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EFFECT OF GROUP-BASED JOGGING ON THE CENTRIPETAL FAT AND ANTHROPOMETRIC INDEX AMONG ADOLESCENT STUDENTS IN ZING, TARABA STATE, NIGERIA

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Abstract

The study looked into how group-based jogging changed centripetal fat and anthropometric index among adolescent students in Zing, Taraba State, Nigeria. A one-group pretest/post-test design was adopted for this study. Purposive sampling techniques were employed to select 30 adolescent students from Government Junior Secondary School Zing, aged 11 to 15, to participate in the study. A body composition monitor device, a stature metre for height, and a flexible tape metre were utilised in this study to investigate the effect of group-based jogging on centripetal fat and anthropometric index in adolescent students. All of the adolescent students chosen satisfied the study's inclusion requirements and were all assigned to group-based jogging at the baseline of pretest values. The exercise programme lasted between 38 and 44 minutes and ended with a cool-down session. All the exercise sessions were conducted between the hours of 4:30 p.m. and 5:45 p.m. on alternate days; Mondays, Wednesdays, and Fridays for eight (8) consecutive weeks. The intensity of the training was maintained between 40 and 45% of the estimated Heart Rate maximum for 2 weeks and was increased as the training progressed to 45–55% of the estimated Heart Rate maximum after 3–8 weeks of the exercise. The collected data were analysed using the statistical package SPSS version 20, and the student's independent t-test was used at a 0.05 alpha level. The results of the study revealed that group-based jogging had a significant effect on visceral fat ($P = 0.000$) and waist circumference ($P = 0.000$). Based on the results of this study, it was therefore concluded that group-based jogging for 8 weeks had a significant effect on the centripetal fat and anthropometric index, thus reducing the visceral fat, and waist circumference, among adolescent students in Zing, Taraba State, Nigeria. It was recommended that the school management should encourage adolescent students to participate in jogging for 30–60 minutes, at least 3 days per week, for the prevention, control, and management of centripetal fat and anthropometric index among adolescent students in Zing, Taraba State, Nigeria.

Introduction

Globally, the incidence of centripetal fat deposition and an increase in the waistline is on the rise, which has an impact on people's health and healthcare costs at every stage of life (Karnik & Kanekar, 2012; Bhupathiraju & Hu, 2016). This might be the result of technological developments that have altered lifestyles, such as increased urbanization, the use of mechanized transportation, increased television viewing, and the consumption of more calorie-dense foods, which lead to an imbalance between energy intake and energy expenditure (Soyler & Zileli, 2018; Piber, Colombo-Souza, & Armond, 2020). Physical inactivity and unhealthy lifestyle choices, on the other hand, have grown to be significant health issues for teenagers, increasing the prevalence of centripetal fat and large waist sizes in the adolescent population (Kerkadi, Sadig, Bawadi, Al Thani, Al Chetachi, Akram, Al-Hazzaa, & Musaiger, 2019). Adolescence is a crucial time for the formation of healthy lifestyle habits; hence it is crucial to address physical inactivity during this era (van Sluijs, Ekelund, Crochemore-Silva, Guthold, Ha, Lubans, Oyeyemi, Ding, & Katzmarzyk, 2021). Teenage obesity and sedentary lifestyle rates are on the rise in Zing, Taraba State, as well as in many other States in Nigeria and around the world, which calls for immediate attention and intervention (Marques, Henriques-Neto, Peralta, Martins, Demetriou, Schönbach, & Matos, 2020).

Centripetal fat accumulation and carrying a large waist size are currently the most significant global health challenges of the twenty-first century, with short- and long-term health implications that will cause immediate psychosocial health issues like low self-esteem and self-image, issues integrating with peers, depression, anxiety, stigmatization, and could also increase the risk of type 2 diabetes, coronary heart disease, hypertension, stroke, and other health conditions (Purnell, 2023). According to Dhawan & Sharma (2020), a number of health hazards, including metabolic and cardiovascular diseases, have been associated with centripetal fat distribution, or more particularly, the buildup of fat around the abdomen area. Regular exercise, like jogging, is becoming more and more popular as a low-cost, simple, and convenient sort of physical activity. Physical activity, especially aerobic exercise, has long been acknowledged as playing a significant role in improving and maintaining overall health and well-being in people of all ages (Ahmed, 2021). According to studies by Nystoriak, &Bhatnagar (2018); Malm, Jakobsson, & Isaksson (2019) as well as Pinckard, Baskin, & Stanford (2019), regular physical activity improves metabolic health, lowers body fat, increases cardiovascular fitness, and improves mental health.

