



Research Article

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The Effects of Circuit Training On Selected Physical Fitness Components: With Specific Reference to Dessie Town Basketball Project Players

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Abstract: The attainment of sustainable and excellent performance in any sporting engagement via the adoptions of general training method alone may be in doubt without special emphasizes on specific fitness training methods. This study was carried out to examine the responses exhibited by Dessie town administration under the age of 15 basketball project players concerning the effects of circuit training on selected physical fitness components of cardiovascular endurance, flexibility of the hip and hamstring muscle, agility, speed and power of the lower extremities following an 8-week circuit training programme. All members of the project were taken as a sample which consists of 16 participants. The subjects were comprehensively selected from the town administration. The subjects underwent training three times a week for an hour a day, for eight consecutive weeks. A single group quasi experimental design, otherwise known as repeated measure design was used for the study. Data collected were analyzed using descriptive statistics of mean, range and standard deviation for interpretations of research hypothesis, while inferential statistics of paired t-test was adopted to confirm the significance of the stated hypotheses at the 0.05 level of significance.

The results show that there was significant difference in the pretest-posttest responses of cardiovascular endurance, flexibility, agility, speed and power. It was recommended that basketball project coaches and players should adopt regimental field training programme and engage in strenuous circuit physical training to see the effects of the training program on the physical fitness components.

Keywords: Circuit Training, Cardiovascular Endurance, Flexibility, Agility, Speed And Power.

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STATEMENT OF THE PROBLEM

The questions, how much exercise is enough? And what type of exercise and method is best for developing and maintaining fitness? are frequently asked. It is recognized that the term physical fitness is composed of a variety of characteristics included in the broad categories of health related like cardiovascular endurance, muscular strength, muscular endurance flexibility and body composition, and skill related including balance, coordination, Agility, power, speed and reaction time.

The research that shows the effects of training method on the physical fitness level of project players was not done before in Dessie town administration. Even there is no research on other sport project other than basketball.

The researcher has had more than five years' experience in teaching physical education in preparatory school and got the chance to be a member of the sport federation committee in dessie town administration and other areas. In addition to that the researcher has also two years' experience as a coach of boys under 15 volleyball projects in the city administration. And also have the experience in playing in different sport competitions, That is why; the

researcher gets the chance to observe closely the training method that implement in different sport activities. Most of the time training methods were not selected based on the changes that brought on the components of physical fitness even the status of the physical fitness components level were not tested and measured. In general the changes that come from the training were not well identified. Through the idea mentioned above the researcher selected the training method and need to study its effect.

According to (Schlish,1990) circuit training method is one of the ways of physical fitness training aiming to general development which includes all the physical aspects, as well as the heart and blood vessels fitness the investigator was interested to evaluate whether there would be any effect on Cardio Vascular endurance, flexibility, agility, speed and power of the physical fitness components of dessie town basketball project players of boys under the age of 15 years after a training period of 8 weeks through applying circuit training method.

Hypotheses

The researcher formulated the following hypotheses of the study which was tested satisfactorily
Ho1 There will be no significant difference on the development of power of the lower extremities in the

pretest and posttest following 8-weeks circuit training program.

Ho2 There will be no significant difference on the development of speed following 8-weeks circuit training program.

Ho3 There will be no significant difference on the development of agility following 8-weeks circuit training program.

Ho4 There will be no significant difference on the development of cardiovascular endurance following 8-weeks circuit training program.

Ho5 There will be no significant difference on the development of flexibility in the lower back and hamstring muscle following 8-weeks circuit training program.

RESEARCH DESIGN AND METHODOLOGY

The researcher was implemented the single group quasi experimental design because it was appropriate for the nature and the objectives of the Study. After going through the related literature the following dependent and independent variables were chosen to collect the data at pretest and posttest and to render training.

Independent variables are Circuit training program that designed for 8 weeks. After the reviewing the available literature the following physical fitness components of cardiovascular endurance, power, agility, flexibility and speed were chosen as dependent variables and the standard tests were Harvard step test, vertical jump, Illinois agility sprint test, sit and reach test and 50m sprint run identified for the pre and post-tests.

Data collection instrument

The researcher was determined the tests that measure the physical fitness components based on those utilized by the NSCA, FITNESSGRAM and the British Association of Sport and exercise science testing guidelines. These tests were sit and reach test for flexibility, Vertical Jump test for power of the lower extremities, Illinois agility sprint test for Agility, 50m sprint for speed and Harvard step test for cardiovascular endurance. The training units were designed for 8 weeks, which included 5 stations to train the trainees on. The following basic materials were used throughout the study Meters, Cons, stop watch, ropes box and data

collection tools with the support of Dessie town administration sport commission.

