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BHARATHIAR UNIVERSITY
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## From the Editors' Desk

Whilst we are striving hard to manage the new normal post Covid pandemic, there is a great realization on health fitness and wellness. The department of Physical Education, Bharathiar University with societal responsibility publishes this 13th volume of 'The Bharathiar National Journal of Physical Education and Sports Sciences'. In-spite of the pandemic break the editorial team had put in tremendous efforts to bring out this volume of research works and articles.

The **Bharathiar National Journal of Physical Education and Exercise Sciences (BNJPEES)** is an open access quarterly journal, double blind refereed journal with ISSN– 0976-3678 which publishes original articles, commentary, editorials, review articles and case reports covering recent innovative high quality researches on sports published by the Department of Physical Education, Bharathiar University Coimbatore since June 2010. The purpose of this journal is to enrich the field of physical education and sport with literary base dynamic latest research and articles. The field of sport and physical education with its dynamic nature needs a literary back up to keep the masses informed of the latest changes that are happening across this field. Since the Sports Climate is experiencing a wide range of change and is very much essential that we stretch ourselves to meet the key challenges on sports and games. Since the inception of the new editorial team from 2019, the journal has been upgraded online to increase the vicinity across the globe and provide a wider citation opportunity scaling up research heights. The journal has been indexed with google scholar, world cat, core and road.

We appreciate the research scholars for stepping forward to get their works published in our university journal. The submitted articles are subjected to a double blind referee system for review. Based on the reviewers report the articles are accepted. We are also working hard towards quality control of the articles in par with the international standards.

From the editorial desk we submit to you that BNJPEES, with immense pleasure is working for the development of research in the field of Physical education and sports sciences which is the need of the hour. We encourage the authors to submit evidence based real time research results which would benefit the society.



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## Publisher's Desk

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# BHARATHIAR NATIONAL JOURNAL OF PHYSICAL EDUCATION AND EXERCISE SCIENCES
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# Combined Impacts of Isometric Strength and Ladder Training on Physical Fitness Variables among Handball Players

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**Abstract**

This study was considered to examine the combined impacts of isometric strength and ladder training on physical fitness variables among handball players. Thirty male handball players were randomly selected from Government Higher Secondary School, R.N. Puthur, Erode. The subject's age ranged from 14 to 17 years. They were divided into two equal groups. The group 1 is considered as experimental group (isometric strength and ladder training) and group 2 was considered as control group. Pre-test was conducted on Speed, Agility and leg explosive power for both the groups and the reading were carefully recorded in their respective unit as pre-test score. After pre test, experimental group was treated with isometric strength and ladder training, for duration of 45 minutes, three days per week for a period of eight weeks. The control group was not treated with any special training. After eight weeks of training post test was conducted and the reading were carefully recorded in their respective units as post test score. The pre and post test were taken for analysis. The collected data on physical fitness variables due to eight weeks isometric strength and ladder training was analysed by dependent 't' test with 0.05 level of confidences. From the results of the study, it was found that there was a significant development on physical fitness variables among handball players.

Keywords: Isometric Strength Training, Ladder Training, Physical Fitness Variables, Handball Players.

## Introduction

Isometric workouts involve the tightening (contractions) of a single or group of muscles. The muscle length does not change substantially during isometric activities. The damaged joint is also immobile. Isometric workouts aid in the maintenance of strength. They can also increase

strength, but not very successfully.

Agility ladder drills aren't just for the pros. Ladder exercises, especially for non athletes, can be an excellent approach to begin athletic type training. A speed and agility ladder workout is also an excellent method to get your heart rate up (and calories melting).

The agility ladder workout is fantastic for a variety of reasons. Yes, your heart rate will rise and you will burn calories, but there is so much more to it. Ladder drills help keep you motivated in your training even if you're stuck in a fitness slump. Here are a few of the advantages of speed ladder training. Agility ladder drills are ideal for cross-training because they increase your speed, agility, and quickness, whether you're a pro athlete or a fitness novice.