Centripetal fat, which makes up 10% of the total body fat, is the kind of fat that is kept in the abdominal cavity and is thus kept close to a variety of vital organs, including the heart, liver, pancreas, and intestines (Gotter, 2021). Visceral fat is sometimes referred to as "active fat" because it has a distinct and potentially harmful role in how hormones work. Its accumulation is linked to higher risks of health issues like insulin resistance, which can result in glucose intolerance, type 2 diabetes, heart disease, and stroke (American Heart Association 2022; Centers for Disease Control and Prevention, 2022). Accordingly,

research has shown that visceral fat secretes a protein called retinol-binding protein 4 that worsens insulin sensitivity (Gotter, 2021; AHA, 2021).

The measurement of your waist circumference is found immediately above your hips. For measuring waist circumference, the Centers for Disease Control and Prevention (CDC, 2022) suggested the methods below. You only need a tape measure. The measurement should be taken while exhaling. Begin by standing up straight and wrapping a tape measure around your waist. It should sit just above your hip bone. Ensure that the tape is in line with the surface and forms a horizontal line across your body. Regarding men, a waist circumference between 94cm (37in) and 102cm (37 into 40in) is considered "high risk," 94cm (37in) and 102cm (40in) or more is considered "very high risk." For women, the risk is low below 80cm (31.5in), high between 80 and 88cm (31.5 and 34.6in), and very high above 88cm (34.6in). It has been argued that a wide waistline can cause diabetes, cancer, or heart disease. Weight gain can occur rapidly, while body fat reduction or control requires significant effort and commitment (Tomlinson, Erskine, Morse, & Onambele, 2019).

According to Flynn, Jellum, Howard, Moser, Mathis, Collins, Henderson, and Watjen (2018), jogging has been around for as long as humans have, and it is an essential tool for preventing, managing, and promoting healthy living. Furthermore, it is highlighted that jogging activities are crucial for the preservation of good health as well as the growth and development of individuals of all ages because, although appearing to be a kinder kind of running, jogging really burns more calories each mile. According to Budnis & Stanborough (2019); National Institution on Aging (2020); Florida Independent (2020) found and reported that running burns 9.8 calories per minute on average whereas jogging burns 10.8 calories per minute. A sedentary lifestyle is linked to metabolic irregularities, which are the main cause of most chronic diseases and could lead to a significantly reduced standard of life.

There are no studies that specifically examine the effects of group-based jogging on centripetal fat distribution and different anthropometric indices among adolescent students in Zing, Taraba State, Nigeria. While existing research highlights the potential benefits of physical activity interventions on body composition and anthropometric measurements, there is a paucity of studies that do so. To establish targeted and evidence-based interventions to combat the rising obesity and the global epidemic among this subjected population, it is essential to comprehend how group-based jogging affects these variables. This study looked at how jogging in a group affected visceral fat and waist circumference in teenage pupils in Zing, Taraba State, Nigeria.

Methodology

One-group pretest-posttest was used as the study's design. A non-random group of participants is exposed to a particular intervention or treatment in order to establish cause-and-effect or a significant effect on the participants on independent and dependent

variables. This is a type of quasi-experimental design in which the outcome of interest is measured twice: once before (pretest) and once after (post-test) (Reichardt, 2019; Thomas, 2020). 906 teenage students from Government Secondary School Zing in Taraba State, Nigeria, who were registered JSS 1-3 pupils between the ages of 11 and 15 made up the study's population. (Annual School Census 2021–2022). 30 people make up the study's sample size. The method used to choose the 30 participants was as follows:

Step 1: The researcher chose one of the two (2) public secondary schools in the Zing, Taraba State using a simple random procedure, in which the names of the two schools were written on a piece of paper, wrapped, and put in a container. Without considering alternatives, the researcher chose a school, and that school's name served as the study area.

