DOI: https://doi.org/10.67203/jhpesls.2025.plfcdz5u

Journal of Health, Physical Education, Sports and Leisure Studies, Vol. 10, No. 2, July, 2025

EFFECT OF ROPE SKIPPING ON WAIST-TO-HIP RATIO (WHR) AMONG MALE STUDENTS OF DEMONSTRATION SECONDARY SCHOOL, FCE, ZARIA, KADUNA STATE

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ABSTRACT

The purpose of this study was to assess the Effect of Rope Skipping on waist to hip ratio (WHR) Among Male Students of Demonstration Secondary School, FCE, Zaria, Kaduna State". 25 selected participants undergoing a secondary education at Demonstration Secondary School Federal College of Education Zaria, Kaduna State were used for the study. They were 12 to 15 years old. All the participants selected satisfied the inclusion criteria and participated in rope skipping for 8 weeks. Data was taken at the baseline (0-week), 4th-week, and 8-week. The exercise session was conducted between the hours of 4:00 pm to 5:00 pm on Mondays, Wednesdays, and Fridays. The data collected were analyzed using the statistical package for social sciences repeated analysis of variance (ANOVA) was used to test the hypotheses at the statistically significant level $P<0.05$. The results of the study revealed that rope skipping significantly reduced Waist-to-hip ratio (WHR), at ($P=.001 < 0.05$) of male students of Demonstration Secondary School FCE Zaria. Based on these results, it was concluded that 8-week rope skipping had a significant effect in reducing waist to hip ratio of male students of Demonstration Secondary School FCE Zaria that were involved in the exercise. In conclusion, the study recommended that rope skipping exercise should be used as an alternative method in reducing Waist-to-hip ratio (WHR) of male students of Demonstration Secondary School FCE Zaria.

Introduction

Understanding student's participation in exercises is crucial to promoting an active lifestyle and maintenance of normal weight. Nowadays, no student wants to be tagged “fatty individual” but unfortunately lacks modalities that could keep him or her under the appropriate weight. Participating in regular physical activities has positive effects on students' health and academic performance as well as general well-being (Zeng, Hipscher & Leung, 2011). Despite the well-known paybacks of physical activities, about 80% of students between ages 18 to 35 years still do not engage in the recommended sixty (60) minutes of moderate to vigorous physical activity per day (Seelen, Mikkelsen & Wolderslund, 2018). One of the predictors of physical inactivity among male students is using technological devices (Alotaibi, Almuhanna, Alhassan, Alqadhib, Mortada, &

Alwhaibi, 2020). Kenney and Gortmaker (2017), discovered that heavy usage of cell phones, tablets, laptops, and video games was positively associated with inactivity.

Alotaibi *et al* (2020), discovered that watching television reduced a student's time for physical activity. One study on 12 to 15-year-old adolescents found that those who utilise electronic devices heavily are less active and are more likely to be sedentary(Alotaibi *et al.,* 2020). Similarly, Webster, Martin, & Staiano (2019) found inverse relationships with screen time but favourable associations with young people's reliable physical exercise and basic motor abilities. Using modern technology can cause adolescents to engage in less physical exercise since it disrupts their daily routines (Alotaibi *et al.,* 2020). Lack of physical activity is associated with over 3.2 million deaths per year worldwide, making it a risk factor for high mortality. To maintain appropriate blood pressure and glucose levels, a healthy body weight, better sleep habits, an improved immune system, and improved metabolism, physical activity is crucial (World Health Organization, 2017). The World Health Organization (WHO) states that inactive young people need at least one hour of vigorous to moderate physical activity every day (WHO, 2017). If daily movement lasts more than 60 minutes, the effect is greater (WHO, 2017). This challenge has kept the rising rate of overweight and obesity which are the leading cause of death as of today, and inactivity levels among students on the high side over time (WHO, 2017).

