International Journal of Yoga, Physiotherapy and Physical Education
www.sportsjournal.in
ISSN: 2456-5067
Received: 15-03-2022, Accepted: 01-04-2022, Published: 16-04-2022
Volume 7, Issue 2, 2022, Page No. 56-64

Comparison of influence of muscular strength and endurance of trunk and speed and agility on various sportspersons fitness levels

G Pramila Rani[1], A Pallavi[2]
[1] Research Scholar, ASD Govt. Degree College for Women, Kakinada, Andhra Pradesh, India
[2] Head of the Department, Department Of Physical Education and Sports Sciences, Andhra University, Andhra Pradesh, India

Abstract
Stratified random sampling method has been used for sample selection. 128 male subjects having at least state level participation were selected to compare the effects of Technical Training, Traditional Exercises and combined training on sportspersons. All the sportspersons were selected from Junior colleges of Visakhapatnam, Andhra Pradesh, India. The age of all the subjects ranges from 16 to 18 years. The selected subjects were from different socio-economic background. All the subjects were physically fit to undergo hard training. All the subjects were aware of hard work as they had been taking part in the required training sessions of their games. A meeting of all the subjects was arranged in the presence of physical education teachers and coaches of Department of Physical Education, Andhra University, Visakhapatnam. The process of pretest and posttest of the training schedule were explained in detail to avoid ambiguity in their minds. They were made aware of the efforts and hard work that they were required to put in all the research procedures.

Keywords: muscular strength, technical training group, traditional exercise

Introduction
Sport training therefore directly or indirectly aims at improving the personality of a sports person, no wonder sports training is an educational process. Sports training is a systemic process extending for a long period, for the best result the system of training has to based and conducted on the scientific facts.
Sports, physical contests pursued for the goals and challenges they entail. Sports are part of every culture past and present, but each culture has its own definition of sports. The most useful definitions are those that clarify the relationship of sports to play, games, and contests. “Play,” wrote the German theorist Carl Diem, “is purposeless activity, for its own sake, the opposite of work.” Humans work because they have to; they play because they want to. Play is autotelic—that is, it has its own goals

Health related components
- **Muscular strength**

Muscular strength: There are a number of ways to measure muscular strength. Generally, lifting a set weight in a prescribed position and comparing the results against any given population is the best way.
In general, if a person works their muscles consistently and regularly, they will increase in strength.
There are various ways of putting the muscles through rigorous activity, but anything that works a muscle until it is tired will increase muscle strength over time.

Statement of The Problem
Comparison of influence of muscular strength and endurance of trunk and speed and agility on various sportspersons fitness levels

Objectives of The Study
1. To develop training program based on Technical training, Traditional exercise and Combined Training (Technical training and Traditional exercise)
2. To administer the training program designed on the basis of Technical training, Traditional exercise and Combined Training (Technical training and Traditional exercise)
3. To find out the effects of Technical training on selected physical fitness variables including speed and agility, muscular strength and endurance of trunk of sportspersons.
4. To explore the effects of Traditional exercise on selected physical fitness variables including muscular strength, speed and agility, endurance of trunk of sportspersons.
5. To ascertain the effects of combined Training on selected physical fitness variables including, speed and agility, muscular strength and endurance of trunk of sportspersons

6. To analyze and compare the effects of Technical training, Traditional exercise and Combined training on selected physical fitness variables including speed and agility, muscular strength and endurance of trunk of sportspersons.

Hypothesis of the Study

1. There exist no significant difference between pre and post training scores of Technical training group.
2. There exist no significant difference between pre and post training scores of Traditional group
3. There exist no significant difference between pre and post training scores of Combined Training group
4. There exist no significant difference between pre and post training scores of Control group.
5. There exist no significant difference between pre and post test scores of Technical training, Traditional exercise, Combined Training and Control group

Limitations of the Study

The life style, family, heredity, nutritional intake, habits and psychological variables are beyond the control of research worker. These will be considered as limiting factors of the study.