Step 2: To indicate their interest in taking part in the program, the participants were given an informed consent form to fill out. Only properly completed and signed forms from participants serving as an attestation of preparedness and a PAR-Q (physical assessment readiness questionnaire) were accepted. Only those participants who responded "no" on the PAQ-R have been selected for the study.

Step 3: Using J.S.S. I-3 as the inclusion criterion, participants between the ages of 11 and 15 were chosen, and only those who met these requirements were included. Participants ranged in age from 11 to 15 and attended the Government Junior Secondary School in Zing Local Government Area of Taraba State. They additionally had to have no underlying medical conditions that might make it dangerous for them to complete the training program, not engage in any other physical activity outside of physical education classes or lessons during the research period, and that central (visceral fat) indicated > 5%, and above who had showed interest were selected for the study. A letter of introduction to the principal of Government Secondary School, Zing, was obtained from the Department of Human Kinetics and Health Education, Ahmadu Bello University, Zaria, as well as ethical approval from the committee on the use of human subjects, School of Postgraduate Studies, Ahmadu Bello University, Zaria. The researcher chose two research assistants, who underwent a two-day training session on how to operate the apparatus used to record the measures used in this study. But by capturing and logging the readings, they helped the researcher. The following tools will be used to gather data: Flexible Measuring Tape and Body Composition Monitor (BF511-511T-E/HBF-511B-E) were used to measure waist circumference and visceral fat at the pretest and posttest, respectively.

To assess the effects of 8-weeks regular group-based jogging exercise on %VF and WC among teenage students in Zing, Taraba State, Nigeria, the participants were exposed to it. The jogging regimen, however, was done three times a week, alternatively on Monday, Wednesday, and Friday between the hours of 4:00 and 5:15 p.m. Therefore, to prepare the body system for the jogging exercise and to prevent injuries in the sessions of the jogging program, the participants were asked to complete a 5-minute warm-up, which consisted

of brisk walking and stretching, and a 5-minute cool down on the town football field. The Statistical Package for the Social Sciences version 20.0 (IBM) was used to analyze the data gathered. The participant's demographics were summarized using simple percentages. While the descriptive statistics of the mean and standard deviation were used to analyse the research question, a paired t-test was used to assess the significant impact of group-based jogging on the centripetal fat patterning variables, including visceral fat, and waist circumference, at the significance level of P = 0.05.

Results

The demographic characteristics of the participant's from JSS 1–3 in the government secondary school Zing, Taraba State, Nigeria, revealed that 7 (23.3%) participants were from JSS 1, while 11 (36.7%) of the participants were from JSS 2, and 12 (40.0%) were from JSS 3. Therefore, it has been concluded that the majority of the participants were from JSS 3, the demographic characteristics of gender, show that 18 (60.0%) of the participants were male, while 12 (40.0%) of them were female. Therefore, the majority of the participants that took part in the study were male, and the age distribution of participants revealed that 2 participants representing (7%) were 11 years old, while 7 participants representing (23%), were 12 years old. Table 7 also shows that 8 participants representing (27%), were 13 years old, 10 participants representing (33%), were 14 years old, and 3 participants representing (10.0%) were 15 years old. It has also been revealed that the majority of the participants were 14 years old.

Table 1: Descriptive statistics of mean, standard deviation, and standard error of group-based jogging on visceral fat percentages in adolescent students in Zing, Taraba State

Variables	Test	No	Mean	SD	SE
Visceral Fat (%)	Pretest	30	6.633	1.098	0.2004
	Posttest	30	4.866	0.776	0.1416

Mean, SD =Standard deviation, and SE= Standard Error

Table 1 above showed the pre-test and post-test mean, standard deviation, and the standard error of visceral fat percentages at baseline and at 8 weeks group based on (%VF) among adolescent students in Zing. An observation of this result revealed that the participants had Mean and (SD) on the visceral fat percentage of (6.633 ± 1.0980) at the baseline. Further observation of the results showed that the participants had Mean and (SD) visceral fat percentages of (4.866 ± .7760) after 8 weeks of group-based jogging. This implies that the mean of (%VF) decreased from (6.633 ± 1.0980) to (4.866 ± .7760) during the intervention programme. The data collected at the baseline and at 8 weeks of group-based jogging were analysed using Paired t-tests; the results were presented in Table 2.