Waist-to-hip ratio (WHR) which is another anthropometry measurement of centripetal fat patterning is defined by Bill, Watson, and Wall (2023) as the smallest circumference measured at the naval and the hip circumference as the widest circumference measured at the hips and buttocks. It measures the ratio of waist circumference to hip circumference to determine how much fat is deposited on the waist, hips, and buttocks. The World Health Organization (2008); Harvard University (2016); and Sachdev, (2021) documented that a healthy waist-to-hip ratio is 0.9 cm or less in males and 0.85 cm or less for females while a moderate risk range is 0.96-1.0 cm for males and 0.85 cm and above for female. The waist-to-hip ratio is a simple calculation that divides the circumference of the waist by the circumference of the hips. It is a method for determining whether someone has a healthy level of body fat around their stomach about hips. Experts recognize that storing too much fat, particularly on the abdomen, raises the risk of a variety of conditions under certain circumstances, including Diabetes, Heart Disease, and Fatty Liver Disease (Sampson, & Leonard, 2020). Furthermore, Budnis and Burgress, (2017), that WHR is a fast measure of fat distribution that might assist in suggesting a person's overall health. People who carry more weight around their stomach than their hips may be more likely to suffer certain health problems.

Rope skipping is a simple and effective physical activity that helps to enhance physical fitness and maintain a good body shape of an individual while training for agility and stamina. Skipping rope exercise involves the use of muscles in arms and legs as the arms rotate the rope and both legs perform repeated jumping, at the same time to maintain

constant vertical take-off and landing phases (Sharma, & Biswas, 2023). This improves cardiovascular function and metabolism as well as centripetal fat patterning indexes which are essential for inhibition of metabolic disorders and cardiovascular risk diseases. The importance of rope skipping includes enhancement of body Coordination and timing, stronger bones, strength and power, self-confidence, and cardiovascular health (Matthew, & Watson, 2023).

Purpose of the Study

The purpose of this study was to assess the effect of rope skipping on: Waist to hip ratio among male students of Demonstration Secondary School FCE Zaria.

Material and method

One-group repeated measures research design was adopted for this study. Twenty five (25) participants nine (9) from JSS 1, eight (8) from JSS 2, and eight (8) from JSS 3 stratum (level). All participants were selected using informed consent form and physical activity readiness questionnaire (PAR-Q). The participants' WHR was tested at 0week, 4th week and 8th week.

The training was carried out in the evening between 4:00-5:00 pm, three times a week on Mondays, Wednesdays and Saturdays of the week for 8 weeks. Before the training program, the participants performed a five-minute steady warm-up exercise such as stretches; jogging etc This was done in each of the training session to prepare the body system for physical exertion to prevent musculoskeletal injuries during the program. Succeeding the warm-up was rope skipping by the participants from moderate to high-intensity interval training which was properly supervised by the researcher and two research assistants. The exercises incorporated into the training were taken from the 'jump variation'. During the training, the participants were advised to remain hydrated by drinking water, but never to stop the rope from moving to remain active and keep the heart rate from dipping back to sedentary mode. The participants were allowed to have 5 minutes' rest in between each training session as some of them may not be able to go for a longer duration at a stretch. The intensity of the training was changed from time to time depending on the rate of perceived physical exertion (RPE) of the participants using the Borg Scale that rates from 6-20. Similarly, to determine exercise intensity is to use the participants' heart rate values. To exercise at a moderate intensity, aim for 40-50 %, 50-60 % of the maximum heart rate. To exercise at a vigorous intensity, aim for 60-70 % of the maximum heart rate.

The researcher used the rating of perceived exertion (RPE) scale, which is a subjective measure of exercise intensity based on how hard you feel you are working. The RPE scale ranges from 6-20, during a moderate-intensity workout, it was aimed at RPE of13-14, hard 15-16, very hard 17-18 and extremely hard 19.

