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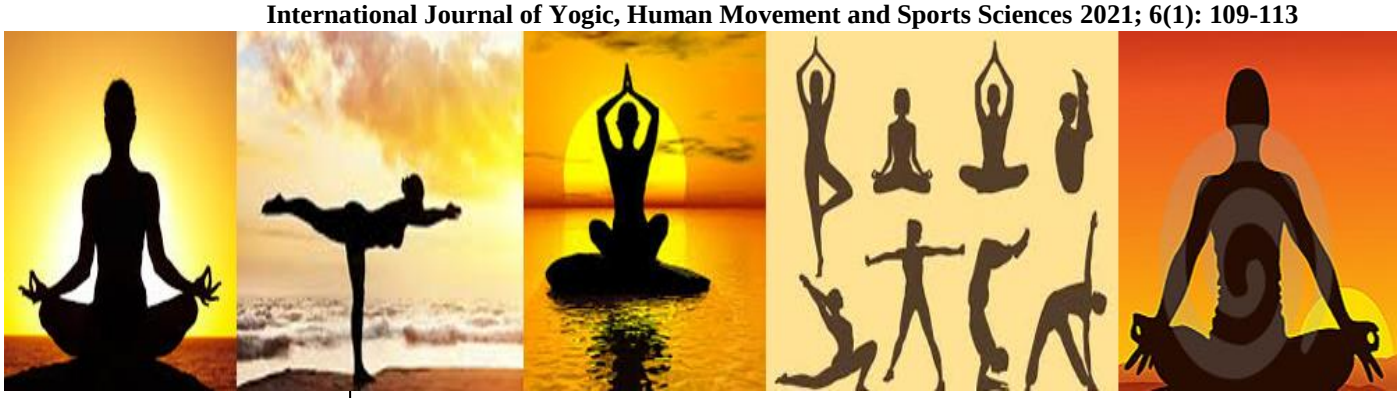

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Effects of aerobic exercise on selected health related physical fitness components in the case of Ambasel Woreda Wuchale 17 general secondary and preparatory school, South Wollo Zone, Amhara Regional State

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Abstract
The main purpose of this study was to investigate the effect of 12 week aerobic exercise on selected health related physical fitness components. The study design was Experimental method. Simple random sampling technique were used to select subjects as well as to assign subjects for control group (EG) and experimental group (CG) while purposive sampling were used to select the sample sex and the study place, the data were analyzed 60 male sample was taken from a population of 71 male students by Slovins formula, the selected subjects were divided into 2 equal groups (n=30) CG and (n=30) EG was implemented. Their age range was from 18-22 years. EG who performed in 3 days/week for 3-month aerobic exercise training program like as walking, jogging, running and rope skipping and a CG did not perform this selected aerobic training unless both groups undergone normal physical education class program. Both groups had taken pre, during and post-testing. PT of two groups of 30 subjects (ME was measured by 900angle push up test, CVE was measured using 12 minute run test, and flexibility was measured using sit and reach test) were recorded. After six weeks of aerobic exercise training, DT was taken in each parameter and a little improvement in each test results was observed and training was continually given by increasing its duration. After three months, posttest measurement on the same parameters was taken. The difference between the tests were analyzed statistically, with paired sample "t" test at the level of significance was $P<0.05$ to determine the difference between initial and final mean for participant. According to analyzed data the mean difference value After 12 week's aerobic exercise boosted in pushup performance by 1.76, in 12 meter run 638 mean difference was recorded, and in sit and reach test 0.53 increments were observed throughout the study period. The result obtained in this study indicated that there were significant improvement in ME, CVE, and flexibility. Based on this finding, it can be concluded that Moderate aerobic exercise has positive effect on improvement of selected health related physical fitness components of male students.

Keywords: Aerobic exercise, health related, physical fitness

1. Introduction

1.1 Background of the Study

Practically, to remain a nation strong physically, mentally, spiritually and socially, there must be education that takes place largely through the formal process of physical education in schools. (Buchres, 1975) [9]. Physical education has long and established tradition in schools, being linked to the development of both body and mind. In other words, it is an important component of the overall school program and integral part of the educational program. However, physical education uses physical activity to produce holistic improvements in persons‟ physical, mental social & emotional qualities. Physical activity has significant physical health benefits; and it appears to improve health-related quality of life by enhancing psychological well-being and by improving physical functioning in persons compromised by poor health and it is positively associated with health related quality of life (Berger & Motl, 2001) [6].

