



**EFFECT OF 8-WEEK INTERMITTENT AEROBIC EXERCISE ON BODY
COMPOSITION OF MALE ADOLESCENT STUDENTS IN DAWAKIN KUDU, KANO
STATE**

By

Adamu. S¹ & Isa Musa²

^{1&2} Department of Human Kinetics and Health Education, Aliko Dangote University of Science
and Technology, Wudil, Kano State, Nigeria

e-mai; adamusalisu65@gmail.com , isahmusa4@gmail.com

Phone No. +2348027997284, +2349084846735

Abstract

Physical inactivity is evidently linked to metabolic diseases leading to increased risk of morbidity and mortality from various causes. Aerobic exercise is one of the tools for decreasing sedentary levels, as well as improving health markers and cognitive abilities. The objective of this study was to determine the effect of eight week intermittent aerobic exercise on body composition variables of male adolescent secondary school (S.S) students of G.S.S Yankatsari, Dawakin Kudu (DKD) local Government Area (LGA), Kano State. Population consisted of all the adolescent boys between the ages of 14-18years (n =1,200) in G.S.S Yankatsari DKD. 60 male adolescent were randomly sampled and assigned into A&B 30 each. Group were subjected into 8-weeks intermittent aerobic exercise (n=30) intermittenwhich is jogging characterized by repetition of work at interval with recovery periods following each repetition to elevate body temperature and physiological functions. while B group (n=30) as control. Anthropometric profiles measured were % BF, FP and LBM. null hypotheses were formulated and tested at an alpha level of 0.05. Analysis of Variance One way (ANOVA) determined the significant differences between the 2 groups. Result revealed that 8-week intermittent aerobic exercise elicited significant changes in body composition by improving (reduced) % BF of the Experimental group from (9.4105±2.14to 5.49±1.39), it also significantly changes body composition by improving (decreased) the body FP of the Experimental group from (41.7435±.18 to 41.4160±108) and improve LBM (42.13±7.99 to 41.7±18) compared to control group. Kano State ministry of Education should collaborate with Health professionals and Exercise Scientists) to help create additional services to adolescent students in schools with a view to engage in exercises for maintaining desirable body composition which can lead to healthier living.

Key Words: Aerobic, Body Composition, Intermittent exercise,



Introduction

Physical inactivity is directly related to metabolic diseases, cancer, among others. Physical inactivity is linked to an increased risk of mortality from various causes. Aerobic exercise, whether interval or continuous, is one of the tools for decreasing sedentary levels, as well as improving health markers and cognitive abilities. This type of exercise can even be practiced by individuals of all ages and health conditions (Pedro, Raphael & Alexandre, 2020). Aerobic exercise is rhythmic in nature (Plowman and Smith, 2003) which require oxygen to burn fat stores for energy, done for a period of 15 to 20 minutes or longer while maintaining 60-80% of your maximum heart. it plays an important role in both primary and secondary prevention of cardiovascular disease (Plowman and Smith 1995). It increased resistance to fatigue, extra energy and stamina, toned muscles and increased lean body mass, decreased tension and stress and improved quality of sleep. Depress et-al (2005) For healthy adults to develop and maintain cardio respiratory fitness, the intensity needs to be between 50% and 80% VO₂ max (American College of Sports Medicine (ACSM), 1995 and Neiman, 2003). More vigorous exercise is needed confer its health benefits (Robergs and Ketayian, 2003). Vo₂ max increase as a result of aerobic exercise (Gaya, Mshelia, and Sansui, 2002: Hagbag, Musa and Adeniran, (1996).

Fox (1990) intermittent exercise is a jogging characterized by repetition of work at interval with recovery periods following each repetition. Intermittent exercise enables the athletes to improve the workload by interspersing heavy bout of jogging with recovery periods. The performer Jogs at a steady state then observes a resting period. During the running lactic acid is produced and state of oxygen debt is reached. At relief interval (recovery), the heart and the lungs are still stimulated as they try to pay back the debt by supplying oxygen to help to break down the lactic acids. The stress put upon the body causes an adaptation including capillarization, strengthening of heart muscles and improving buffers. Intermittent exercise comprises the sprint interval training and endurance interval training (Astrand, 1992). Wellberg and Ward (1985) and Hermanse (1996) in Gunnen (2001) participation in long duration interval training raised the concentration of enzymes involved in fatty acid oxidation among young children. Similarly, they maintained that interval exercise has beneficial effect on body composition. Gwani (2001) with intermittent exercise more work is done and this will lower blood pressure levels by mobilizing fat deposition in the arterial walls to exercising muscles for energy purpose and by reducing weight.