Delimitation of the Study

1. The study was limited to 128 sportsmen of various Junior colleges of Visakhapatnam, Andhra Pradesh, India.
2. The study was delimited to 16 -18 years male players. All the subjects were healthy and normal
3. The subjects were selected from selected various games and sports (Athletics, football, Judo, Handball Cricket, Taekwondo, Hockey and Volleyball) having at least State level participation
4. After pretest all the selected subjects were randomly divided in 4 groups to form four independent groups; having equal number of players of selected games, e.g. Experimental Group I underwent Technical training (N =32) Experimental Group ii underwent Traditional (N=32) Experimental Group iii underwent Combined Training (Technical training and Traditional Group); (N =32) Experimental group iv acted as Control Group (N = 32).
5. The duration of experimental period was restricted to 6 Weeks, 5 days per week training in morning session for approximately one hour (45-60 Min.) and 55-70 Min. for traditional exercise.
6. The Criterion Variables of Physical Fitness were following;- Muscular Strength and Endurance of trunk Speed and Agility
7. Modified and Revised AAHPER Youth Physical Fitness Test Battery was used to test the criterion measures of Physical Fitness
8. Data were collected two days prior to and after the experimental period

Technical training: Technical training is an organized way of exercising in which players go from one exercise station to another in a planned sequence in the shortest possible time. It improves Muscular Strength,

Muscular Strength: Muscular strength refers to the amount of force a muscle can produce with a single maximal effort.

The size of your muscle fibers and the ability of nerves to activate muscle fibers are related to muscle strength. It is measured during muscular contraction.

Building muscle strength helps with body alignment, makes performing everyday actions easier, and increases metabolism.

Speed: Speed is the ability to move quickly across the ground or move limbs rapidly to grab or throw... Movement speed requires good strength and power, but also too much body weight and air resistance can act to slow the person down.

Agility: Agility refers to the ability to start, stop, and change direction quickly while maintaining proper posture. Therefore, agility training is a type of exercise training that incorporates short bursts of movement that involve changes of direction.

Significance of The Study

1. The findings of the study will be helpful in guiding the research workers in planning their research programs in the light of observation made and interpretation recorded.
2. The study will provide feedback to Physical Education Personnel and Sports Coaches in planning effective Training Program based on Technical training, Traditional exercise or Combination of both.
3. The study will be helpful in quantifying the effectiveness of training program.
4. The study will be helpful in evaluating the rate of development of each individual.
5. The study will be helpful in developing physical fitness program as well as sports skill development program with necessary modification in training program as per desired goals.
6. The study may be helpful to the future research scholars to select new problem relating to the study.

Research Methodology: Role of research methodology is to carry out the research work in a scientific and planned way to achieve the objectives of the study. A research worker has to follow a systematic process from identification of problem to conclusion. So research design of present study is covered under following headings:

Selection of Subjects: Stratified random sampling method has been used for sample selection. 128 male subjects having at least state level participation (as shown in table no.1) were selected to compare the effects of Technical Training, Traditional Exercises and combined training on sportspersons. All the sportspersons were selected from Junior colleges of Visakhapatnam, Andhra Pradesh, India.
The age of all the subjects ranges from 16 to 18 years. The selected subjects were from different socio-economic background. All the subjects were physically fit to undergo hard training. All the subjects were aware of hard work as they had been taking part in the required training sessions of their games. A meeting of all the subjects was arranged in the presence of physical education teachers and coaches of Department of Physical Education, Andhra University, Visakhapatnam. The process of pretest and posttest of the training schedule were explained in detail to avoid ambiguity in their minds. They were made aware of the efforts and hard work that they were required to put in all the research procedures.

Table 1: Categorization of Subjects

Sl. No	Name of Game	No. of subjects
1.	Cricket	16
2.	Taekwondo	16
3.	Football	16
4.	Hockey	16
5.	Handball	16
6.	Athletics	16
7.	Judo	16
8.	Volleyball	16
Total		128

Selection of Criterion Variables Dependent variables: Physical and mental fitness is required in Sports because sportsperson needs to take decisions within fraction of seconds and without planned training sportspersons will not be able to understand and execute their potentials. Physical fitness requires special training program to have significant improvement. Sports training aims to develop physical fitness and while preparing training schedule for elite athlete sports training should be more organized and planned so that athletes may perform better under pressure conditions and bodily fatigue. After a lot of literature review, following criterion variables were selected as dependant variables for the present study, which play important role in every game:-