Fitness is the ability of a person to live a full and balanced existence and it is considered as one of the most important health markers in childhood also has long been recognized as one of the primary objectives of physical education and Generally, Fitness is defined as the ability of a person to live a happy, well-balanced life. It embraces the physical, intellectual, social and spiritual aspects of a person's life. Fitness has health-related components which include; aerobic fitness, muscular strength, muscular endurance, flexibility and body composition and Skill –related components include agility, balance, coordinate, speed, power and reaction time. However proper exercise program, nutrition, adequate rest, good health habits etc. are influencing factors for achieving, maintaining, and improving a considerable level of HRPF. Among the influencing factors the aim of the study want to evaluate the effect of aerobic training on health related physical fitness.

1.2 Statement of the problem

The unique role that quality physical education programs play is to teach the importance of health-related fitness, as well as to develop physical competence and cognitive understanding about physical activity for all students so that they can adopt healthy and physically active lifestyle. (National Association for Sport and Physical Education, 2010).

Physical activity provides in developing health related physical fitness. Garzón defined health related physical fitness is the ability of a person to perform daily activities with vigor, and by traits and capacities that are associated with a low risk for the development of chronic diseases and premature death. Hippocrates said that, if all parts of the body are used in moderation it develops and ages slowly. But if left unused, it becomes defective quickly. Therefore, Physical activity is an important ingredient in the quality of life (Singh, 2014) and it is widely acknowledged to children's growth and development (Singapore Ministry of Education, 2005) [11].

2. Materials and methods

2.1 Experimental materials

The following materials were used in this study, Measuring tapes, weight machines, exercise mats, marking cones, stopwatch, jumping ropes, record sheets, paper, pen and whistle were used during training as well as in the tests.

2.2 Source of data

For this study primary data were used. The primary data were obtained from experimental variables according to designed parameters. And the secondary data was collected from various documents, journals, books, internet sources and unpublished booklets.

2.3 Treatment and study design

The study was carried out for three consecutive months for training aerobic exercise. In the beginning of the first month (October) pretest was taken and in half of the second month (November) the second test was taken and also at the end of the 3rd month (December) post- test was also administered.

Table 1: The Study Design Layout

Treatment	Aerobic exercise Program
Frequency	3days/week
Duration	12 Week Duration
Session	40-60 minutes
Intensity	Moderate (60-75 HR max)
Exercise days	Monday, Wednesday and Friday
Time of training	Morning

2.4. Study Sample

Participants of this study were grade 12 male students in the study area, who fulfilled the requirements for the study, age from 18-22 years old, free from any impairment or chronic disease, and volunteer in response to the desired study. The participants of this study have believed that they will develop physical fitness during working with the study.

3 Methods of data analysis

The data collected through fitness tests were analyzed, interpreted and tabulated in to a meaningful idea using manually and in computer in order to compare the selected health related physical fitness components changes which observed among participants that undergoing aerobic exercise program. The data was analyzed using computerized statistical package software (SPSS version 20). Paired sample t-test was used to compare the pre and post training data at level of significance is <0.05.

3.1 Protocol and Ethical Consideration

This study went in line with ethical issues. The privacy of the participant could be protecting. Generally, this research has been conduct as pre rules, policies and research ethics of Haramaya University.

4. Results and discussion

4.1 Characteristics of study participants and physical fitness variables

Table 2: Characteristics of the study participants

Group	N	Age		Height		Weight	
		Mean	S.D	Mean	S.D	Mean	S.D
EG	30	19.35	.933	1.7310	.0766	54.025	5.495
CG	30	19.80	1.105	1.719	.0717	55.900	5.548

As shown from above Table 2 Descriptive characteristics of 60 study participants from wuchale17 preparatory school mean of age (EG=19.35, CG=19.80) height (EG=1.73, CG=1.72) and weight (EG=54.03, CG= 55.9). Subjects were relatively had the same age, height and weight at the beginning of exercise

Table 3: Dependent variables and tests

No	Variables	Methods/Tests	Equipment	Unit of measurement
1	ME	90° angle pushup	Stopwatch	Repetition per minute recorded
2	CVE	Twelve minute run/walk test	Sport Field, Stopwatch, whistle and cones	To the Nearest to 50m/400m
3	Flexibility 90	Sit and Reach test	20cm Height sit and Reach box, Measuring Tape	Recorded to the nearest 1 millimeter

As it can be seen in above table 3 illustrated that the types of variables, methods, test items and its measurement units which designed to do this experimental research. The results of selected physical fitness variables of experimental and control groups pre, during and post-test data were analyzed. Its results had showed under these tables.