Body composition variables are the structural components of the human body which include percent body fat, fat mass, lean body mass and the bone stature. A theoretical model consisting of the average physical dimensions obtained from measurement of people aged 20-24 years through anthropometric survey, a gross composition of reference man and woman in term of muscle, fat and bone was formed. The determining variables of which include age, stature,



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muscles mass, total fat, essential fat, bone and lean body mass, it was observed that the reference man is taller, heavier has heavier skeleton, larger muscles and lower total body fat than reference woman (McArdle et al, 1991). The major concern with body composition is the enlargement of the body total fat tissue; the upper limits of normalcy with regard to 'Desirable' levels of body fat are below 19% for male and below 25% for females. Desirable in this context is the fatness level that is compatible. There is complete saturation of adipose cells with lipids and further cellular proliferation leading to increase in body weight (Hammond, 1985).

Several epidemiological studies have shown an inverse relationship between the level of fitness cardiovascular risk profile in adult population and have also reported that endurance training in this population can reduce the risk factors (Venkateswarlu, 1991). However, there is therefore a need for secondary school students to be fit in order to improve their fitness, controlling and reducing body fat and maintaining desirable body composition, using intermittent mode of exercises. It is against the background that this study was conducted to determine the effect of Effect of 8-week intermitten aerobic exercise on body composition of male adolescent students in Dawakin Kudu, Kano state.

Musa and Toriola (2002 Despress, Boucherd and Malina, 1990) revealed that children and adolescent do not suffer high level of mortality rate due to coronary heart diseases (CHD) but they have shown to develop some risk factors.

In Nigeria, there is evidence that hypertension and related over fatness identified at an early age in secondary school adolescents were due to lack of definite participation in physical education programme in the school system. In addition adolescents in the present dispensation cannot afford to feed well and it is obvious that exercise is energy demanding, they remain in active, thereby, living sedentary life that hampers fitness.

Scientific research evidence has been inconclusive on the best type of training programme for improving physiological attributes of an individual that will consequently improve the general physical fitness and health. Emiola (1986) several studies have used different training programmes in order to determine their effects on fitness and health. However, research on the efficacy of intermittent aerobic exercise on adolescent male secondary school students was insufficient .Therefore; there is need to improve secondary school students' exercise habits, with a view to attaining physical fitness and desirable body composition through properly structured exercise programmes. It is against this background that this study was under taken to determine the effect of Effect of 8-week intermittent aerobic exercise on body composition of male adolescent students in Dawakin Kudu, Kano state.

Objectives of the Study

The objectives of the study were to determine the effect 8-week intermittent exercise programme



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on fat patterns of male adolescent (FP), on lean body mass of adolescent (LBM) and on Percent body fat of male adolescent (%BF).

Research Questions

1. Will there be a significant difference between the effect of intermittent aerobic exercise on percent body fat (%BF) body fat patterns, and lean body mass (LBM) of body composition of male adolescent secondary school Students?
2. Will 8-week intermittent aerobic exercise elicit significant effect on percent body fat of body composition of male secondary school adolescents?
3. Will eight week intermittent exercise elicit significant effect on body fat patterns of body composition of male secondary school adolescents?
4. Will eight week intermittent exercise elicit significant effect on lean body mass of male secondary school adolescents?

Significance of the Study

The outcome of the study provide information on percent body fat (%BF), fat patterns and lean body mass (LBM) of adolescent male secondary school students, in Dawakin Kudu LGA Kano State prior to and after training. It also provide information on the effect of 8-week intermittent exercise on body composition variables of adolescent male secondary school students. It is importance to coaches, physical educators and exercise professionals, games masters, ministry of youth and sports and Kano State ministry of education in general to intensify effort in designing and organizing fitness program for health and wellness for adolescent students in secondary schools. The result also adds to the existing body of knowledge in exercise physiology.

Training Protocol

Training programme involved low training modes, of intermittent aerobic exercise. The exercise programme was preceded by warm up activities which included running, jumps, side Stretch, waist bend, and brisk walking with a view to elevate the body temperature and physiological functions. Similarly, cool down exercises were performed after each training session which entailed activities like mild walks, floor finger touch, thigh, arm and shoulder stretch. The aim was to restore the body physiology to normal. Subjects in the experimental group were to participate in jogging programme three times a week for 8-weeks. The training was done differently among the experimental groups, but at the same time on a (Standard 400 meters track) at G.SS Yankatsari.

Method of Data Analysis

The descriptive statistic (means and standard deviation) was used to analyze the physical characteristic and baseline data (pre- training and post training result) of the subjects inferential statistics of Analysis of Varian's One Way (ANOVA) was used to determine the difference

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between the experimental and control groups in pre and post-treatment measurement post treatment measures of the dependent variables. Where significant difference is obtained, the scheffe post hoc analysis was used to locate the point of difference. The hypotheses were tested at 0.05 alpha levels.