1. Muscular strength and endurance (trunk)
2. Speed and agility

Independent Variables: In order to cater to the increasing competition in sports domain various training programs have been incorporated to reach top performances like Technical Training, Traditional exercises and Combined Training. These trainings have their specific effects on physical fitness components.
Based upon the above mentioned concepts the following Independent Variables have been taken up for the present study

1. Technical Training Group
2. Traditional Exercises Group
3. Combined Training Group
4. Control Group

Research Design: The experimental research design was used for the present study. All the 128 subjects were randomly divided into four equal groups (shown in Table no.2) having equal number of players (e.g. 4 players from each selected game, shown in table no2)

Table 2: Categorization of Subjects In Experimental Groups

Sl. No	Experimental Groups	Treatment Offered	No. of Subjects
1	Technical Training Group	Selected Technical Training	32
2	Traditional Exercise Group	Selected Tradit Asanas and Pranayama techniques	32
3	Combined Training Group	Combination of selected Technical training and Traditional training (Asanasand Pranayama)	32
4	Control Group	Advised to do routine exercise	32
		Total	128

Pre test of all the selected subjects was taken initially on selected criterion variables. After pre test, all the subjects were divided in four equal groups and allotted specific training program as shown in table no.2. A training program was devised for 6 weeks wherein subjects were trained for 5 days per week to fulfil the purpose of the study.

Thursday and Sunday of every week were kept as rest days. First experimental group underwent Technical based selected Exercises; second experimental group underwent Traditional Exercises including selected Asanas and Pranayama techniques; third experimental group underwent Combined Training including Technical based selected Exercises and selected Traditional Exercises (selected Asanas and Pranayama) on separate specified days of every week, fourth experimental group worked as control group and didn't participate in specific training except daily routine exercises. After 6 weeks of training program all the subjects were again tested and post training data were collected on selected variables.

Table 3: Aahper youth physical fitness test items to test criterion variables

Sr. No.	Name of test items	Criterion variables Tested	Unit of measurement
1.	Pull Ups	Muscular strength (dynamic) and muscular endurance of arms and shoulders	Numbers
2.	Shuttle run (10x4 yards)	Speed and agility	Seconds

The AAHPER Youth Physical Fitness Test was conducted for two days given below:

1. Pull Ups
2. Shuttle Run

Administration of Tests and data Collection: The tests were administered on all the subjects in the Department of Physical Education & Sports Sciences, Andhra University, Visakhapatnam, Andhra Pradesh, India.

Table 4: Training Procedure Adopted For Experimental Group – I/Technical Training Group

Duration of whole training program	45-60 minutes according to weekly schedule of Technical Training
Training program	6 weeks
Frequency of training program	5 days per week in morning session
Warm-up	15 minutes with moderate intensity
Duration of each Technical exercise	30 seconds
Rest in between exercises	As required to reach on the next station and taking equipment otherwise no rest was provided between exercises
Intensity	50 to 70% (increased progressively)
Warm down	10 minutes

Table 5: Schedule of training for Technical Training group

1.	Total Frequency	6 weeks (5 days per week)					
2.	Rest Days	Thursday and Sunday of every week					
3.	Training program	Technical Type I – Monday, Tuesday and Wednesday of every week. Technical Type II – Friday and Saturday of every week					
4.	No. of exercises in each circuit	Technical Type I: Consists eight stations Technical II: Consists eight stations					
5	Week	1st	2nd	3rd	4th	5th	6th
6.	Intensity	50%	50%	60%	6-%	7-%	70%
7	Duration of each exercise (in seconds)	30	30	30	30	30	30
8.	No. of sets	3	3	4	5	3	5