To monitor the intensities of rope skipping, a high correlation exists between the participant's perceived exertion rating times 10 and the actual heart rate during physical activity; so, the participant exertion rating may provide a fairly good estimate of the actual heart rate during activity (Borg, 1998). For example, if the participant's rating of perceived exertion (RPE) was 13, then 13 x 10 = 130; so, the heart rate should be approximately 130 beats per minute. Note that this calculation only approximates heart rate, and the actual heart rate can vary quite a bit depending on age and physical condition.

In this study, the duration of the training session of the somewhat hard phases 13-14 was observed for 35 minutes, while the hard training session 15-16 lasted for 40 minutes, very hard session 17- 18 was done for 45 minutes, and extremely hard phase 19 was 50 minutes respectively.

However, the participants skipped from 0-2 weeks of the somewhat hard session at 13-14, meaning 13×10 =130 to 14×10 = 140, 3-4 weeks of hard session 15×10 =150 to 16×10 = 160, 5-6 weeks very hard at 17×10 = 170 to 18×10 = 180 and extremely hard 19×10 = 190 approximates maximal heart rate.

Results

Table 1 Demographic Characteristics of Participants

Variables		Frequency	Valid Percent	Cumulative Percent
Class	JSS 1	9	36	36
	JSS 2	8	32	68
	JSS 3	8	32	100
	Total	25	100	
Age Range	12 years	3	12	12
	13 years	5	20	32
	14 years	8	32	64
	15 years	9	36	100
	Total	25	100	
	Total	25	100	100

Class, Age range, and gender (Frequency, Percentages and Cumulative Percent).

Table 1 above displays the distribution by class of the participants from JSS 1-3 at Demonstration Secondary School, Federal College of Education Zaria, Kaduna State, Nigeria. An observation of this table, revealed that nine (9) participants, representing (36 %) were from JSS 1, whereas 8 participants representing (33 %) were from JSS 2.

Furthermore,8 participants, representing 32 % were from JSS 3. Consequently, the findings indicate that majority of the participants who took part in this study were from JSS 1.

Table 1 above also shows distribution by age of participants from 12 years through 15 years. This table also showed that 3 (12 %) of the participants were 12 years old, whereas, 5(20 %) were 13 years old, 8 (32 %) of the participants were 14 years old and 9 (36%) of the participants were 15 years old. Therefore, the results of this study shows that the majority of the participants who took part in the study were 15 years old during the time of the study.

Table 1 above also displays the demographic characteristics of the gender of participants. The table also shows that, 25 participants representing (100 %) were male. Consequently, the findings of this study shows that all the participants involved in this research were male.

Result

Table 2 Result of pretest, 4th and 8th weeks of rope skipping

Variables	Measurement	N0	Mean	Std. Deviation	Std. Error
Waist-to-Hip Ratio	WHR Baseline	25	0.9052	0.04104	0.00821
	WHR 4th-wk	25	0.8816	0.05444	0.01089
	WHR 8th-wk	25	0.8156	0.047	0.0094

Table 2 shows the results of the waist-to-hip ratio of the participants at three different time points: the baseline, the 4th week, and at 8 weeks. Furthermore, Table 4 demonstrated that the participants' waist-to-hip ratio reduced from (.9052 ±.04104) at the baseline to (.8816 ±.05444) at the 4th week of rope skipping and (8156 ±.04700) at the 8th week. The data was collected at the baseline, 4thand 8weeks of rope skipping intervention.

Table 3 Repeated measures ANOVA of the rope skipping on waist-to-hip ratio of participants

Waist-to-Hip Ratio	Sum of Squares	Df	Mean Square	F	P
Between Groups	.108	2	.054	23.59	.001
Within Groups	.165	72	.002		

Table displayed above provides evidence of repeated measures ANOVA analysis at baseline, 4th and 8thweek of rope skipping on waist-to-hip ratio of participants. Consequently, the study indicates a statistically significant reduction in waist-to-hip ratio of participants with F= 23.59 at P=0.000 significant level. However, an examination of the study revealed that rope skipping for 8 weeks had a significant effect on the waist-to-hip ratio of participants with a significance level of P<0.000, which is less than p<0.05. Consequently, the null hypothesis that stated; there is no significant effect of rope skipping on the waist-to-hip ratio was rejected.