**Methodology**

The selected thirty subjects were randomly divided into two equal groups consist of 15 each such an experimental group and control group. Pretest was conducted on Speed, Agility and leg explosive power for the two groups and the reading were carefully recorded in their respective unit as pretest score. After pre test, experimental group was treated with isometric strength and ladder training, for duration of 45 minutes, three days per week for a period of eight weeks. The control group was not treated with any special training. After eight weeks of training post test was conducted and the reading were carefully recorded in their respective units as post test score. The pre and post test were taken for analysis.

The training programme is designed for 60 minutes per session per day, three days per week for a period of six weeks. These 60 minutes include 10 minutes warm up and 10 minutes warm down, with the remaining 40 minutes dedicated for ladder training. Every two weeks, 10% of the work load is increased from 50% to 60%. The participants' maximum working capacity is used to enhance the training load.

**Statistical Technique**

The collected data on physical fitness variables due to eight weeks isometric strength and ladder training analyzed by using means and standard deviation. In order to find out the significant changes if any dependent ‘t’ test will be applied 0.05 level of confidences fixed to level of significant..

**Results**

**Table 1: Computation of 't' ratio between pre and post-test means of experimental group on physical fitness variables**

| Experimental Group | | | | | |
|---|---|---|---|---|---|
| **Physical Fitness Variables** | **Pre/Post test** | **Mean** | **Std. Deviation** | **Std Error Mean** | **'t' Ratio** |
| Speed | Pre-Test | 7.63 | 0.58 | 0.24 | 10.28* |
| | Post-Test | 7.38 | 0.63 | | |
| Agility | Pre-Test | 10.99 | 0.60 | 0.42 | 11.06* |
| | Post-Test | 10.95 | 0.60 | | |
| Leg Explosive power | Pre-Test | 2.26 | 0.12 | 0.01 | 20.40* |
| | Post-Test | 2.28 | 0.12 | | |

*Significant at 0.05 level of confidence (2.145), 1 & 14.

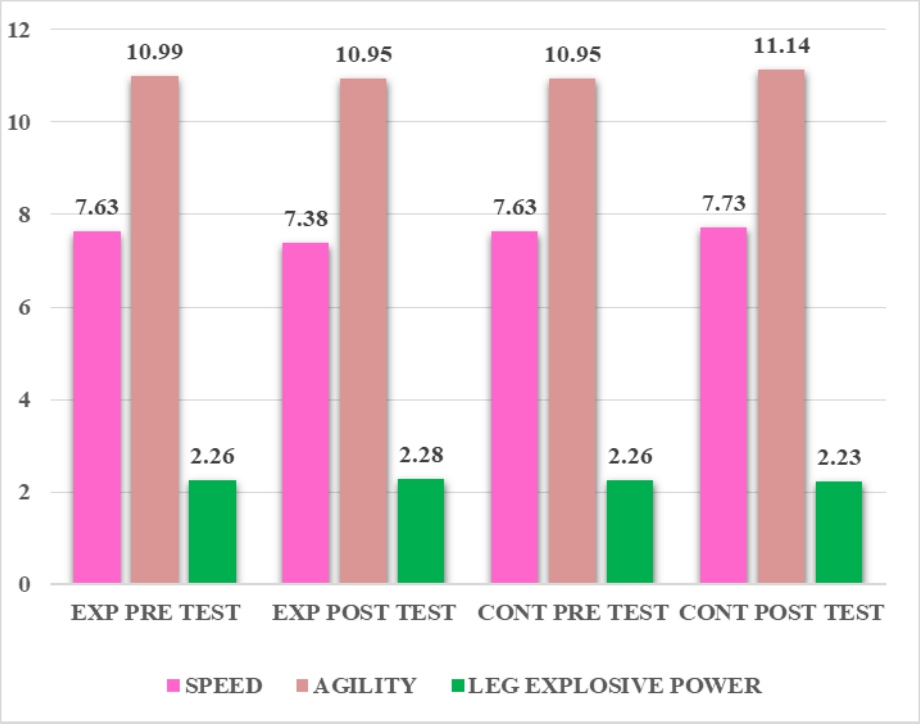
**Table 1** reveals that the Computation of 't' ratio between pre and post-test means of experimental group on Physical fitness variables. The 't' ratio on Speed, Agility and Leg Explosive power are 10.28, 11.06 and 20.40 respectively. The required table value was 2.14 for the degrees of freedom 14 at 0.05 level of significance. Since the obtained 't' ratio values were greater than the table value, it was found statistically significant.