Training Procedure Adopted for Experimental Group–II/ Traditional Exercise Group: Traditional Exercise Group (n=32) underwent weekly five classes for six weeks of training program in the morning session (6 a.m onwards). For the present study, two formats of Traditional Exercises (Type-1 and Type-II) were framed for training purpose. Both formats of Traditional Exercises (Type-I and II) consists of different eight Traditional Asanas and two Pranayama techniques. Both formats of Traditional exercises were implemented in the training program on separate specified days of every week. Two formats of Traditional exercises were framed to avoid boredom and achieve better results of training progamme due to variation of Asanas and Pranayamas. All Subjects of Traditional Exercise group were given same Exercises including Asanas and Pranayama. The training session includes 10-13 minutes (Depending upon frequency of sets of every week) Pranayama techniques, 10 minutes warm up based on Traditional Asanas and Stretching exercises. 28-42 minutes Asanas (Depending upon frequency of sets of every week) and 5-7 minutes relxation/cool down. The whole

experimentation lasts for 55-70 minutes (Including warm up, warm down and rest period given in between Pranayama and Asanasa). The whole procedure adopted was demonstrated by the Yoga Experts and conducted with the help of yoga experts.

Table 6: Training Program Designed For Experimental Group Ii/Traditional Exercise Group

Duration of whole training program	**55-70 min.**
Training program	Six weeks
Frequency of training program	Five days per week in morning session
Warm-up	Ten minutes with Traditional exercise and stretching exercise for whole body parts
Duration Traditional exercise	Holding time 15-17 sec.
Rest in between exercises	2-3 sec.
Warm-down	5-7 min.

Data Collection: The data were collected on physical fitness components namely dynamic muscular muscular strength and endurance of trunk, speed and agility for all the four groups before the experimentation period (Pre test) and after six weeks of training (Post test) respectively.

Statistical Procedure: Firstly, Normality and Homogeneity of variance were computed using kolomogorov smirnov normality test (k-s test) and Levene's Test of Equality of Error Variances respectively to fulfill the assumptions of use of parametric tests (MANOVA). In order to test the effects of training, the data collected from all the four groups before and after experimentation on physical fitness variables, were statistically analyzed. Paired t-test and Multivariate analysis (MANOVA) were used to determine significant differences. LSD (Least significant Difference) Post Hoc test was used to determine which paired mean had significant differences. In all the cases the level of confidence was fixed at 0.05 to test the significance.

Results of The Study: As per the objectives of the study, data was collected on muscular strength speed and agility, with the help of AAHPER Youth Fitness Test variables namely pull ups, shuttle run, respectively. Normality and homogeneity of variance were computed to check normal distribution of data and variance of data respectively to fulfill the assumptions of use of parametric tests (MANOVA). Paired "t" test was computed to find out the significance difference, if any, between means of pre and post tests of male players following the six weeks specified training program. The data was subjected to multivariate analysis of variance (MANOVA) for determining significant difference, if any, among the type of treatments given to groups. LSD (Least significant difference) Post Hoc Test was applied for pair wise comparisons to test significance differences between different combinations of the treatment groups. The significance level of 0.05 was used for all statistical analysis because this level is commonly used within the field of social sciences and has a relatively low risk of committing a type - I error.