Hypothesis Testing

Table 2: Paired t-test Analysis of the Pretest and Post-test Effect of Group-Based Jogging on Visceral Fat among Adolescent Students in Zing Local Government Area of Taraba State, Nigeria

Variables	Test	N	Mean	Std. D	Df	t	p
%Visceral Fat	Pretest	30	6.633	1.098	29	17.026	0.000
	post-test	30	4.866	0.776			

t = (29) = 17.0261.96, P =.000 ˂ 0.05

Table 2 above showed the paired t-test of group-based jogging on %visceral fat among adolescent students in Zing. An observation of this result showed a statistically significant effect of group-based jogging at the pretest and post-test of (P=.000˂0.05) on visceral fat among adolescent students in Zing. Therefore, the null hypothesis, which states that there is no significant effect of group-based jogging on visceral fat percentage among adolescent students in Zing, Taraba State, was rejected.

Table 3:Descriptive statistics of mean, standard deviation, and standard error of effect of group-based jogging on waist circumference among adolescent students in Zing, Taraba State.

Variables	Test	No	Mean	SD	SE
Waist circumference	Pretest	30	29.2	1.73	0.316
(cm)	post-test	30	27.57	1.501	0.274

Mean, SD =Standard deviation, and SE= Standard Error

Table 3 above showed the pre-test and post-test mean, standard deviation, and standard error of waist circumference at baseline and at 8 weeks of group-based jogging among adolescent students in Zing. An observation of this result revealed that the participants had Mean and (SD) of waist circumference (29.20 ± 1.730) at the baseline. Further observation of the results showed that the participants had Mean and (SD) of waist circumference (27.57 ± 1.501) at 8 weeks of group-based jogging. This implies that the mean waist circumference decreased from (29.20 ± 1.730) to (27.57 ± 1.501) during the intervention programme. The data collected at the baseline and after 8 weeks of group-based jogging were analysed using Paired t-tests; the results are presented in Table 4.

Table 4: Paired t-test Analysis of the Pretest and Posttest Effect of Group-Based Jogging on Waist Circumference of Adolescent Students in Zing Local Government Area of Taraba State, Nigeria

Variables	Test	N	Mean	Std. D	df	t	p
	Pretest	30	29.20	1.730			
Waist circumference					29	13.379	0.000
	Posttest	30	27.57	1.501			

t = (29) = 13.3791.96, P =.000 < 0.05

Table 4 above showed the paired t-test of group-based jogging on waist circumference among adolescent students in Zing. An observation of this result showed a statistically significant effect of group-based jogging at the pretest and posttest of (P=.000<0.05) on the waist circumference among adolescent students in Zing. Therefore, the null hypothesis, which states that there is no significant effect of group-based jogging on waist circumference among adolescent students in Zing, Taraba State, was rejected.

Discussions

The findings of this study revealed that group-based jogging had a significant effect on visceral fat among adolescent students in Zing, Taraba State, Nigeria. However, the results of this study agreed with those of Ngayimbesha, Jean, and Marie (2019), who discovered and reported that regular jogging exercise induced a considerable reduction in visceral fat. The study also supported the findings of Abdulsalam, Gunen, and Suleiman (2021), who discovered that jogging had a significant effect on visceral fat; similarly, Vissers, Hens, Taeymans, Baeyens, Poortmans, & Van Gaal, (2013), discovered that aerobic training of moderate to high intensity has the greatest potential to reduce visceral adipose tissue in males and females regardless of age and that aerobic exercise programs used without a hypocaloric diet have shown a beneficial effect in reducing visceral adipose tissue with more than 30 cm2 (on CT analysis) in women and more than 40 cm2 in men, even after 8 weeks. Similarly, as Bubnis and Beabout (2020) pointed out that aerobic exercise has long been recognized as an important component of a healthy lifestyle, and new scientific research has connected regular aerobic exercise such as jogging, running, and walking to a variety of physical health advantages. To that purpose, research has shown that altering the strength of physical exercise reduces the risk of various chronic diseases, including coronary heart disease, hypertension, non-insulin-dependent diabetic mellitus, osteoporosis, and colon cancer (Sorate, 2015). Aerobic exercises, such as jogging, walking, and running, are also thought to be the greatest for reducing visceral fat. Researchers from the Imperial College School of Medicine in London attested that moderate aerobic activity over an extended period of time, generally known as "cardio," is beneficial in reducing or losing visceral fat (Chapman 2020). The study also allied with Chtourou and Souissi (2012), who reported that researchers from Japan's National Institute of Health and Nutrition discovered that mild to moderate jogging exercise is