**Table 2: Computation of 't' ratio between pre and post-test means of Control group on Physical Fitness variables**

| Control Group | | | | | |
|---|---|---|---|---|---|
| **Physical Fitness Variables** | **Pre/Post test** | **Mean** | **Std. Deviation** | **Std Error Mean** | **'t' Ratio** |
| Speed | Pre-Test | 7.63 | 0.58 | 0.55 | 1.12 |
| | Post-Test | 7.73 | 0.57 | | |
| Agility | Pre-Test | 10.95 | 0.60 | 0.03 | 1.17 |
| | Post-Test | 11.14 | 0.61 | | |
| Leg Explosive power | Pre-Test | 2.26 | 0.12 | 0.89 | 1.04 |
| | Post-Test | 2.23 | 0.11 | | |

*Significant at 0.05 level of confidence (2.145), 1 & 14.

**Table 2** reveals that the Computation of 't' ratio between pre and post-test means of control group on Physical fitness variables. The 't' ratio on Speed, Agility and Leg Explosive power are 1.12, 1.17 and 1.04 respectively. The required table value was 2.14 for the degrees of freedom 14 at 0.05 level of significance. Since the obtained 't' ratio values were lower than the table value, it was found statistically insignificant.




**Discussion on Findings**

The combination of isometric strength and ladder training is a fantastic training which has been found to be beneficial for the handball players. To study the combined impacts of isometric strength and ladder training on physical fitness variable of school level male handball players, it was tested under, to differentiate between isometric strength and ladder training group and control group.

The following studies was revealed that **A hidyat (2022)**[1], effect of agility ladder exercise on agility of participants extra curicular futsal at bina darma university. The result of the study supports the result of the present study. **V Pratheep Kumar*et al.*,(2019)** Effect of ladder training and combination of ladder training with plyometric training on selected skill performance variable of school basketball players.. The result of the study supports the result of the present

study. These finding had not been previously replicated for a sample of college students. The result of the study showed that the control group was not significantly improved.

**Testing Hypotheses**

1. In First hypotheses, it was hypothesized that there would be significant improvement on speed of male handball players due to combined effect of isometric strength and ladder training. The result of study indicates that speed improved significantly to isometric strength and ladder training. Hence, the first hypothesis of the investigator was accepted.
2. In Second hypotheses, it was hypothesized that there would be significant improvement on agility of male handball players due to combined effect of isometric strength and ladder training. The result of study indicates that agility enhanced significantly to isometric strength and ladder training. Hence, the second hypothesis of the investigator was accepted.
3. In Third hypotheses, it was hypothesized that there would be significant improvement on leg explosive power of men hockey players due to male handball players due to combined effect of isometric strength and ladder training. The result of study indicates that agility progressed significantly to isometric strength and ladder training. Hence, the third hypothesis of the investigator was accepted.

**Conclusions**

Based on the findings and within the limitation of the study it is noticed that practice of combined training of isometric strength and ladder helped to improve physical fitness variable among male handball players. It was also seen that there is progressive improvement in the selected criterion variables of isometric strength and ladder training group of school level male handball players after eight weeks. Further, it also helps to improve speed, agility and leg explosive power. It was concluded that combined effects of isometric strength and ladder training showed a statistically significant over the course of the treatment period on physical fitness variables of among male handball players.

1. It was concluded that individualized effect of control group showed a statistically insignifi-

cant over the course of the period on selected physical fitness variables of male handball players.

2. The results of comparative effects lead to conclude that the combine isometric strength and ladder training group had better significant enhancement on selected physical fitness variables (speed, agility and leg explosive power) of male handball players as compared to their performance with control group.