Discussion

This study assessed the effect of rope skipping on some selected WHR among male students of Demonstration Secondary School FCE, Zaria. The result of these findings showed that rope skipping had a significant effect on WHR after 8 week of intervention. This agrees with the findings of Esan (2018) who conducted a study on the influence of a circuit strength training program on the waist-to-hip ratio of college students. The objective of Esan's study was to investigate the amount of fat accumulated around the hips and thighs, as indicated by the waist-to-hip ratio, among college students in Ikere-Ekiti, Nigeria, following a 8-week circuit strength training program. The study revealed that the intervention program effectively prevented the accumulation of fat around the hips and thighs in the experimental group, thereby averting the high disease risk threshold of ≥ 1.00 for men and ≥ 0.85 for women. In the same vein, Amiri, Mirzaie and Elmieh, (2013) investigated on Effect of low and high-intensity walking programs on the body composition of overweight women. The results revealed that after an exercise intervention of walking exercise for 8 weeks, 3 times a week, the results of the test showed a significant difference in body composition but didn't show a significant difference in WHR measures after analysing the pre and post-test results using independent t-test. This result showed that aerobic activity with high intensity had a more desirable effect than aerobic activity with low intensity.

Park and Kim, (2022) revealed that aerobic exercise on waist circumference, VO2 max, blood glucose, insulin, and lipid index in middle-aged women: a meta-analysis of randomized controlled trials showed that aerobic exercise reduced waist circumference and blood glucose, and increased VO2 max significantly.

Similarly, Tadiotto, Furtado-Alle, Corazza, Jesus Menezes Junior, Brito, Michel, Mota, Purim, Turek and Leite (2018) conducted a study that investigated the relationship between Waist Stature Ratio (WHtR) and sedentary behaviour in adolescents, regardless of their level of physical activity. The study revealed that adolescents who engaged in more sedentary activities had a higher likelihood of being classified with high WHtR, indicating an increased risk of central obesity, even among those who were physically active (OR = 2.06; P = 0.02) or insufficiently active. Interestingly, measurements of Waist-Stature-Ratio showed that the distribution of fat is not influenced by age, race, or

gender (Rezende, Souza, Jardim, Perillo, Araujo, de Souza, Souza, Moreira, de Souza, Peixoto, & Jardin, 2018). In other words, individuals with a certain anthropometric measure of fat distribution will have the same amount of fat regardless of their age, race, socioeconomic status, or gender (Rezende, et al., 2018).

Furthermore, the WHtR measurement provides insights into the distribution of body fat in the abdominal region, which has been found to be more strongly associated with cardiovascular risks compared to overall body weight (Rezende, et al., 2018). However, Fontes, de Oliveira, Vanderlei, Garner, and Valenti (2018) examined the Waist-Stature Ratio and its Relationship with Autonomic Recovery from Aerobic Exercise in Healthy Men and found that Group 1 sat for 15 minutes at rest, followed by an aerobic activity, and then sat for 60 minutes at rest after exercise recovery. While Group 2 had a delayed recovery in respiratory rate, diastolic blood pressure, SD1, and HF markers. Group 3 had a delayed recovery following the maximal effort test, however, there was no difference between Group 2 and Group 3 in the moderate intensity. Correlation and linear regression analysis revealed a link between WSR, BMI, waist circumference, and HRV indices in Group 2 during recovery from aerobic activity (45 to 60 minutes after exercise). Finally, healthy males with higher WSR achieved delayed autonomic recovery following maximal effort exercise.

Conclusions

Based on the results of this study: it is concluded that Rope skipping for the 8 weeks significantly reduces the Waist-to-hip ratio (WHR) of male students of Demonstration Secondary School FCE, Zaria.

Recommendation

It is therefore recommended that rope skipping exercise could be used as an alternative exercise to reduce WHR among male students of Demonstration Secondary School FCE, Zaria.

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