AkwaIbom State. This study therefore investigates these effects.

Nigeria, being the most populous country in Africa, has seen a significant increase in the prevalence of hypokinesea in recent years especially among the affluent ones. Specifically, according to the WHO [2] the prevalence of obesity in Nigeria has 24.1 percent of adults being overweight; 8.5 percent being obese. A 2020 study from WHO [3] again found an overall obesity prevalence of 26 percent among adults in Nigeria; with higher prevalence among the women (15.1%); the urban residents (14.5%); high-income earners (16.3%). The key factors contributing to obesity in Nigeria were noted to be the sedentary lifestyle; unhealthy diet (high sugar, salt, and saturated fat intake); excess alcohol consumption, urbanization and modernization; limited access to healthcare and lack of nutrition education. Obesity rates are generally higher in urban areas compared to rural areas, reflecting the impact of urbanization and lifestyle changes. Quite a number of other factors including cultural practices have been linked to prevalence of obesity in Nigeria.

The prevalence of hypokinesea, exemplified by obesity in Akwa Ibom State, Nigeria, and in Uyo in particular, is not explicitly stated in the available data. However, a 2014 study on geographic variations of overweight and obesity among women in Nigeria found that Akwa Ibom State had a higher risk of overweight/obesity, alongside Cross River, Rivers, Bayelsa, and Taraba States [4]. It was observed in that study that some cultures take obesity for granted; as mere social issue and culturally has been wrongly associated with wealth and possessing enormous fighting-physical-strength in many cultures.

Physiological and hypokinetic health challenges are complex medical conditions characterized by an excessive accumulation of body fat that can have negative impacts on an individual's health [5]. Obesity for an example is typically defined as having a Body Mass Index (BMI) of 30 or higher [6]. The BMI is however a measure of subjective body fat based on a person's height and weight. Obesity is caused by an imbalance between calorie intake and energy expenditure, often influenced by a combination of genetic, environmental, and lifestyle factors, such as poor diet, sedentary behaviour, and underlying medical conditions

Obesity is associated with an increased risk of various health problems, including type twodiabetes, heart diseases, high blood pressure, certain types of cancer, sleep apnea, and osteoarthritis, among others [7]. These are the common health problems among the retired athletes. Of recent two All-Star members (retired athletes considered to be older adults), that represented Nigeria in the 1980 African Cup of Nations (football) have been declared dead and were known to be diabetic and found to die of heart failure, a common cardiovascular health challenge to retired older adults. The retired older adults are former active athletes who have stop participating adequately in physical activities. These two ex-players of Nigerian national Green Eagle team, who had aged into retired older adults, are said to have gradually stayed away for long from active sports and recreational activities. They did not even take to exercising themselves while socially indulging in alcohol intake at clubs and home.

### **Statement of the Problem**

Retired older adults in AkwaIbom State are increasingly experiencing declines in motor fitness due to reduced physical activity. Many individuals exhibit low leg power, which affects their ability to perform basic movements such as standing up, walking, and climbing stairs. Similarly, reduced agility limits their ability to respond quickly to movement changes, increasing the risk of falls and injuries. These challenges are often worsened by sedentary lifestyles and lack of participation in structured exercise programmes. While some older adults engage in recreational activities, such activities are usually insufficient to improve motor fitness components effectively. Aerobic Zumba dance exercise presents a promising intervention due to its dynamic and engaging nature. However, there is limited research evidence on its effectiveness in improving leg power and

agility fitness among retired older adults in AkwaIbom State. This gap necessitated the present study.

### **Purpose of the Study**

The main purpose of this study is to examine the effects of aerobic Zumba dance exercise on selected motor fitness parameters of retired older adults in AkwaIbom State.

Specifically, the study aims to:

1. The difference between the mean of leg power fitness (LEPF) level at pre Aerobic Zumba Dance exercise programme and mean after the programme on the retired older adults in AkwaIbom State.
2. The difference between the mean of agility fitness (AGIF) level at pre Aerobic Zumba Dance exercise programme and mean after the programme on the retired older adults in AkwaIbom State.