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**Conflict of interest**

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# Effect of Traditional Teaching with Computer Assisted Instruction on Selected Skill Performance Variables among Volleyball Players

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**Abstract**

The purpose of the study was to find out the effect of traditional teaching with computer assisted instruction on selected skill performance variables among volleyball players. To facilitate this study (60) sixty men Volleyball players from Puducherry State were randomly selected as subjects whose ages ranged from 17 to 21 years. They were divided into three groups, group I traditional teaching, group II computer assisted instruction and group III combined. The pre-test was conducted for all the 60 subjects on selected Volleyball skills such as underarm and overhead passing skills. The experimental groups participated in the respective training program six days per week for six weeks. After the experimental training, all the sixty subjects were measured on the selected passing skills. The final test scores formed the post-*test score of the subjects. The pre-test and post scores were subjected to statistical* analysis of Covariance (ANCOVA) to find out the significance of the mean differences. Whenever the `F' ratio for the adjusted test was found to be significant Scheffe's post hoc was used. In all cases, 0.05 level of significance was fixed to test hypotheses. The results indicated that the combined teaching was better than the isolated training in improving selected skills in Volleyball.

Key words: Computer assisted instruction, Traditional teaching, Underarm pass, Overhead pass, Volleyball.

## INTRODUCTION

Computer assisted instruction teaching processing which a computer is used to enhance education of students. Documents can be scanned or typed into electronic formats which can be handled in sophisticated ways, altering the layout, font styles and sizes etc., with ease, these documents can include pictorial and graphic information.

Volleyball is a sport played by two teams on a playing court divided by a net. There are different versions available for specific circumstances in order to offer the versatility of the game to everyone. The object of the game is to send the ball over the net in order to ground it on the opponent's court and to prevent the same effort by the opponent. The team has three hits for returning the ball (in addition to the block contact). The ball is put in play with a serving, hit by the serving over the net to the opponents. The rally continues until the ball is grounded on the playing court, and goes "Out" on a team that fails (Rally Point system). When the receiving team wins a rally, it gains a point and the right to serve and its players rotate one position clockwise.

**Hubert Dhanaraj (1991)**

The skills in the game of Volleyball are Serving, Underarm pass, Overhead pass, Attacking, Setting, and Blocking.

The following are the importance of passing skills in volleyball

1. Passing skill is a fundamental skill in Volleyball.
2. The two main pass skills are the underarm and overhead pass.
3. Passing is the base for setting up the team offense.
4. It is used to receive service.

A player with good passing skills can handle the attacking situation and collect the ball with passing skills (underarm pass & overhead pass).

**PURPOSE OF THE STUDY**

The purpose of the present study was to find out the effect of traditional teaching with computer assisted instruction on selected skill performance variables among Volleyball players.

**HYPOTHESES**

1. It was hypothesized that there would be a better significant improvement in underarm passing skill due to the combined computer assisted instruction and Traditional drills than the isolated computer assisted instruction and Traditional drills among Volleyball players.
2. It was hypothesized that there would be a better significant improvement in overhead passing skills due to the combined computer assisted instruction and Traditional drills than the isolated computer assisted instruction and Traditional drills among Volleyball players.

**METHODOLOGY**

For the purpose of the study, the investigator has selected (60) sixty men Volleyball players from Puducherry State by random method. The subjects'

ages ranged from 17 to 21years. They were divided into three groups, group I (N=20) traditional teaching, group II (N=20) only computer assisted instruction, and group III (N=20) traditional and computer assisted instruction combined.

**SELECTION OF VARIABLES**

1. Underarm Pass
2. Overhead Pass

**Experimental Training**

The experimental groups participated in the drill practices through traditional teaching, computer assisted instruction and traditional and computer assisted instruction combined. For six days per week for six weeks, 60 minutes (6.00 am to 7.00 am).

.

| **Traditional Teaching** | **CAI Training** | **CAI & Traditional Teaching** | **Duration (60) Min** |
|---|---|---|---|
| Warm up | Warm up | Warm up | 10 min |
| Traditional teaching | CAI Training | CAI Training | 40 min |
| | Drills | Drills | |
| | | Traditional teaching | |
| Cooldown | Cool down | Cool down | 10 min |

**STATISTICAL TECHNIQUE**

The pre-test and post scores were subjected to statistical Analysis of Covariance (ANCOVA) to find out the significance of the mean differences. Whenever the `F' ratio for the adjusted test was found to be significant Scheffe's post hoc was used. In all cases, a 0.05 level of significance was fixed to test hypotheses.

