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# Effects of an eight-week aerobics programme on the cardiorespiratory endurance of Kenyan female university students

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**Abstract**
It is globally recognized that Physical Activity (PA) plays a critical role in health, especially energy expenditure, energy balance and body composition. The absence of physical activity has been identified as a leading causative factor in Non-Communicable Diseases (NCDs) in the world, resulting in disability and death among young adults and the aged. Due to technological advancement, different forms of exercise have emerged. Aerobics or Aerobic dance, which activates a variety of muscles, is gaining great popularity among young women because moving to music is enjoyable and sociable. The current research focused on effects of an eight-week aerobics programme on the Cardiorespiratory Endurance amongst Kenyan female university students. An experimental research design was used in this research such that there was a pre-test administered to all the participants, followed by an eight-week aerobics treatment programme administered to the experimental group only and culminated in a post-test administered to all the participants. In this research, an eight-week Aerobics programme served as the independent factor. The assessments covered Cardiorespiratory Endurance as an element of physical fitness linked to well-being. Data analysis was done using the Statistical Package for Social Sciences (SPSS Version 22). Paired t-tests were utilized to compare means pre and post-treatment, with descriptive statistics used to calculate means, percentages, frequencies, and standard deviations for each variable. All hypotheses were tested at the 0.05 *alpha level*. The pre-test in the study enabled an insight into the existing health status of the female university students. The positive post-tests revelations provide evidence for the introduction and implementation of Aerobics programmes in higher institutions of learning in support of Cardiorespiratory Endurance status among female students. That would consequently minimizing the cost of medical treatment for non-communicable and general lifestyle diseases.

**Keywords:** Aerobics, cardiorespiratory endurance, physical activity

## 1. Introduction
From the moment human came into being, lifestyle perspectives have evolved as scientific development has brought with it lesser need for physical activity (Akyol & Sogut, 2018) [5]. Technological advancement has brought newer tools and machines that are more efficient, which has not only simplified human workload but also human activity. Machines have reduced individual workload on body strength (Akyol & Sogut, 2018) [5]. The concept of fitness has transformed throughout the industrial revolution, shifting from simply the capability to carry out daily tasks without exhaustion to an assessment of the body's capacity to function effectively and healthily at work and during recreational pursuits, to prevent hypokinetic diseases, and to manage unexpected situations (Kumar, 2022) [11].
Modern technology has simplified the mode of living and work by making life easier, more luxurious, more comfortable and inactive (Kumar & Priyanka, 2016) [12]. Rather than walking, standing, or engaging in physical activity, the majority of individuals these days drive motorized vehicles. All of which have resulted to less physically activity. Economic development and adoption of new lifestyles have led to a gradual increase in weight among the young (Siqiang, 2018) [19]. Inactive lifestyles along with consuming unhealthy food has resulted in excessive body weight amongst the people living in developing countries (Spartali,

Kostantinos, Ioannis & Thrasivoulos, 2014) [20]. Apart from traditional forms of exercise, other more enticing types of exercise, which have positive impact on the development of the fitness components, have emerged (Stosic *et al.*, 2016) [21]. The popularity of aerobics is considered to have surpassed the popularity of other forms of physical exercise among different population (Zaletel, Gabrilo & Peric, 2013) [23]. Aerobic dance has become a popular mode of workout exercise in recent decades, particularly among women living in urban settings (Kouli, Rokka, Mavridis & Derri, 2009) [10].

Regular participation in physical activity (PA) lowers the risk of developing cardiovascular diseases, osteoporosis, diabetes, hypertension, and ensures the normal functioning of all body organs (Stosic *et al.*, 2016) [21]. Aerobic dance was useful in burning a lot of calories (Ahmad & Rosli, 2015) [3]. Aerobic dance was very effective in reducing fat among middle-aged women; it had impact that is more appreciable on cardiorespiratory function (Jaywant, 2013) [9]. The rhythm, tempo and variety of music in Aerobic dance encourage activation of different muscle groups, energy systems and organs in the body (Pantelic, Milanovic, Sporis & Tosic, 2013) [16]. The cardiorespiratory fitness as one of the physical fitness constituents that is critical to health and optimal functioning to daily living (ACSM, 2013) [1].

### 1.1 Purpose of the Study

The major purpose for the study was to investigate the effects of an eight-week aerobics programme on the cardiorespiratory endurance of Kenyan female university students.

### 1.2 Hypotheses of the Study

The research null hypotheses was:

**H1:** An Eight-week aerobics programme would have no significant effect on the cardiorespiratory endurance among Kenya Female University students.