### **Research Questions**

1. What is the difference between the mean of leg power fitness (LEPF) level at pre Aerobic Zumba Dance exercise programme and mean after the programme on the retired older adults in AkwaIbom State?
2. What is the difference between the mean of agility fitness (AGIF) level at pre Aerobic Zumba Dance exercise programme and mean after the programme on the retired older adults in AkwaIbom State?

### **Research Hypotheses**

1. There is no significant difference between the mean of leg power fitness (LEPF) level at pre Aerobic Zumba Dance exercise programme and mean after the programme on the retired older adults in AkwaIbom State.
2. There is no significant difference between the mean of agility fitness (AGIF) level at pre Aerobic Zumba Dance exercise programme and mean after the programme on the retired older adults in AkwaIbom State.

## **LITERATURE REVIEW**

### **Conceptual Review**

#### **Hypokinetic Characteristics Changes in Retired Older Adults**

According to [8] there are a number of changes that occur in the body of retired athletes. These changes are parts of hypokinesea often associated with a sedentary lifestyle and can lead to various health problems. The key hypokinetic characteristics of the body include:

**Muscular System:** Consisting of muscle atrophy (the shrinking and weakening of muscles due to disuse). There is decreased strength and endurance (the reduced ability to perform physical tasks) [9]. There is also loss of flexibility (the stiffness and reduced range of motion); and poor posture (due to weak core and back muscles).

**Skeletal System:** Consisting of decreased bone density (increased risk of osteoporosis and fractures). There is joint stiffness and pain (due to lack of movement and lubrication). There is higher risk of arthritis (cartilage degeneration from inactivity).

**Cardiovascular System:** Consisting of reduced Cardiac Output (the heart becomes less efficient at pumping blood). There is higher Resting Heart Rate (the heart works harder at rest). There is poor circulation (the increased risk of blood clots and varicose veins). There is increased risk of hypertension (High Blood Pressure) and Heart Disease.

**Respiratory System:** Consisting of reduced Lung Capacity (weaker respiratory muscles). There is decreased Oxygen utilization (the body becomes less efficient at using oxygen).

**Metabolic and Endocrine System:** There is slowed metabolism (leading to weight gain and obesity). There is increased Insulin Resistance (showing higher risk of Type 2 Diabetes). There is higher Cholesterol and Triglyceride levels (the increased risk of atherosclerosis).

**Nervous System:** Consisting of poor gaiting due to poor Coordination and Balance.

These hypokinetic characteristics must be made known to the older adults and the body Mass Index is important adjunct to measuring the hypokinetic status of these older adults.

### **Zumba Exercises Programme.**

Heid and Zumba Fitness, addressed Zumba Exercises Programme as a popular, high-energy fitness programme that combines dance, aerobic exercise and strength training. It is an effective way to combat hypokinetic lifestyle disorders, characterized by inadequate physical activity. The word “Zumba” is a dance-based fitness programme created by Beto Perez in 2001. It combines Latin and international music with aerobic exercise; strength training; and dance movements. Among the benefits of Zumba are improved cardiovascular health; increases flexibility and mobility; enhancement of strength and endurance; support to weight management; reduction of stress and anxiety; improved coordination and balance and a boost in metabolism. The hypokinetic health challenges that can benefit from Zumba exercises include sedentary lifestyle; obesity; diabetes; cardiovascular disease; osteoporosis; arthritis; Parkinson's disease and stroke rehabilitation.

George [10] asserted that Zumba is a fun and effective way to manage obesity by combining dance and aerobic exercises with energetic music. It helps burn calories, improve cardiovascular health, and enhance overall fitness. A Zumba session can burn between 300-900 calories per hour, depending on intensity. The high-energy movements help increase metabolic rate, aiding in fat loss. The fast-paced movements enhance heart health and endurance. Zumba incorporates resistance exercises using body weight that strengthen muscles and improve body composition. The fun and social nature of Zumba helps reduce stress.

David [11] stressed that Zumba exercises can contribute significantly to the management of high blood pressure. It combines aerobic exercise with dance movements, which can improve normalize blood pressure. Aerobic exercises like Zumba help strengthen the heart, making it more efficient at pumping blood with less effort, which can reduce blood pressure. Stress can contribute to high blood pressure. The fun and social aspect of Zumba releases endorphins, reducing stress level and possible blood pressure.