**RESULT AND DISCUSSION**

**COMPUTATION OF ANALYSIS OF COVARIANCE FOR PRE AND POST-TESTS DATA ON UNDERARM PASS AND OVERHEAD PASS EXPERIMENTAL AND CONTROL GROUPS**

| | | **Traditional** | **CAI** | **CAI & Traditional** | **SV** | **Sum of Squares** | **df** | **Mean Squares** | **Obtained f** |
|---|---|---|---|---|---|---|---|---|---|
| **U** | **Pre** | 7.94 | 7.6 | 8.24 | **B** | 3.1 | 2 | 1.51 | 0.66 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| UNDERARM PASS | Test Mean | | | | W | 127.8 | 57 | 2.25 | |
| | Post Test Mean | 14.8 | 12.74 | 18.2 | B | 302.1 | 2 | 151.55 | 31.64* |
| | | | | | W | 263.54 | 57 | 4.63 | |
| | Adjusted Post Test Mean | 14.80 | 12.85 | 18.17 | B | 271.63 | 2 | 136.32 | 30.38* |
| | | | | | W | 242.15 | 56 | 4.33 | |
| | Mean Gain | 5.84 | 4.04 | 9.03 | | | | | |
| OVERHEAD PASS | Pre Test Mean | 8.34 | 8.1 | 7 | B | 2.21 | 2 | 1.14 | 0.43 |
| | | | | | W | 143.66 | 57 | 2.51 | |
| | Post Test Mean | 15.8 | 13.04 | 18.64 | B | 323.8 | 2 | 161.12 | 25.56* |
| | | | | | W | 347.4 | 57 | 5.12 | |
| | Adjusted Post Test Mean | 15.58 | 13.11 | 18.80 | B | 333.81 | 2 | 166.4 | 35.40* |
| | | | | | W | 256.36 | 56 | 3.58 | |
| | Mean Gain | 6.34 | 3.85 | 3.58 | | | | | |

* Significant the table F required for 2 and 57(df) and 2 and 56(df) = 3.15

The pre-test scores of experimental group I (CAI), experimental group II (traditional) and experimental group III (combined) group on Underarm pass were 7.94, 7.6 and 8.24 respectively. The post-test scores of experimental group I (CAI), experimental group II (traditional) and experimental group III (combined) group on Underarm pass were 14.8, 12.74 and 18.2 respectively. The ordered adjusted mean scores of experimental group I (CAI), experimental group II (traditional) and experimental group III (combined) group on Underarm pass were 14.80, 12.85 and 18.17 respectively. The mean gain in the experimental group I (CAI), experimental group II (traditional) and experimental group III (combined) group were 5.84, 4.04 and 9.03 respectively. The obtained F value on pre-test scores 0.66 was less than the required F value of 3.15 to be significant at 0.05 level. This proved that there was no significant difference between the three experimental and combined groups indicating that the process of randomization of the groups was perfect while assigning the subjects

to groups. The post-test scores analysis proved that were significant differences between the three experimental and combined groups, as the obtained F value 31.64 was less than the required F value of 3.15. This proved that the differences between the post-test means of the subjects were not significant. Taking into consideration the pre and post-test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 30.38 was less than the required F value 3.15. This proved that there was no significant difference among the means due to the experimental training on the Underarm pass.

The pre-test scores of experimental group I (CAI), experimental group II (traditional) and experimental group III (combined) group on Overhead pass were 8.1, 7 and 8.34 respectively. The post-test scores of experimental group I (CAI), experimental group II (traditional) and experimental group III (combined) group on Underarm pass were 13.04, 18.64 and 15.8 respectively. The ordered adjusted mean scores of experimental group I (CAI), experimental group II (traditional) and experimental group III (combined) group on Overhead pass 13.11, 18.80 and 15.58 respectively. The mean gain in the experimental group I (CAI), experimental group II (traditional) and experimental group III (combined) group were 3.85, 9.64 and 6.34 respectively. The obtained F value on pre-test scores 0.43 was less than the required F value of 3.15 to be significant at 0.05 level. This proved that there was no significant difference between the three experimental and combined groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups. The post-test scores analysis proved that were significant differences between the three experimental and combined groups, as the obtained F value 25.56 was less than the required F value of 3.15. This proved that the differences between the post-test means of the subjects were not significant. Taking into consideration the pre and post-test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 35.40