Results

Table 1: Baseline characteristics of subjects

Variables	Intermittent exercise (N=30)	
	X	S
Age (yrs)	16.80	±1.24
Weight (kg)	53.15	±7.39
Height (M)	1.64	±0.91
%BF	9.18	±3.94
% BF (posttest)	6.34	±1.69
Fat pattern	41.75	±0.15
Fat pattern (posttest)	41.50	±0.10
LBM	48.10	±6.38
LBM (posttest)	44.78	±8.88

H₀₁: there was no significant difference among the subject in the experimental and control group for their respective body fat pattern

Table 2 Analysis of variance (ANOVA) table of difference among the subject in the experimental and control group for their respective body fat pattern

Source	df	sum of squares	mean of squares	F	P
Between group	2	2.606	1.803	27.572	.000
Within group	57	2.694	0.47		
Total	59	5.299			

Table above shown that the null hypothesis was rejected p-value .000 less than 0.05 alpha level. This means that there was difference among the subject in the experimental and control group for their respective body fat pattern.



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H₀₁: there was no significant difference among the subject in the experimental and control group for their respective %BF

Table 3: Analysis of variance (ANOVA) table of difference among the subject in the experimental and control group for their respective %BF

Source	df	sum of squares	mean of squares	F	P
Between group	2	326.914	163.45	27.217	.000
Within group	57	342.327	6.006		
Total	59	669.241			

Table above shown that the null hypothesis was rejected p-value .000 less than 0.05 alpha level. This means that there was difference among the subject in the experimental and control group for their respective body %BF.

H₀₂: there was no significant difference among the subject in the experimental and control group for their respective LBM

Table 4: Analysis of variance (ANOVA) table of difference among the subject in the experimental and control group for their respective LBM

Source	df	sum of squares	mean of squares	F	P
Between group	2	1649.217	819.608	13.111	.000
Within group	57	3563.161	62.512		
Total	59	5202.378			

Table above shown that the null hypothesis was rejected p-value .000 less than 0.05 alpha level. This means that there was difference among the subject in the experimental and control group for their respective LBM after 8-week exercise

H₀₅: there was no significant effect of 8-week intermittent aerobic exercise among the subject in the experimental for their respective body fat pattern

Table 5: Analysis of t-test table of significant effect of 8-week intermittent aerobic exercise among the subject in the experimental for their respective fat pattern

Test	df	X	SD	t	Sig
Pre test	29	.24700	±.27686	3.990	.001
Posttest		.11742	±.37658		

***p-value <0.05**

Table above t-test implies that there was difference between pre test and posttest on the subjects' **fat pattern** after 8-week exercise. Hence, the null hypothesis was rejected



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H₀₃: there was no significant effect of 8-week intermittent aerobic exercise among the subject in the experimental for their respective %BF

Table 6: Analysis of t-test table of significant effect of 8-week intermittent aerobic exercise among the subject in the experimental for their respective %BF

Test	df	X	SD	t	Sig
Pre test	29	2.8400	±3.06246	4.147	.001
Posttest		1.40672	±4.27328		

***p-value <0.05**

Table above t-test implies that there was difference between pre test and posttest on the subjects' %BF after 8-week exercise. Hence, the null hypothesis was rejected

H₀₄: there was no significant effect of 8-week intermittent aerobic exercise among the subject in the experimental for their respective LBM

Table 7: Analysis of t-test table of significant effect of 8-week intermittent aerobic exercise among the subject in the experimental for their respective LBM

Test	df	X	SD	T	Sig
Pre test	29	3.34250	±6.94174	2.153	.044
Posttest		.09367	±6.59133		

***p-value <0.05**

Table above t-test implies that there was difference between pre test and posttest on the subjects' LBM after 8-week exercise. Hence, the null hypothesis was rejected

A Significant effect of 8-week exercise was also found between pre-test and post-test intermittent exercise on percent %BF $t(19), 4.147$ Sig=.0018. A Significant effect of 8-week exercise was also found between pre-test and post-test of continuous exercise on FP $t(19), 7.479$ Sig=0009. A Significant effect of 8-week exercise was found between pre-test and post-test of intermittent exercise on FP $t(19), 3.990$ Sig=00110. A Significant effect of 8-week was found between pre-test and post-test of Continuous exercise on LBM $t(19), 2.383$ Sig=.02811. A Significant effect of 8-week was found between pre-test and post-test of intermittent exercise on LBM $t(19), 2.153$ Sig =.0444.3

Discussion

The study determined the effects of 8-weeks intermittent aerobic exercise on body composition variables of adolescent male S.S students of G.SS Yankatsari, DKD Local Government Kano State. Adewumi and Amusa (1992). Igbonugu and Fabumi (1995), and Toriola (1994) recorded significant reduction in body FP of their experimental groups after 8-week continuous aerobic



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exercise and intermittent exercises. Ismail (2003), Sung, Yu, Chang, Mo, Woo and Lam (2002) also reported significant decrease in body FP following a programme of circuit training.