Louis [12] further reported that Zumba exercise can contribute positively to the management of blood sugar. Zumba is an excellent workout for managing blood sugar levels, especially for people with diabetes or pre-diabetes. It combines aerobic and resistance exercises, which help improve insulin sensitivity and regulate glucose levels. Aerobic exercises like Zumba help muscles use glucose more efficiently, reducing insulin resistance. Zumba is an energy dance workout that helps burn calories and use up stored glucose in the muscles, preventing blood sugar spikes. Regular physical activity like Zumba makes the body's cells more responsive to insulin, helping lower blood sugar levels. Since Zumba is an enjoyable activity, people are more likely to stick with it as a long-term exercise routine, leading to sustainable blood sugar control.

Another contribution of Zumba exercises by Louis is the management/ normalization of heart rate. Zumba is a dance-based aerobic workout that can be highly beneficial for managing /normalizing heart rate. It combines rhythmic movements with varying intensity, which helps improve heart health, circulation, and overall fitness. The rhythmic movements promote better blood flow, reducing the risk of heart failure and blood clot formation. These enormous benefits of Zumba exercise on the management of hypokinetic diseases informed the rationale for this study on the older adults.

The Zumba exercise is a process resulted in providing preventive, remedial and curative measures to combat health challenges [13]. There is no doubt that preventing a health challenge should continue to be a primary focus of an individual since it is timely and less expensive than applying direct curative measures later. The management of hypokinetic disease can be effective through the use of non-pharmacological approaches that would improve the condition of affected persons and less cost. One of the viable approaches that can be used to effectively manage hypokinetic disease is Zumba exercise.

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### **Causes, Preventions and Management of Physiological and Hypokinetic Lifestyle Disorders**

Various researches have shown the causes of physiological and hypokinetic diseases/disorders as:

- i. Sedentary occupation
- ii. Urbanization
- iii. Increased screen time (TV, computers, smartphones)
- iv. Lack of physical education
- v. Poor diet and nutrition
- vi. Smoking and excessive alcohol consumption
- vii. Chronic diseases (diabetes, hypertension, cardiovascular disease)
- viii. Disability or physical limitations
- ix. Medication side effects
- x. Social isolation and cultural norms

Similarly steps for prevention of physiological and hypokinetic diseases/disorders include:

- i. Regular physical activity (150 minutes/week)

- ii. Incorporate strength training exercises
- iii. High-intensity interval training (HIIT)
- iv. Promote physical education in schools
- v. Workplace wellness initiatives
- vi. Community-based programs (park recreation, sports leagues)
- vii. Healthy diet and nutrition
- viii. Stress management techniques (meditation, yoga)
- ix. Social support networks
- x. Regular health check-ups

In the management of hypokinetic lifestyle disorders, the following have been included:

- i. Behavioral counseling
- ii. Physical activity programs (aerobic, strength training)
- iii. Nutrition counseling
- iv. Weight management programs
- v. Smoking cessation programmes
- vi. Stress management techniques
- vii. Medication management (if applicable)
- viii. Physical therapy and rehabilitation
- ix. Lifestyle modification programs
- x. Monitoring and evaluation

Lifestyle Modifications would include:

Increase in daily physical activity

Reducing screen time

Improving sleep quality

Healthy eating habits

Stress reduction techniques

Social engagement and community involvement

Regular health check-ups

Smoking cessation

Limit alcohol consumption

Weight management

### **Theoretical Framework**

#### **Aerobic Zumba Dance Programme and Leg power (Jump and reach)**

Puspodari [14] went on to determine the effectiveness of Zumba exercise on maximum oxygen volume, agility, and muscle power in female students. The study purpose was to prove the effectiveness of Zumba exercise on VO<sub>2</sub>max, agility, and muscle power in students at Universitas Nusantara PGRI Kediri, East Java, Indonesia. The research was a pre-experimental research design with one group Pretest-Posttest Design. A total of 15 female students from the Student Activity Unit