**Figure 1**

**BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED MEANS OF UNDERARM PASS**

**(Scores in Numbers)**

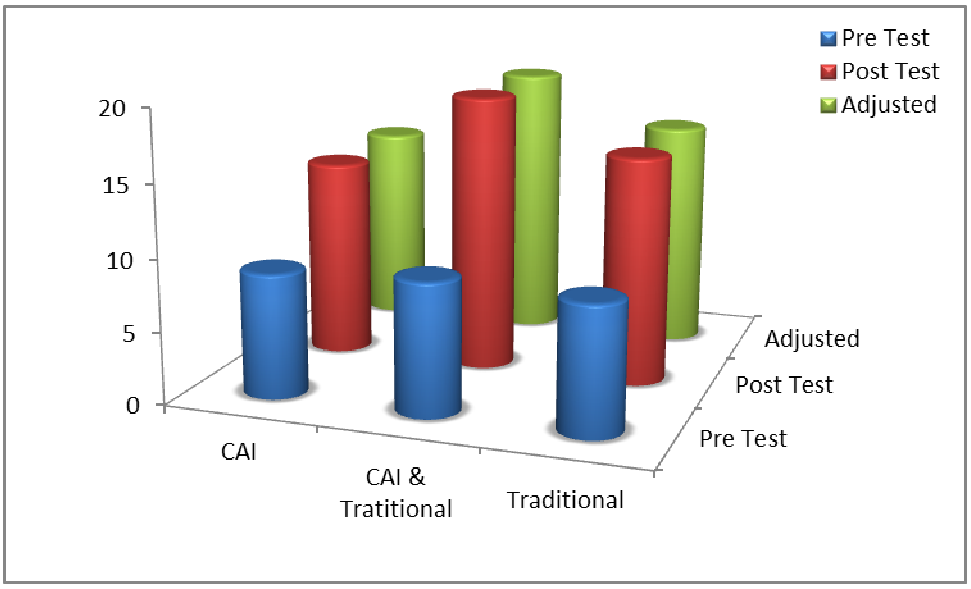


**Figure 2**

**BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED MEANS OF OVER-HEAD PASS**

**(Scores in Numbers)**

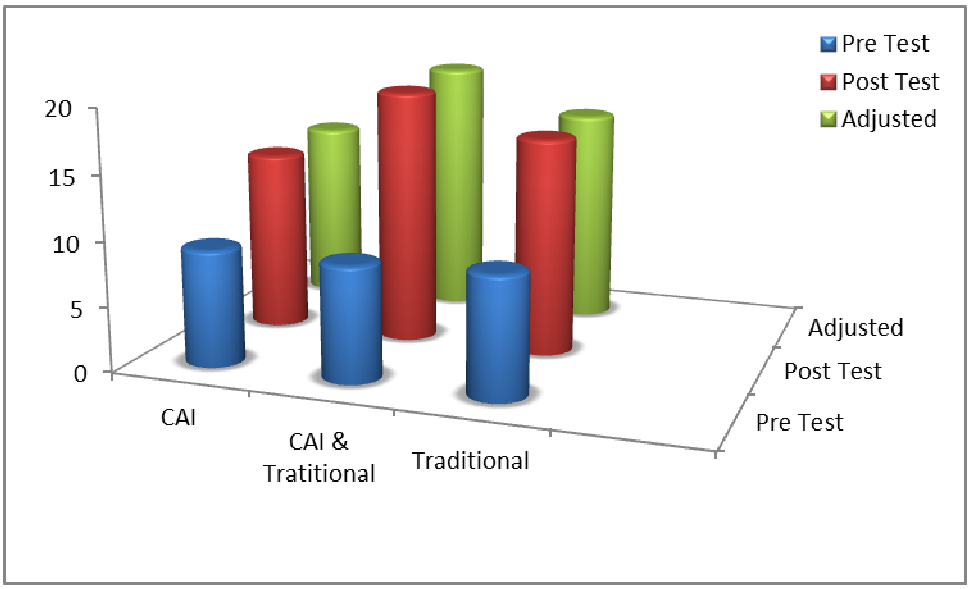


**Table – II**

**SCHEEFF`S TEST FOR THE DIFFERENCE BETWEEN THE ADJUSTED POST – TEST PAIRED MEANS OF UNDERARM PASS AND OVERHEAD PASS**

| | Tradition-al | CAI | CAI & Tradi-tional | Mean Difference | Required C.I |
|---|---|---|---|---|---|
| UNDERARM PASS | - | 12.95 | 18.17 | 4.24* | 1.66 |
| | 14.92 | 12.95 | - | 1.84* | 1.66 |
| | 14.92 | - | 18.17 | 2.27* | 1.66 |
| OVERHEAD | - | 13.11 | 18.89 | 4.67* | 1.71 |

| | | | | | |
|---|---|---|---|---|---|
| **PASS** | 15.68 | 13.11 | - | 2.45* | 1.71 |
| | 15.68 | - | 18.89 | 2.21* | 1.71 |

*Significant

The multiple mean comparisons shown in Table II proved that there were significant differences exist between the adjusted means of (CAI) and CAI and traditional group, traditional and (CAI) group, traditional and (CAI) traditional as the mean difference were greater than the obtained confidence interval 1.66. Comparing the means of the three groups, the experimental group – III (combined group) was found better in improving Underarm pass than the experimental groups – I (traditional) and experimental group – II (CAI).

The multiple mean comparisons showed in Table II proved that there were significant differences exist between the adjusted means of (CAI) and ICT and traditional group, traditional and (CAI) group, traditional and (ICT) traditional as the mean difference were greater than the obtained confidence interval 1.71. Comparing the means of the three groups, the experimental group – III (combined group) was found better in improving Overhead pass than the experimental groups – I (traditional) and experimental group – II (CAI).

## CONCLUSIONS

Within the limitation and delimitations set for the present study and considering the results obtained, the following conclusions were drawn.

1. The selected skills such as underarm and overhead pass were significantly improved by three experimental trainings namely the traditional, Computer Assisted Instructions and combined (CAI and traditional) among Volleyball.