Validity and Reliability

A pre-test and posttest were carried out with standardized physical fitness test of the same and appropriate identified methods in the design of the study. Additionally, the selected tests were approved by the national strength and conditioning association/NSCA / FITNESSGRAM and the British Association of Sport and exercise science testing guidelines. It is insured the researcher comprehensive enough and measure what it is intended to measure.

Test retest technique was implemented to measure reliability level of the instrument. The test at all level is measured repeatedly three times showed no difference. The only variable the test would measure is the one it is designed to. To minimize mistakes occurred during data collection, all data collectors were oriented about the measurement procedures.

Statistical analysis plan

The data collected through performance tests assessment were analyzed and interpreted in to a meaningful idea using manually as well as with computer in order to compare physical fitness variable and changes observed among participants in the training program. Data was analyzed using version 16 of the Statistical Package for Social Sciences (SPSS). Descriptive Statistics (i.e., means and standard deviations) and (t) test were computed to achieve the objectives of the current study. The level of significance was or the value of P was set at 0.05.

Ethical consideration

The primary ethical conduct was taken into consideration. Permission was obtained from the university ethical conduct management committee and also discussed with the administration of dessie town sport commission prior to proceeding with the study. The participants were signed informed consent to participate in the study. The data is kept by the researcher in a secured location.

DISCUSSION AND RESULTS

The result showed that there were significant differences in the pretest-posttest responses on physiological variables tested in the study.

Table1: Show Pre and Post training test of Descriptive Statistics of the demographic Variables of height, weight and BMI for Dessie town basketball project players.

Variables	Measures	Mean	N	Range	SD
Height	Pretest	1.515	16	.25	0.0625
	Posttest	1.515	16	.25	0.0625
Weight	Pretest	44.000	16	10	2.63312
	Posttest	43.1875	16	8.5	2.32289
BMI	Pretest	19.2012	16	5.24	1.16290
	posttest	18.8538	16	4.97	1.10209

Body weight: there was a difference in the pretest and posttest body weight of the subjects following 8-weeks circuit training programme. The t value was 5.665 was statistically significant. The result was in line with the observation of Bowers and Fox (1992) who submitted that persistence in any rigorous activities would lead to an immediate drop in body

weight of the athletes, especially during progressive resistant training.

Body Mass Index (BMI): The result shows that there was a significant difference in the pretest posttest BMI of the project players following 8- weeks' circuit training programme. The drop in BMI could be attributed to the positive effect training on body composition.

Table 2: Pre, and Post training test Mean standard deviation values of Illinois (distance/sec) and 50 meter speed (distance/sec) for Dessie town basketball project players.

Variables	Measures	Mean	N	Range	SD
Illinois agility	Pretest	16.1725	16	2.59	0.67215
Run Test	Posttest	14.9644	16	1.98	0.55977
50meter Sprint	Pretest	9.7312	16	4.10	1.02952
Run	Posttest	8.680	16	2.95	0.71389

Values mean ± SE, PT = pre training test which was taken before exercise for comparing the result with posttest results of the performance, POT= posttest which taken at the end of 8th week of exercise training program.

The data (Table 2) shows that there was significant difference between before the exercise and after 8 weeks of exercise on individuals' Illinois agility run and 50m speed performance. The mean values of Illinois agility run test was 16.1725sec in before exercise, which was improved 14.9644sec at the end of 8 week exercise training program test, this means Illinois agility run performance improved by -1.2081sec after 8 weeks of exercise training program. The main reason for these performance improvements were the involvements and efforts of selected subjects on the proposed exercise training schedule.

As indicated in Table2, 50m speed run shows that there was a significant improvement of speed performance. The mean value of 50m speed run test before exercise training program was 9.7312sec and after training mean score value was 8.68sec. When we

compare the mean value of pretest result with post test result, it has -1.0512sec difference. The mean value was decreased from 9.7312sec to 8.68sec by -1.0512sec mean difference. Though the negative mean difference value shows that the time to cover a given distance. On the other hand it indicates that the quality of participant's on increments' of speed capacity and the improvement of the participant's in reduction of time duration. This also shows that, increments' of 50m speed performance were observed on the selected research members. The reason behind this change was exercise training program that they were engaged in. The result of this study was agreed with the finding of (Hakkinen, K. And K.L. Keskinen, 1989) suggest that sprint training could lead to improvements in human muscle power capabilities, as well as to improvements in dynamic athletic performance. And also it was supported by Juila, Chris & Hughes, (2005) advocated for field speed work for squash players to strengthen their reaction time during normal game situation. Also, Zhang Ying Qiu, (2004) recommended more robust speed drilled for tennis player during the pre-seasons conditioning.