## 2. Material and Methods

### 2.1 Research Design

This study had a proper experimental design because participants were randomly assigned to either the experimental or control groups, and all participants were tested before and after the experiment. The rue experimental design as the strongest and most accurate (Sharma, 2019) [17]. The study involved:

- An experimental group that participated in the treatment of the eight-week Aerobics programme and a control group that did not take part in the Eight-Week Aerobics programme.
- Administration of a pre-test to both, the experimental and the control groups, to establish initial base-line fitness levels of all participants on the dependent variables.
- Administration of the independent variable of an Eight-Week Aerobics programme to just the experimental group.
- Subsequent to the Eight-Week Aerobics programme, a post-test was administered to both the experimental and the control groups to establish whether any changes had taken place in cardiorespiratory endurance.

### 2.2 Data Collection Tool

Participants were selected in both, the experimental and the control groups. Both groups undergo fitness tests before the start of the eight-week Aerobics programme and at the end of the eight-week Aerobics programme. Each student who agreed to take part in the study signed a consent form and fill Medical Form. Progressive Aerobic Cardiovascular Endurance Run (PACER) test was administered to assess Cardiorespiratory Endurance. It includes variation of the Beep Test that is maximal aerobic fitness test, where the participants run 20m shuttles at increasing speeds. Participants run back and forth and the score was the total number of shuttles reached before she was unable to keep up with the recording for two consecutive ends. Participants' results were recorded in the score sheets for analysis.

### 2.3 Data Analysis

The gathered data underwent a process of cleaning, coding, and entry using excel. Subsequently, it was imported into the Statistical Package for Social Sciences (SPSS version 22) for analysis. Descriptive statistics like standard deviation, mean and percentage were calculated. Furthermore, paired t-tests were utilized to determine any significant changes in the cardiorespiratory endurance variable after the eight-week Aerobics programme. Paired t-test is utilized in normally distributed data in the paired form (Manfei *et al.*, 2017) [13].

## 3. Results

The researcher experimental character necessitated the creation of an experimental (n=20) and control group (n=20). Both groups were tested. One set of test was performed prior to the start of the eight-week Aerobics course to create a baseline, and the second set of post-tests was administered after the eight-week Aerobics programme. The overall goal of the research was to explore the effect of an eight-week aerobics programme on the Cardiorespiratory Endurance of Kenyan female university students. The data was analyzed using the Statistical Package for Social Sciences (SPSS Version 22), and a series of paired t-tests were performed to compare means before and after Exercise. Each variable's means, percentages, frequencies, and standard deviations were examined using descriptive statistics. Every hypothesis was examined at the alpha level of 0.05.

The above table presents the average scores for cardiorespiratory endurance (CRED) before and after the test, which were 5.85±0.47, 6.50±0.43 for the experimental, and control groups respectively. The experimental group achieved an average score of 8.95±0.35 in the post-test, while the control group's average score was 6.15±0.46. The findings indicate that, although not evident at the initial test ($p=0.313$), there was a notable difference in CRED scores between the experimental and control groups after the test [$t(38) = 4.83$; $p<0.001$]. The CRED scores for the experimental group had increased significantly between the pre-test and post-test [$t(19) = 8.74$; $p<0.001$], but the score for the control group did not change significantly [$t(19) = -1.44$; $p=0.167$] between the two data collection points. This in accordance with the paired t-test analysis conducted to examine the change in scores in each of the two groups between the pre-test and post-test. The post-revelation results indicate that the experimental group improved statistically because of their involvement in aerobic dance.

**Table 1:** Pre-Test and Post-Test Raw Data for Cardiorespiratory Endurance (20-M PACER).

| Experimental Group (EG). Codes | Experimental Group (EG). Pre-Test | Experimental Group (EG). Post-Test | Change (EG). | Control Group (CG) Codes | Control Group (CG). Pre-Test | Control Group (CG). Post-Test | Change (CG). |
|---|---|---|---|---|---|---|---|
| EG 001 | 06 | 08 | 2 | CG 01 | 04 | 04 | 0 |
| EG 002 | 04 | 07 | 3 | CG 02 | 08 | 08 | 0 |
| EG 003 | 05 | 07 | 2 | CG 03 | 06 | 04 | -2 |
| EG 004 | 09 | 10 | 1 | CG 04 | 10 | 09 | -1 |
| EG 005 | 04 | 08 | 4 | CG 05 | 07 | 08 | 1 |
| EG 006 | 04 | 11 | 7 | CG 06 | 04 | 03 | -1 |
| EG 007 | 06 | 09 | 3 | CG 07 | 05 | 05 | 0 |
| EG 008 | 04 | 08 | 4 | CG 08 | 06 | 05 | -1 |
| EG 009 | 05 | 10 | 5 | CG 09 | 05 | 04 | -1 |
| EG 0010 | 10 | 12 | 2 | CG 010 | 09 | 10 | 1 |
| EG 0011 | 06 | 08 | 2 | CG 011 | 09 | 06 | -3 |
| EG 0012 | 07 | 08 | 2 | CG 012 | 09 | 09 | 0 |
| EG 0013 | 07 | 10 | 3 | CG 013 | 07 | 06 | -1 |
| EG 0014 | 04 | 10 | 6 | CG 014 | 04 | 04 | 0 |
| EG 0015 | 03 | 07 | 4 | CG 015 | 05 | 06 | 0 |
| EG 0016 | 05 | 08 | 3 | CG 016 | 04 | 05 | 1 |
| EG 0017 | 06 | 08 | 2 | CG 017 | 06 | 05 | -1 |
| EG 0018 | 08 | 10 | 2 | CG 018 | 08 | 09 | 1 |
| EG 0019 | 04 | 08 | 4 | CG 019 | 06 | 06 | 0 |
| EG 0020 | 10 | 12 | 2 | CG 020 | 08 | 07 | -1 |