4.2 Effects of aerobic exercise on muscular endurance

Table 4: The mean value of ME (900angle push up test) for CG and EG

Group	Test	PT(X±SD)	DT(X±SD)	PoT(X±SD)	ΔX)PT and PoT	P
EG	90° angle pushup test	25.97±6.04	26.80±6.18	27.73±6.24	1.76	.000
CG	90° angle pushup test	25.77±10.00	25.83±9.75	25.87±9.90	0.1	.676

ME=Muscular endurance EG= experimental groups, CG=control group X=mean value of each tests, SD= Standard deviation, ΔX= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results, p=significance level

900 push up test was poor improvement by a mean difference of 0.1 at P=0.676. The implication therefore is aerobic exercise training had improvement on push up endurance of students when compared with CG. As a result the investigator testified and accepted alternate hypotheses one and rejected the null hypothesis which said that there is a significant improvement of muscular endurance after three consecutive aerobic exercise training. But as the data shows there is no significant improvement in muscular endurance of the CG who only has a single 42 minutes of physical education practical class.

4.3 Effect of aerobic exercise on cardiovascular endurance

Table 5: The mean value of CVE (12 minutes run/walk test) for CG and EG

Group	Test	PT(X±SD)	DT(X±SD)	PoT(X±SD)	ΔX) PT and PoT	P
EG	12minute run test	2865.00±270.42	3140.00±252.36	3503.00±181.43	638	0.000
CG	12minute run test	2933.67±322.50	2935.80±317.24	2937.97±318.52	4.2	0.709

CVE=cardiovascular endurance EG= experimental groups, CG=control group X=mean value of each tests, SD= Standard deviation, ΔX= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results p=significance level

As shown from table 5 the average pretest score of EG (N=30) was found to be 2865.00 with a SD of 270.42 and CG (N=30) was found to be 2933.67 with an SD of 322.50 from this data we can see that the scores in the pretest for both groups were near. After six weeks EG score was
3140.00 with SD 252.36 and CG mean score of 2935.80 with SD score 317.24. In contrast, the average post test score after 12 week aerobic exercise training of EG was found out 3503 with SD of 181.43 and for CG mean 2937.97 with SD of 318.52. From this data we can see that the scores in the posttest for both groups were very different. One can pick up that these numbers in pretest and posttest mean scores (achievement levels) are different. Hence, these data indicated that there is a significant difference and gradual improvement between PT, DT and PoT test results of EG and there is no sufficient improvement between PT, DT and PoT test results and there is no improvement between PT, DT and PoT test results of CG.

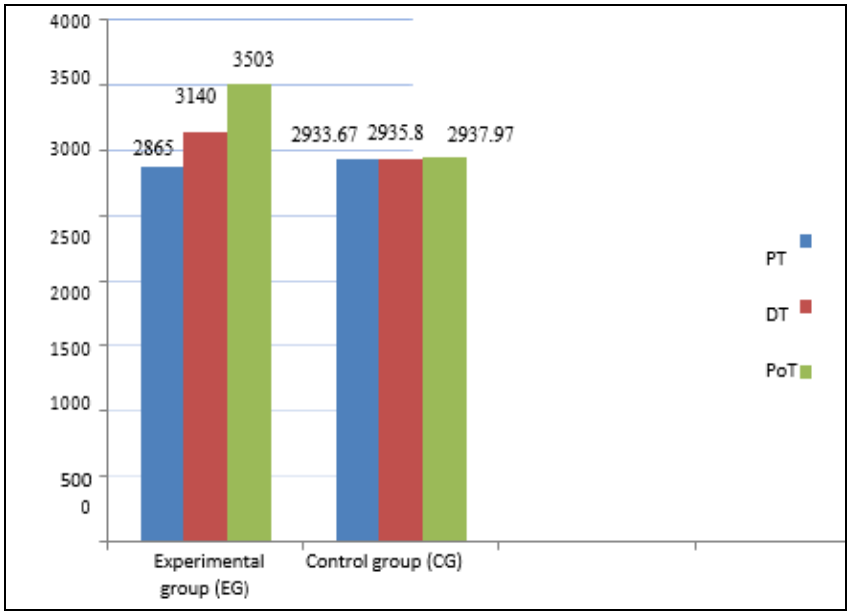

Fig 2: Graphical presentation of 12 minutes run/walk test result of EG and CG

Fig 2 as shown in the graph above the pre and posttest of the EG in 12 minute run/walk test was a mean score of 2865.00 and 3503.00 and also the CG was 2933.67 and 2937.97 respectively. From this data the investigator compute a pre and post mean difference of EG and CG.