essential for visceral fat reduction and that it does not matter how one moves as long as one continues to move. As reported by Silva, Petroski, and Pellegrini (2014), aerobic exercise-based intervention promotes positive changes in body composition, such as a reduction in visceral fat, beginning with the lipid profile, increasing high-density lipoprotein, and decreasing triglyceride levels. This study also agreed with Adams, Oppong, Worlanyo, Agblo, Owusu, and Moses (2022), who discovered and reported that regulated aerobic exercise reduced visceral fat and improved sleep quality (p 0.05) in the experimental group at the end of the intervention period. In the control group, there was no significant difference in visceral fat. The trial lasted six weeks and was conducted 3-5 times per week for 45 and 40 minutes per session, with the control group receiving no intervention. This implied that it would be greatly reduced after 8 weeks and 12 weeks, as demonstrated in this study. Similarly, Sabag, Way, Keating, Sultana, O'Connor, Baker, Chuter, George, and Johnson (2017), on the other hand, showed a significant pooled effect size for the meta-analysis comparing aerobic exercise vs. control on visceral adiposity (ES = -0.21, 95% CI: -0.37 to -0.05; P = 0.010). Aerobic exercise effectively reduced visceral fat, perhaps even hepatic adipose tissue, in those with obesity-related type 2 diabetes. According to the linked literature examined, the reduction in the %VF was caused by the effect of group-based jogging 3 days per week for 8 weeks.

The study revealed that group-based jogging had a significant effect on waist circumference among adolescent students in Zing, Taraba State, Nigeria. The study also concurred with Armstrong, Jungbluth, Rodriguez, Sabag, Mavros, Parker, Keating, and Johnson (2022) who found and reported that regular aerobic exercise reduced waist circumference by 3.2 cm (95% confidence interval [CI] -3.86, -2.51, p 0.001) against the control group. This study also coincided with Mills and Wellington's (2020) conclusions that (pre-39.34; post-37.26; diff. 2.08 inches) waist circumference was seen before and after the 6-week intervention (P = 0.001) and was statistically significant. Aerobic exercise, like the findings of Park and Kim (2022), lowered waist circumference. The study was also consistent with Khan, Agrawal, and Memon's (2022) observations that aerobic exercise alters waist circumference considerably in pre- and post-intervention with a p-value of 0.05. The study also agreed with Chiu Ko, Wu, Yeh, Kan, Lee, Hsieh, Tseng, and Ho (2017), who discovered and reported that comparing aerobic exercise intensities between the pretest and post-test revealed a significantly lower, waist circumference, and fat mass, and cardiorespiratory endurance index. The difference was marginally significant in the low- or light-intensity training group, marginally significant in the moderate-intensity training group, and marginally significant in the high-intensity training group. They also discovered that the high-intensity training and moderate-intensity training groups did not differ substantially, however, the light-intensity training group and control group did. However, the occurrence has demonstrated that aerobic exercise has the ability to alter waist circumference after 6 weeks of training with respect to the intensity of the activity; therefore, the researcher concludes that the reduction in WC was a result of regular group-based jogging done for 8 weeks.

Conclusions

Centripetal fat, also known as visceral fat, is the fat that accumulates around the abdominal organs, particularly in the intra-abdominal area which brings about increased waistline or abdominal obesity is a significant health concern, especially among adolescents. On the basis of the findings of this study, the following conclusion was drawn: Group-based jogging modified visceral fat and waist circumference among adolescent students in Zing, Taraba State, Nigeria.

Recommendations

Based on the findings of this study, it was recommended that Exercise Scientists, Sports medicine physicians, and Physiotherapists should organise seminars, and workshops on the importance of group-based jogging and its effects on visceral fat in reducing centripetal fat patterning among adolescent students in Zing, Taraba State. The government should organise an intervention programme on group-based jogging to adjust waist circumference and modify centripetal fat patterning among adolescent students in Zing, Taraba State.

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