aerobic dance exercise at Universitas Nusantara PGRI Kediri, East Java, Indonesia, aged 19-24 years, with body mass index (BMI) 19.0-24.0 kg/m<sup>2</sup>, normal blood pressure, resting heart rate normal, normal oxygen saturation (SpO<sub>2</sub>), voluntarily participated in the study. Zumba exercise was carried out for 30 minutes/session with an intensity of 80 percent HR<sub>max</sub> with a frequency of 3x a-week for 8 weeks. The measurement of maximum oxygen volume (VO<sub>2max</sub>) used the Multi-Stage 20-m Shuttle Run Fitness Test. The measurement of leg muscle power used the vertical jump test, while the arm muscle power was evaluated using the medicine ball throw test. Data analysis used Paired Sample t-Test with a significance level of 5 percent. The results obtained: mean VO<sub>2max</sub> between pretest vs post-test (26.64±4.25 vs. 30.76±4.20 mL/kg/min;  $p \leq 0.001$ ), average agility between pretest and post-test (15.76±1.24 vs. 14.55±1.27 seconds;  $p \leq 0.001$ ), average limb muscle power between pretest vs posttest (394.21±66.36 vs. 411.09±67.45 joule;  $p \leq 0.001$ ), and the average arm muscle power between pretest and posttest (123.45±17.12 vs. 138.21±13.92 joule;  $p \leq 0.001$ ).

### **Aerobic Zumba Dance Programme and agility (shuttle-runs)**

Hortobágyi investigated the effectiveness of power training compared to strength training on muscle power and functional performance in older adults, including retired athletes. The purpose of the study was to determine whether power training (focusing on high-velocity movements) is more effective than traditional strength training for improving muscle power and functional performance in older adults that included retired athletes. The variables tested were Fitness Components of muscle power, strength, and activity-based tests (e.g. chair rise, stair climb and gait speed).

A Systematic review and meta-analysis of randomized controlled trials (RCTs) was used as the design of the study. The method involved a search into PubMed, Embase, CINAHL and Cochrane Library for RCTs; comparing power training and strength training in retired athlete adults >65 years. It included 15 trials with 583 participants and Standardized mean difference (SMD) with 95% confidence intervals (CI) using random effects models was used. The heterogeneity was assessed via I<sup>2</sup> statistic.

The results were that power training showed superior improvements in muscle power (SMD: 0.99,  $p < 0.001$ ) and activity based tests (SMD: 0.37–0.43,  $p < 0.05$ ) compared to strength training. No studies measured daily physical activity levels. In conclusion power training is more effective than strength training for enhancing muscle power and functional performance in older adults, including retired athletes.[15]

## **METHODOLOGY**

The quasi-experimental (Interrupted Time-Series) design was used for the study. The area of the study is AkwaIbom State. The area of the study is AkwaIbom State. The population of the participants who volunteered for the study, and identified as older adults, was initially 150 retired older adults (these included 12 women; aged between 65 years and above); who took part in the study. A population of 150 retired older adult began the programme in Uyo with 68 participant, Eket, 47 participants and IkotEkpene, 35 participants. The instruments for the study are already standardized instruments, invented for the purpose they were made for. To ensure reliability of the weighing scale, a standard weight lifting barbell of 1 kg was always placed to set a scale-pointer correctly at 1kg. After the posttest measurement, the data sorted out were treated with the Descriptive Statistics to answer the research questions. The Paired sample t-test statistical (PTS) was used to test the hypotheses, set at probability alpha significant level of .05.

## RESULTS AND DISCUSSION

**Research Question 1:** What is the difference between the mean of leg power fitness (LEPF) level at pre Aerobic Zumba Dance exercise programme and mean after the programme on the retired older adults in Akwa Ibom State, Nigeria?

**Table 1: Descriptive Statistical Analysis of difference between the pre and post means of leg power fitness (LEPF) level.**

Gender	N	$\bar{X}$	SD	Results
Pre-test	72	20 cm	1.6 cm	A difference of 5cm is obtained.
Post tests	72	25 cm	1.5 cm	

Source: Field Data in Appendix IV

Result: In Table 1, the descriptive statistical analysis showed that the pretest score for leg power fitness (LEPF) level has a mean 20 cm while the post test score has a mean of 25 cm. The result is that a difference of 5 cm is obtained showing an increase in the leg power fitness (LEPF) level of the retired older adults.