In which in case of the EG distance of 12 minute run/walk test was significantly improved by a mean difference of 638 at P=0.000 after three months aerobic exercise training.

And also in case of the CG, in which distance of 12 minute walk test was poor improvement by a mean difference 4.2 at P=0.709,There was an increase and a statistical significant improvement of EG compared to a constant score in CG. The implication therefore is aerobic exercise training had improvement on CVE of students when compared with CG. As a result the investigator testified and accepted alternate hypotheses two and rejected the null hypothesis which said that there is a significant improvement of CVE after three consecutive aerobic exercise training. But as the data shows there is no significant improvement in CVE of the CG who only has a single 42 minutes of physical education practical class.

4.4 Effect of Aerobic Exercise on Flexibility

Table 6: The mean values of flexibility (sit and reach test) for EG and CG

Group	Test	PT(X±SD)	DT(X±SD)	PoT(X±SD)	ΔX)PT and PoT	P
EG	Flexibility	14.93±5.61	15.14±5.53	15.46±5.44	0.53	0.000
CG	Flexibility	14.69±5.57	14.73±5.58	14.79±5.62	0.1	0.212

EG= experimental groups, CG=control group X=mean value of each tests, SD= Standard deviation, ΔX= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results p=significance level

As shown from table 6the average pretest score of EG (N=30) was found to be 14.93with a SD of 5.61 and CG (N=30) was found to be 14.69 with an SD of 5.57. From this data we can see that the scores in the pretest for both groups were close. After six weeks EG mean score was 15.14 with SD 5.53and CG mean score of 14.73 with SD of5.58. In contrast, the average post test score after 12 week aerobic exercise training of EG was found out 15.46 with SD of 5.44 and for CG mean 14.79 with SD of 5.62. From this data we can see that the scores in the posttest for both groups were very different. One can pick up that these numbers in pretest and posttest mean scores (achievement levels) are different. Hence, these data indicated that there is a significant difference and improvement between PT, DT and PoT test results of EG and there is no improvement between PT, DT and PoT test results of CG.