Table 3: Shows Pre, and post training test mean and standard deviation values of sit and reach (distance/cm), Harvard step (RHR/minute) and standing vertical jump (distance/cm) performance test of dessie town basketball project players

Variables	Measures	Mean	N	Range	SD
Sit and reach test	Pretest	-0.0625	16	27.5	7.20850
	Posttest	3.7188	16	25.5	6.95933
Harvard step test	Pretest	89.1875	16	41.0	10.1339
	Posttest	95.50	16	37.0	10.95445
Vertical jump test	Pretest	26.375	16	14.0	4.51479
	posttest	31.5625	16	16.0	4.57120

p=0.05, df=15, t=1.475

Values are mean ± SE, PT = pre training test which was taken before selected training exercise program for differences of performance of basketball players, POT= posttest which was taken after consecutive 8th week of training program.

The above table 3 shows that there was significant improvement in between the pre to post test score. The increments on the performance was due to they were involved on the exercise training program. The mean score value for sit and reach test before exercise training program was -0.0625cm, and after

training mean score value was 3.7188cm. When we compared the mean score value of before training test with after 8th weeks exercise training test, the result was 3.7813cm mean difference. This shows the increments of mean value from -0.625cm to 3.7188cm, with 3.7813cm. Though the positive mean difference value shows that, the efforts of participants during training session and the impacts of exercise to being flexible. The result of this study was incorporate with the finding of (G baltaci et al., 2003). They conducted their study on effect of exercise program on Comparison of back saver sit and reach test and modified back saver sit and reach test as a measurement of hamstring flexibility.

As indicated in the table 3 Harvard step test, mean value of pre training test result was 89.1875 and post training test was 95.5. When we compare performance of individuals before training test result

with that of post training test result, 6.3125 mean difference was recorded. At the end of the study, the mean value of participants on Harvard step test was significantly increased. This indicates that, the major benefits of exercise training program on increasing the participant's performance in Harvard step test.

As indicated in the table 3 standing vertical jump test, mean value of pre training test result was 26.375cm and post training test was 31.5625cm. When we compare performance of individuals before training test result with that of post training test result, 5.1875cm mean difference was recorded. At the end of the study, the mean value of participants on standing vertical jump was significantly increased. This indicates that, the major benefits of exercise training program on increasing the participant's performance in vertical jump. Therefore, this result was consistent with the finding of (Markovic G and Mikulic P, 2010).

Table 4: The mean difference value and significance level of each test results of participants

Variables	MPT	MPOT	MD	Sig.
Sit and reach test	-0.0625	3.7188	-3.78125	.000
50m sprint run	9.7312	8.6800	1.0512	.000
Vertical jump test	26.3750	31.5625	-5.1875	.000
Illinois agility run test	16.1725	14.9644	1.2081	.000
Harvard step test	89.1875	95.5000	-6.3125	.000

P=0.05, df=15, t=1.475

POT= posttest which was taken at the end of 8th week proposed training scheduled=mean difference
 PT = pre training test which was taken before selected training exercise program for differences of performance of basketball project players.

Table 4 Show the overall results of each test. It includes the mean difference from one test to another and the significance of posttests in reference to the pretests. Improvement of performance was recorded in all physical fitness variables. Even though the result of improvements was different in all fitness programs, all participants revealed remarkable changes. This was due to that all study members were involved on the training program. The mean difference value of sit and reach test as well as 50m speed test (3.7813), (-1.0512) respectively from post to pretest. In addition Illinois agility test, Harvard step test and vertical jump tests performance were increased and more significant

improvements were recorded at the end of 8th week on performance of dessie town administration basketball project players.

Generally according to this findings and based on standard norms, the selected type 8 week training exercises program brought a significant changes on selected physical fitness components. Therefore these findings put a remarkable idea for the differences of performance with in selected basketball project players. The proposed dependent variable drills were significantly improved, cardiovascular endurance, explosive power of the lower extremities, flexibility of the hip and hamstring, as well as speed, and the overall agility of an individual's. Similarly in a study conducted by examined the effect of functional training on the functional training exercises demonstrated improvements in speed, endurance, explosive power, flexibility and agility.