N = 40 (20: Experimental Group and 20: Control Group)

**Table 2:** Differences in the Cardio-Respiratory Endurance Scores Between Experimental and Control Groups at Pre-Test and Post-Test.

| | CRED scores by study group (mean ± SE) | | Statistic |
|---|---|---|---|
| | Experimental, N=20 | Control, N=20 | p-value |
| Pretest | 5.85±0.47 | 6.50±0.43 | 0.313 |
| Posttest | 8.95±0.35 | 6.15±0.46 | <0.001 |

**Table 3:** Differences Between Pre-Test and Post-Test Cardio-Respiratory Endurance Scores for Study Groups and Paired T-Test.

| Study group | CRED scores (mean ± SE) | | Difference (MoC) | Statistic |
|---|---|---|---|---|
| | Pretest | Posttest | | p-value |
| Experimental, N=20 | 5.85±0.47 | 8.95±0.35 | 3.1±0.35 | <0.001 |
| Control, N=20 | 6.50±0.43 | 6.15±0.46 | -0.35±0.24 | 0.167 |

## 4. Discussion

The study revealed the changes between Experimental and Control groups during the pre-test and the post-test of an Eight-Week Aerobics Programme. The significance of cardiorespiratory endurance is highlighted, whereby the heart, lungs, and blood vessels can operate at their best while carrying out their functions. This makes it possible for the body to take in oxygen and transport it throughout, especially to active tissue, where metabolic activities may use it (Arfanda, Wiriawan, Setijono, *et al.*, 2022) [2]. This is among the most significant elements of physical fitness that have to do with health. The Cardiorespiratory Endurance is the site where the heart and lungs take in and transfer enough oxygen to the working muscles such that prolonged activity is possible (Subramani & Suba, 2019) [22]. Thus enhancing endurance in sports or daily activities at maximum level. The improvement in cardiorespiratory endurance performance revealed that aerobic dance-training programme had positive effects (Annadurai & Gandhimaheswaran, 2021) [7]. Thus demonstrating that cardiorespiratory endurance in the experimental group significantly improved at the end of an eight-week Aerobic training programme (Naveena & Glory, 2019) [15].

The changes imply the need to live healthy life through improve of cardiorespiratory endurance by exercise (Singh, Laishram & Meetei, 2021) [18]. Healthy cardiorespiratory endurance is essentials to high level of fitness and wellness. Regarding that, there was no discernible change in the control group cardiorespiratory endurance between the pre- and post-test. The goal was to perform aerobic exercise since it strengthens the heart, enhances the circulatory system, and increases the body's capacity to supply oxygen to the muscles. Cardiorespiratory endurance is the most crucial and significant aspect of physical fitness relating to health, other from flexibility, muscular endurance and strength, and body composition (Anuar, 2020) [8].

A strong cardiorespiratory base is necessary for success in endurance sports, and aerobic metabolism that power endurance exercise (Arfanda, Wiriawan, Setijono *et al*., 2022) [2]. They fortify our heart and lungs and teach our circulatory system to better control and distribute oxygen throughout our body in the course of daily activities and athletic endeavors. Large muscle groups with a rhythmic character that can be sustained for at least 10 minutes are useful during endurance sports (Mathai & Balasubramanian, 2022) [14].

## 5. Conclusion

Aerobic exercise generates beneficial changes in the body and mind and activates the heart, lungs, and all functioning groups of muscles (Alemayehu, Bayile & Mossa 2021) [6]. This implies that, after an Eight-Week Aerobics Programme, Experimental group experienced significant change in mean scores in comparison with Control group. During the pre-test Experimental and Control group had no significantly difference. Aerobic Exercise is the kind of exercise strengthens the heart, enhances the circulatory system, and increases the body's capacity to supply oxygen to the muscles (Annadurai and Gandhimaheswaran, 2021) [7]. This meant

that Experimental group had an increase in mean scores compared with Control group.

The changes exhibited in the experimental group during the post-test ascertained the need of exercising at least 3 days per week for the improvement of cardiorespiratory endurance. Therefore, maintaining enough cardiorespiratory fitness is necessary to enable the completion of these full-body exercises without experiencing abrupt and intense tiredness. The knowledge of the heart, lungs, and blood vessels (as well as the blood they carry) is necessary to improve cardiorespiratory fitness (Ajisafe, 2019) [4].

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