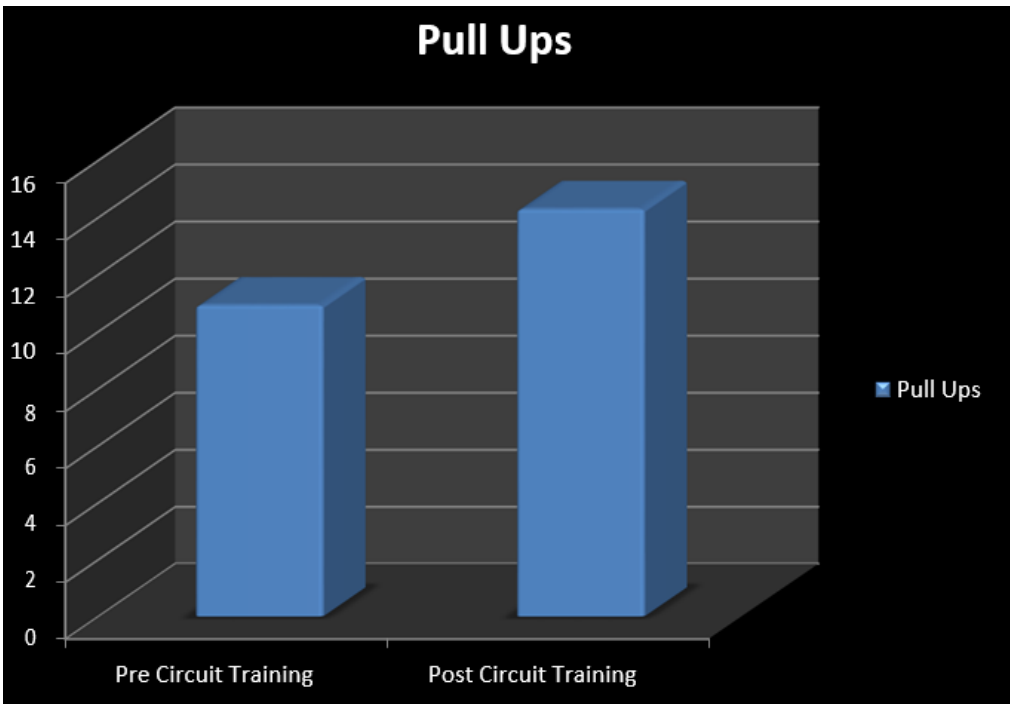

Fig 1: Difference of Pull Up Scores of Technical Training Group For Pre And Post Test Conditions

Figure 1- Shows that mean score of Pre test of Technical Training for pull ups is 10.93 and mean score of Post test of Technical Training for pull ups is 14.30. The figure indicates that pull up performance/ Muscular Strength (dynamic) and Endurance of Arms and Shoulders were significantly increased after "6" weeks of Technical Training Program.

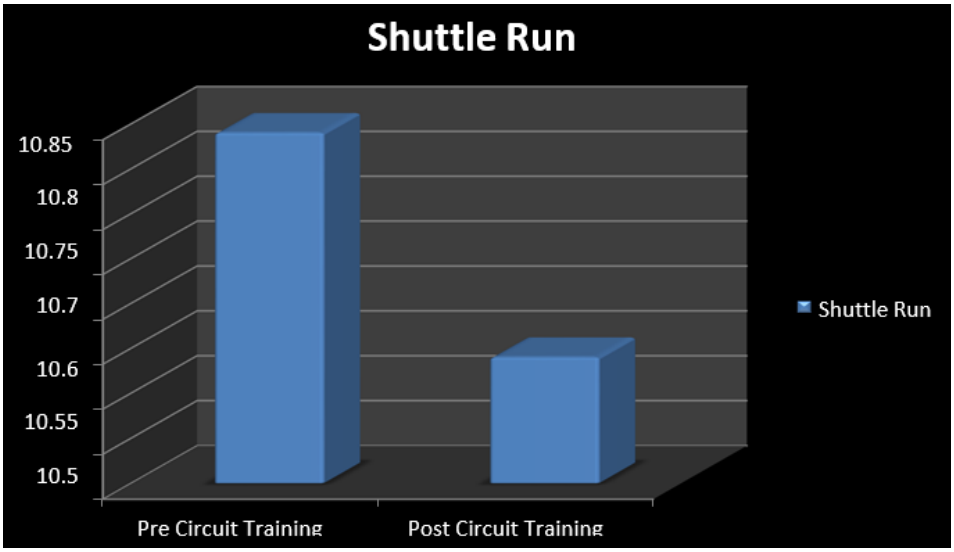

Fig 2: Difference Between The Shuttle Run Scores of Technical Training Group For Pre And Post Test Conditions

Figure -2 Shows that mean score of Pre test of Technical Training for shuttle run is 10.84 and mean score of Post test of Technical Training for shuttle run is 10.59. The figure indicates that shuttle run performance/ Speed and Agility were significantly increased after six weeks of Technical Training Program as time taken in performing shuttle run was significantly decreased.

Table 7: Comparison Between Pre Test and Post Test Scores of Physical Fitness of Both Training Group

S. No	Test items	Score	N	Mean	SD	T value	Significance
1	Pull ups	Pre	32	10.80	1.72	-35.30	.001
		Post	32	13.71	1.66		
2	Shuttle run	Pre	32	10.85	.13	89.37	.001
		Post	32	10.55	.14		

Significant level – 0.05 Degree of freedom = 31

The mean scores of Pre and Post test for Pull Ups are (10.80±1.72) and (13.71±1.68) respectively, which are significant at 0.01 level and shows significant improvement in Dynamic Muscular Strength. The mean scores of Pre and Post test for Shuttle Run are (10.85±.13) and (10.55±.14) respectively, which are significant at 0.01 level and shows significant improvement in Speed and Agility.