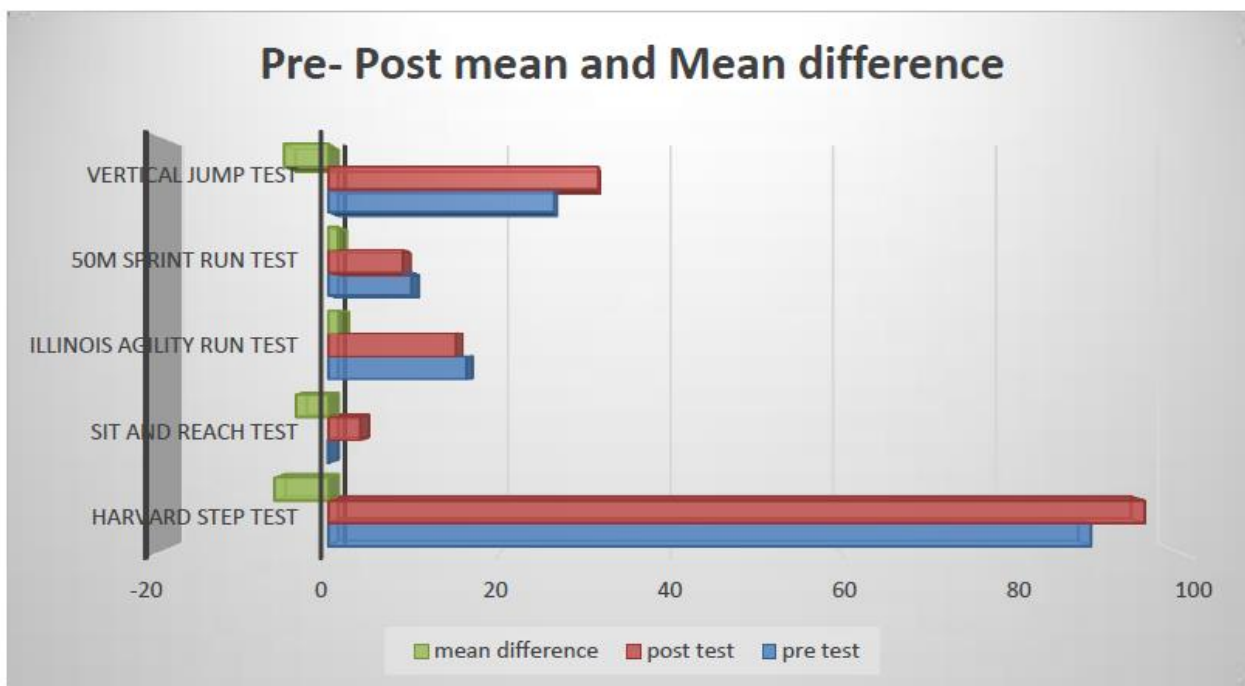


Figure 1. Pre Post and mean difference comparison by bar graph from SPSS data result (source SPSS)

As it was shown in the figure 1 the above bar graph the result of pretest in the Harvard step test, sit and reach test and vertical jump test was decreased while comparing with the post test. In the case of 50m sprint run test and Illinois agility run test the pretest has shown the incensement while comparing with the posttest all the test was shown a significant improvement change while comparing the pretest with the post test. The improvement has also shown in the mean difference.

CONCLUSIONS

Based on the major findings of the study, the following points are mentioned as conclusion.

□ According to the results of this study the researcher null hypothesizes were concluded as follows, Ho1 is failed to accept or rejected because all study subjects brought a significant performance improvement in power of the lower extremities that was tested by vertical jump test; Ho2 is failed to accept or rejected because all study subjects brought a significant performance improvement in speed of short distance sprint, Ho3 is failed to accept or rejected because all study participants brought a significant performance improvement in agility of Illinois agility run test, Ho4 is failed to accept or rejected because all study participants brought a significant performance improvement in RHR after Harvard step test, Ho5 is failed to accept/rejected/ because all study participants brought a significant performance improvement of the hip and hamstring muscles of the lower extremities of sit and reach test.

□ Based on the finding of this study, the exercise training completely reforms the performance of the research members. This also indicates that, circuit

exercise training was paramount for the variation of differences on the effects of selected physical fitness components of basketball project players of dessie town under the age of 15.

In general while concluding, it may be stated that, within the limits of the present study, selected circuit training exercises contributed positively towards the improvement of cardiovascular endurance, power of the lower extremity, Agility, Speed, flexibility of the hamstring muscle of basketball project players as tested by Harvard step test, Vertical Jump test, Illinois agility run test, 50meter sprint run test and sit and reach test

Recommendations

Depending on the study results, discussions and findings of the research, the following ideas were recommended on the assessments of selected types of physical fitness variables.

- The subjects in this study belonged to under the age of 15 categories of basketball project players. A similar study should undertake for other age and project category.
- Circuit training should include as an integral part of training as well as coaching basketball
- Not only researcher but also specialists from the sector of basketball federation; have a great mandate to identify the fitness level and upgrade the performance of basketball players, through facilitating consistent seminars and coaching course programs for the coaches.
- Based on the changes on performance of this study, coaches of basketball players and sport science teachers should apply this finding as well as conduct other additional investigations to reform the level of performance of dessie

town administration under 15 basketball project players.

- The same study can be used for other project players and other physical fitness components.
- To bring sustainable change on the physical fitness components of basketball project players sport commission should improve the societal outlook towards having awareness concerning the role of involving on circuit training physical exercise.

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