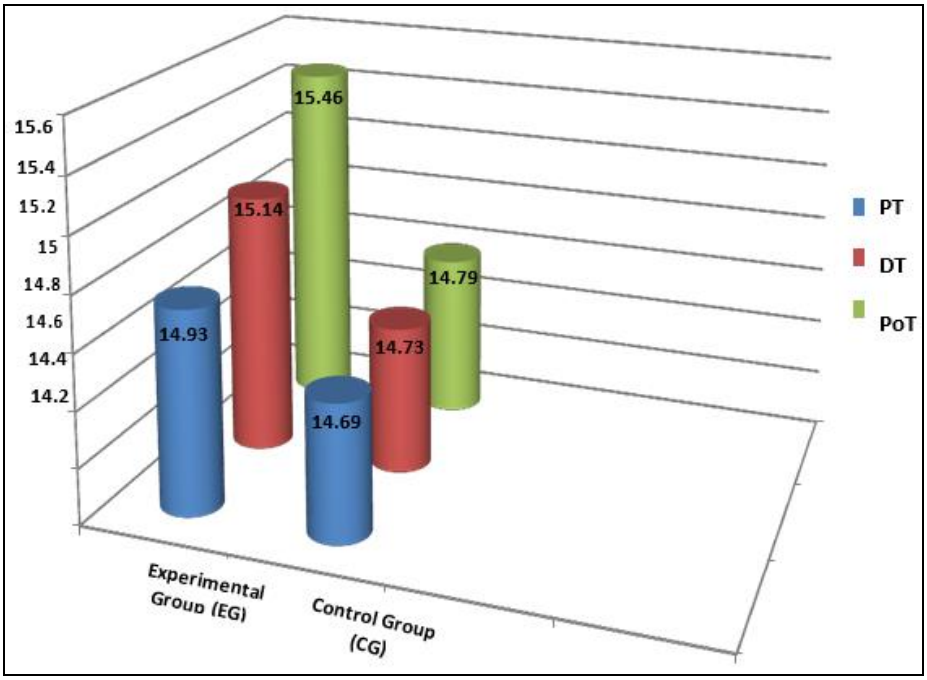

Fig 3: Graphical presentation of sit and reach test result of EG and CG

Fig 3 as shown in the graph above the pre and posttest of the EG in sit and reach test was a mean score of 14.93 and 15.46 and also the CG was 14.69 and 14.79 respectively. From this data the investigator compute a pre and post mean difference of EG and CG. In which in case of the EG length of sit and reach test was significantly improved by a mean difference of 0.53 at P=0.000 after three months aerobic exercise training. And also in case of the CG in which length of sit and reach test was poor improvement by a mean difference 0.1 at P=0.212, There was an increase and a statistical significant improvement of EG compared to a constant score in CG. The implication therefore is aerobic exercise training had improvement on flexibility of students when compared with CG. As a result the investigator testified and accepted alternate hypotheses three and rejected the null hypothesis which said that there is a significant improvement on flexibility after three consecutive aerobic exercise training. But as the data shows there is no significant improvement in flexibility of the CG who only has a single 42 minutes of physical education practical class.

4.5 Comparison of three tests (900 pushup, 12 minutes run, sit and reach) results of EG

Table 7: Changes of 12 weeks aerobic exercise in the selected health related physical fitness components (ME, CVE, Flexibility)

Type of test	PT(X±SD)	DT(X±SD)	PoT(X±SD)	ΔX)PT AND POT	P
ME (90^0 Push up)	25.97±6.04	26.80±6.18	27.73±6.24	1.76	0.000
CVE(12 Minutes run)	2865.00±270.42	3140.00±252.36	3503.00±181.43	638	0.000
Flexibility(sit and reach test)	14.93±5.61	15.14±5.53	15.46±5.44	0.53	0.000

ME= Muscular endurance, CVE=Cardiovascular endurance X=mean value of each tests, SD= Standard deviation, ΔX= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results p=significance level.

The above table showed that EG there was significance difference in between the pre to post test score of (900 pushup test, 12 minutes run/walk test, sit and reach test) results due to twelve week aerobics exercise in the selected health related physical fitness components (ME, CVE and Flexibility)

all test had changes was due to Aerobic exercises in which they were engaged in. the mean score value of ME pretest before training result was (25.97) and posttest after training mean score values was (27.73) The mean difference score of pretest with mean difference score of posttest mean difference value increased by (1.76).

As indicated the tables mean value of CVE from pretest 2865.00 increased to 3503.00 posttest. CVE score of pretest to posttest mean difference value of EG increased (638) recorded.

The mean value of flexibility from pretest 14.93 increased to 15.46 posttest result. Flexibility score of pretest mean to posttest mean difference value of EG increased (0.53) recorded.

When we compare the pretest and posttest of mean difference value score in each test of 12 weeks Aerobic exercise intervention experimental groups. The first Better change observed on CVE=22.3%, second on ME=6.8%, and lowest score of mean difference value was FLEXIBLITY=3.5% respectively. The improvement rate of this data was one indicator of the great Aerobic exercise training effect on CVE= 22.3% than others components. Therefore, aerobic exercise training was important for increment of CVE according to the result on this study.

5. Conclusion

Previous studies have found that aerobic exercise is associated with improved health related physical fitness among students at different age and sex levels. However, it remains unclear whether associations are present in both aerobic exercise and health related physical fitness particularly.

The purpose of this study was to evaluate the associations between aerobic exercises with selected health related physical fitness components in grade twelve students in case of South Wollo Zone Ambasel Wereda wuchale17 general secondary and preparatory school. Data was drawn from a pre and posttest after 12 weeks of aerobic exercise training within selected physical fitness tests i.e. 900 angle push up to assess ME,12 minute run/walk to assess CVE and sit and reach test to assess flexibility administered to selected sample male subjects (N=60). As a result, the following conclusion was made. This study indicate that aerobic exercise has its own advantage on improving students health related physical fitness particularly ME, CVE, and flexibility on the aerobic exercise EGs showed a significant difference ($p<0.05$) on the above components compared with control group.

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