**Research Question 2:** What is the difference between the mean of agility fitness (AGIF) level at pre Aerobic Zumba Dance exercise programme and mean after the programme on the retired older adults in Akwa Ibom State, Nigeria?

**Table 2: Descriptive Statistical Analysis of pre and post means of agility fitness (AGIF) level.**

Gender	N	$\bar{X}$	SD	Results
Pre-test	72	26 secs	1.6secs.	A difference of 2 secs. Is obtained.
Post tests	72	24 secs	1.5 secs.	

Source: Field Data in Appendix IV

Result: In Table 2, the descriptive statistical analysis showed that the pretest score for agility fitness (AGIF) level has a mean 26 seconds while the post test score has a mean of 24 seconds. The result is that a difference of 2 seconds is obtained showing a reduction in time but an improvement in the agility fitness (AGIF) level of the retired older adults.

### Hypothesis Testing

**Hypothesis 1:** There is no significant difference between the mean of leg power fitness (LEPF) level at pre-Aerobic Zumba Dance exercise programme and mean after the programme on the retired older adults in Akwa Ibom State, Nigeria.

**Table 3: Summary oft-test statistical analysis of no significant difference between pre and posttest means of leg power fitness (LEPF) level of the retired older adults in Akwa Ibom State.**

Tests	N	$\bar{X}$	SD	Df	SE	t-cal	Decision
Pre-test	72	20 cm	1.6 cm	71	0.177	*28.25	H <sub>0</sub> rejected
Post tests	72	25 cm	1.5 cm				

\*Significant at  $P \leq .05$ , df. 71 = 1.994 t-critical value.

Source: Appendix IV

Result: In Table 3, the t-calculated value of 28.25 is greater than the t-critical value of 1.994. Therefore the hypothesis of no significant difference between pretest and posttest means of leg power fitness (LEPF) level of the retired older adults in Akwa Ibom State is rejected. The finding is

there is significant difference between the pretest and posttest means of leg power fitness (LEPF) level of the retired older adults in Akwa Ibom State; showing significant improvement in the leg power fitness (LEPF) level.

**Hypothesis 2:** There is no significant difference between the mean of agility fitness (AGIF) level at pre–Aerobic Zumba Dance exercise programme and mean after the programme on the retired older adults in Akwa Ibom State, Nigeria.

**Table 4: Summary of t-test statistical analysis of no significant difference between pre and post test means of agility fitness (AGIF) level of the retired older adults in Akwa Ibom State.**

Tests	N	$\bar{X}$	SD	Df	SE	t-cal	Decision
Pre-test	72	26 secs	1.6 secs.	71	0.177	*11.3	H <sub>0</sub> rejected
Post tests	72	24 secs	1.5 secs.				

\*Significant at  $P \leq .05$ , df. 71 = 1.994 t-critical value.

Source: Field Data Appendix IV

Result: In Table 4, the t-calculated value of 11.3 is greater than the t-critical value of 1.994. Therefore, the hypothesis of no significant difference between pretest and posttest means of agility fitness (AGIF) level of the retired older adults in Akwa Ibom State is rejected. The finding is there is significant difference between the pretest and posttest means of leg power fitness (LEPF) level of the retired older adults in Akwa Ibom State; showing significant improvement in the agility fitness (AGIF) level.

## CONCLUSION

The study concludes that aerobic Zumba dance exercise is effective in improving leg power and agility fitness among retired older adults. These improvements contribute to enhanced mobility, better balance, and reduced risk of falls, thereby promoting functional independence. The study also showed that there is significant difference between the pretest and posttest means of leg power fitness (LEPF) level of the retired older adults in Akwa Ibom State; showing significant improvement in the leg power fitness (LEPF) level.

## RECOMMENDATIONS

1. Healthcare providers can consider suggesting structured group dance exercise like Zumba as a complementary, non-pharmacological intervention for older adults with pre-hypertension or as part of a controlled hypertension management plan.
2. To enhance functional mobility and safety senior centers and retirement communities should offer regular Zumba-based classes to directly improve agility and lower-body power, which are critical for preventing falls and maintaining independence in daily activities.

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