It was hypothesized that there will be no significant difference in Pre and Post test scores of Physical Fitness variables of Combined Training Group but result shows that highly significant difference exists in Pre and Post scores of all the selected Physical fitness Variables. Hence, the null hypothesis was rejected.

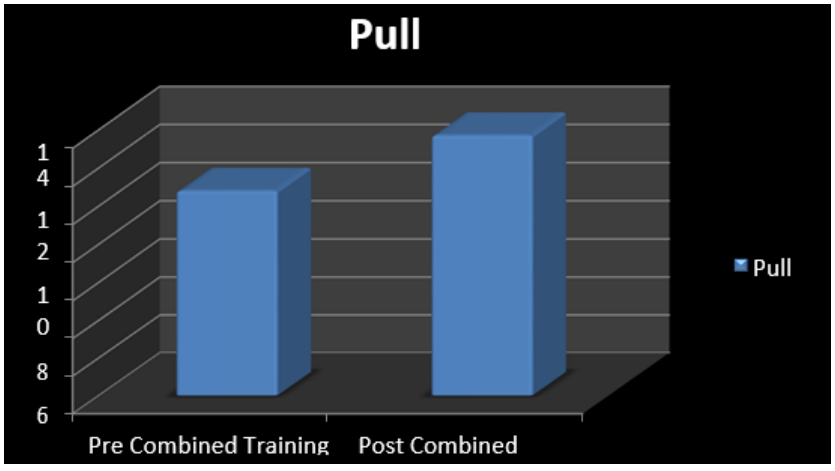

Fig 3: Difference Between Pull Up Scores of Combined Raining Group For Pre Test And Post Conditions

Figure -3 Shows that mean score of Pre test of Combined Training for pull ups is 10.80 and mean score of Post test of Combined Training for pull ups is 13.71. The figure indicates that pull up performance/ Muscular Strength (dynamic) and Endurance of Arms and Shoulders were significantly increased after "6" weeks of Combined Training Program.

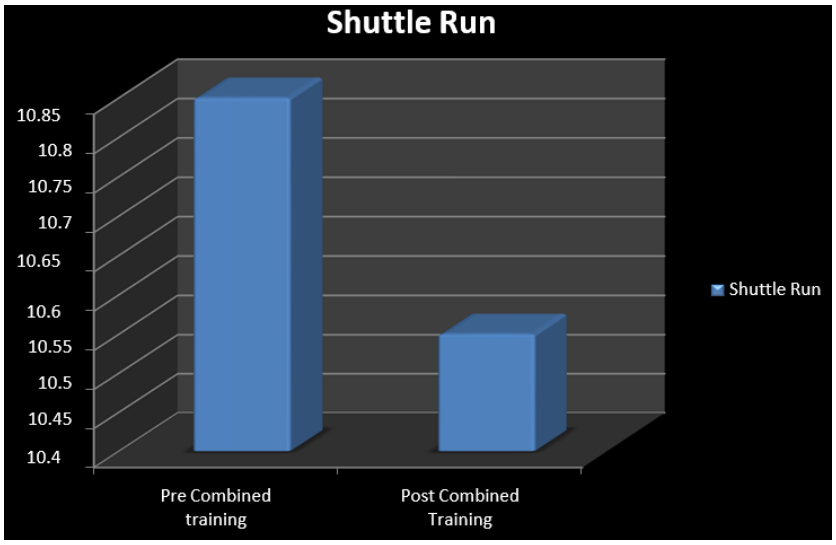

Fig 4: Difference Between Shuttle Run Scores of Combined Training Group For Pre Test And Post Test Conditions

Figure 4.Shows that mean score of Pre test of Combined Training for shuttle run is 10.85 and mean score of Post test of Combined Training for shuttle run is 10.55. The figure indicates that shuttle run performance/ Speed and Agility were significantly increased after six weeks of Combined Training Program as time taken in performing shuttle run was significantly decreased.