The study showed significant reduction in LBM from baseline (42.1270 ± 7.99 , 44.7635 ± 8.88 , vs 53.90 ± 6.69). Also Despres, Bouchard, Trebly, Savard and Marcotte, (1985) as reported by Heyward 1998; that a 20 week Continuous and intermittent exercises has significantly reduced body weight, %BF and fat cell weight in a group of sedentary adolescents. The study contradicts findings reported by Jackie, Marcus, Gallagher and Napolitano (2003) in which 184 subjects were randomly selected; participants completed 12 months of treatment and concluded that no differences were found in body weight based on exercise duration and intensity. This may be attributed to the energy intake and energy expenditure and the initial fitness of the subjects.

The findings of this study indicated a significant difference in total body weight and %BF between the experimental and the control group following the intermittent exercise regimens is consistent with the work conducted by Wilmore, Royce, Grandola, Katch and Katch (1970) as reported by Heyward (2000) that a 10 week jogging program (three times per week), which produced significant decrease in total body weight and %BF.

The present study found a significant difference in %BF, between the Experimental and the Control group ($P > 0.000$), The findings of this study also agrees with a study by Pate, Prath, Blair, Heskell, Macera, Bouchard, Buchner, Ettinger, Health, King, Krisker, Leon, Mercus & Morris, (1995) which reported vigorous exercise is effective in reducing body fat and mobilization of abdominal and visceral adipose tissue. An interesting finding of the study was the decrease in LBM between the subjects in the experimental groups and those in control group ($P > 0.000$) after 8-week of continuous and intermittent exercises. Lohman (1992) reported similar results in a study involving 28 subjects who participated in eight week continuous aerobic and intermittent exercise program and recorded slight decrease in total fat percentile and LBM content and also improvement in body composition.

The findings of the present study also agrees with other studies which states aerobic exercise performed in a controlled manner produces significant changes in body composition of adolescents and a modest reduction of fat oxidation, both visceral and subcutaneous (Singh, Chin, Paw, Brug, Van Mechelen, 2007; Harris, Kuramoto, Schulzer, and Retallack, 2009).

Conclusion

The objective of this study was to determine the effect of 8-week intermittent aerobic exercise on body composition variables of Adolescent male SS students of G.SS Yankatsari, DKD local Government Area, Kano State. The subjects consisted of all the Adolescent boys between the ages of 14-18 years ($n = 1,200$) in G.SS Yankatsari. A total number of 60 male Adolescent were



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selected for the study by simple random sampling techniques. The body composition variables assessed included % BF, FP and LBM. Hypotheses were tested at an alpha level of 0.05.

Subject's anthropometric profiles were measured based on protocol of international working group on Kinanthropometry. Research ethics were duly applied as per the human subjects. Intermittent training was used as treatment for the experimental groups. Training frequency of three days per week was used for the duration of eight weeks. The experimental groups trained continuously and intermittently. The workload for exercise groups were carried out between 3:00-4:00pm in each training day. Data Collected were analyzed using descriptive statistics (Means and Standard deviations) and Inferential Statistics of Analysis of Variance One way (ANOVA). The result of this study showed significant reduction in total body weight, % BF, FP and LBM. The finding revealed that continuous and intermittent exercise produced significant reduction in all the body composition variables. Based on the findings of this study it was concluded that:-

1. Eight week intermittent exercise elicited significant changes in body composition by improving (reduced) %BF of the Experimental groups from (9.1830 ± 3.94) to (6.3430 ± 1.69) .
2. Eight week intermittent exercise significantly decreased body FP in body Composition of the Experimental group from $(41.7540 \pm .35)$ to (41.5070 ± 15)
3. The Experimental group was significantly different after 8-week intermittent exercise on LBM (48.1060 ± 638) to (44.7635 ± 8.88) .

Recommendations

The following recommendations were made based on the outcome of this study:-

1. The finding of this study indicated that intermittent exercises produces significant decrease in %BF, FP and LBM. ($P > 0.05$) It is therefore, recommended that the Kano State ministry of Education should collaborate with Health professionals and Exercise Scientists) to help create additional services to adolescent students in schools with a view to engage in exercises for maintaining desirable body composition which can lead to healthier living.
2. Intermittent exercises according to the findings of this study was effective in decreasing total body weight of the Experimental groups when compared to that of the Control group as such this study also recommended SS adolescents should participate in health - enhancing fitness activities to develops desirable body weight.
3. Intermittent exercises had effect on body composition variables, and recommended that Adolescent should exercise intermittently, with a view to develops sound fitness of the body. Similarly, there is need to develop a school/community relationship that ensures the maintenance of a moderate to vigorous lifestyle patterns.

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