Table 8: Comparison Between Pre Test And Post Test Scores of Physical Fitness of Control Group

S. No	Test items	Score	N	Mean	SD	T -value	Significance
1	Pull ups	Pre	32	10.62	1.61	-1.52	.135
		Post	32	1080	1.52		
3	Shuttle run	Pre	32	10.85	.13	1.86	.006
		Post	32	10.85	.13		

Significant level – 0.05 Degree of freedom = 31

The mean scores of Pre and Post test for Pull Ups are (10.62±1.61) and (10.80±1.52) respectively, which are not significant at 0.05 level and shows no significant improvement in Dynamic Muscular Strength.
The mean scores of Pre and Post test for Shuttle Run are (10.85±.13) and (10.85±.13) respectively, which are not significant at 0.05 level and shows no significant improvement in Speed and Agility.

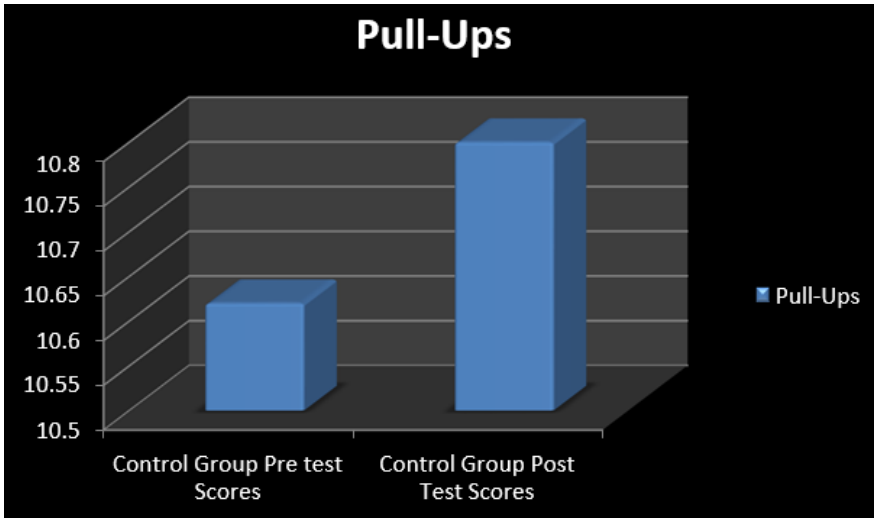

Fig 5: Differences Between Pull Up Scores of Control Group For Pre Test And Post Test Conditions

Figure -5 Shows that mean score of Pre test of Control Group for pull ups is 10.62 and mean score of Post test of Control Group for pull ups is 10.80. The figure indicates that pull up performance/ Muscular Strength (dynamic) and Endurance of Arms and Shoulders were not significantly increased of Control Group.

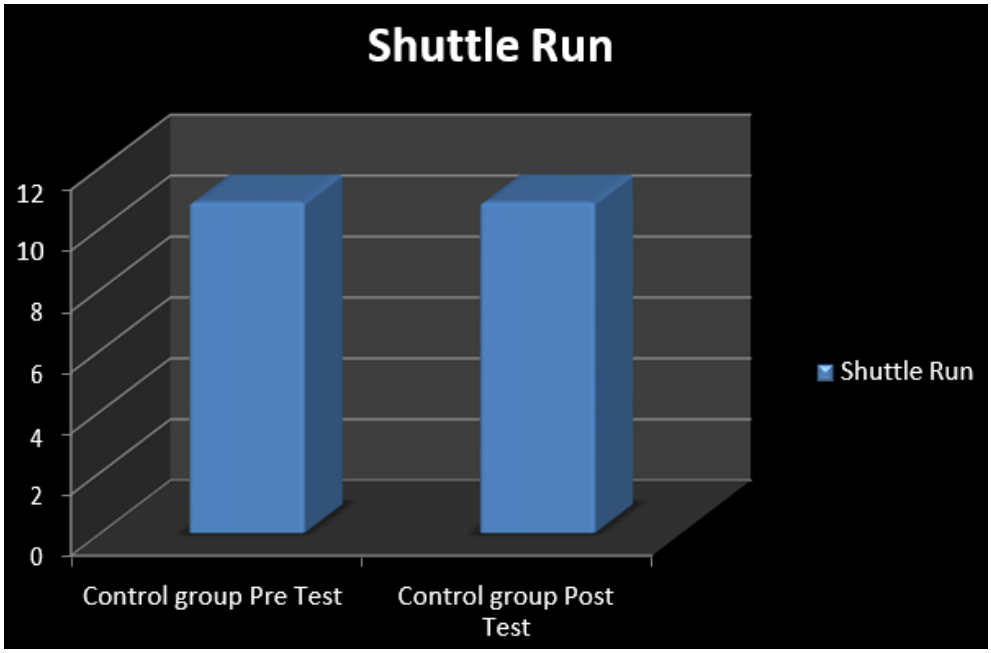

Fig 6: Difference Between Shuttle Run Score of Control Group For Pre Test And Post Test Conditions

Figure-6 -Shows that mean score of Pre test of Control Group for shuttle run is 10.85 and mean score of Post test of Control Group for shuttle run is 10.85. The figure indicates that shuttle run performance/ Speed and Agility were equal of Control Group.

Table 9: Illustrative of Technical Training, Traditional Exercise, Combined Training And Control Group of Pull Ups Measurements For Pre Test Conditions

S. No	Group	N	Mean value	S.D.
1	Technical training group	32	10.93	1.68
2	Traditional exercise group	32	10.71	1.60
3	Combined training group	32	10.80	1.72
4	Control group	32	10.62	1.61

Shows that the mean score of Technical Training Group is 10.93 and S.D is 1.68 for Pull Ups dimensions for Pre Test conditions. The mean score of Traditional Exercise Group is 10.71and S.D is 1.60 for Pull Ups dimensions for Pre Test conditions. The mean score of Combined Training Group is 10.80 and S.D is 1.72 for Pull Ups dimensions for Pre Test conditions. The mean score of Control Group is 10.62 and S.D is 1.61 for Pull Ups dimensions for Pre Test conditions.

Conclusion

On the basis of findings of the study, the following conclusion may be drawn

Six weeks Technical Training, Traditional Exercises comprising Asanas and Pranayama and Combination of Technical Training and Traditional Exercises (Combined training) are beneficial for sportspersons to improve muscular strength (dynamic) speed and agility. However all the types of training mentioned in the study are beneficial but some specific conclusions are drawn on the basis of comparison (LSD- Post Hoc) of all the experimental groups:-

- Technical training is better than combined training and Traditional exercises to develop strength and endurance of trunk.
- Combined training is better than Traditional exercises to develop strength and endurance of trunk.
- Technical training and Combined training both are better than Traditional exercises to improve speed and agility of sportspersons.

Recommendations

- Technical training, Traditional training and combined training can be recommended in the training program to improve the performance of sportspersons of different games.
- The similar study may be conducted to find out differences among women players.

- The same study may be extended for boys and girls of different age groups.
- Research work can be done on large population of different ethnicity.
- The similar study may be conducted with modified training program

Reference

1. Ashok and Sumitra Rani. "A Study of effects of circuit training on selected physical fitness variables of sports persons" RJIF Yoga,2016:2-16:2(2):10-15.
2. Aunoori Mallesh, Suresh TN. and other "Effectiveness of Sports Specific training and high intensity interval training on Aerobic capacity in male basketball players", 2018.
3. Bal BS, Kaur PJ. Effects of selected asanas in hatha yoga on agility and flexibility level. Journal of Sport and Health Research,2009:1(2):75-87.
4. Billy Sperlich. Limiting factors for maximum oxygen uptake and determinants of endurance performance. *Med. Sci. Sports Exerc*,2022:32:70-84. doi: 10.1097/00005768-2022.
5. Blake HT, Stenner BJ, Buckley JD. others controlled train comoparing two group-based exercise programs on men's health, study protocol, BMJ open Sports Exercise Medicine, 2021. Dai. 10.11.36.
6. Braun WA, Hawthorne WE, Markofski MM. Acute EPOC response in women to circuit training and treadmill exercise of matched oxygen consumption. *Eur. J. Appl. Physiol*,2021:94:500-504. doi: 10.1007/s00421-005-1383-7.