2. The combined training (CAI with traditional) was found to be better in improving the underarm pass and overhead pass than the isolated Computer Assisted Instructions and traditional teaching

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among college students. Unpublished Doctoral Dissertation, Tamil Nadu Physical Education and Sports University, Chennai.

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# Effect of Adapted Aerobic Dance on Lung Capacity of Obese Children with Down syndrome

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**Abstract**

This study is to investigate the effect of adapted aerobic dance on lung capacity of obese children with Down syndrome. Thirty obese Down syndrome children age ranging from 10-15 years were chosen with purposive random sampling technique from Coimbatore district. The subjects were randomly conferred into two groups equitably with 15 subjects. The first group was named as the Adapted Aerobic Dance group (ADG) and the second group as controlled group (CG). The training period was scheduled for 6weeks (3days a week). Experimental group (ADG) underwent Adapted Aerobic Dance practice and the control group (CG) did not undergo any specific training other than the regular work. After 6weeks of the training period post test was conducted for both the groups. To find out significant difference exist between pre and post training, t ratio was applied. The Adapted Aerobic Dance group (ADG) had significantly improved ($P<0.05$).The Experimental group was better than the control group. The Control group did not show any significant improvement. Based on the results, it is break through that Adapted Aerobic Dance have enhancement in variables of obese children with Down syndrome.

Keywords: Down Syndrome, Adapted Aerobic Dance, Lung Capacity.

## INTRODUCTION

Down syndrome (DS) is a chromosomal blemish of trisomy 21 in al cells of the body. The effects of an extra chromosome have direct concerns for their health and wellbeing (e.g. heart defects, muscle hypo tonicity, joint hypermobility). Likewise, DS has been ordinarily related to obesity and low levels of physical fitness. Overall growth of children with Down syndrome is moderately slow when they are compared to their peers as those

children are floppy and poorly coordinated because of diminished muscle tone during childbirth (i.e., hypotonic) however it improves with age. Children with Down syndrome (DS) are at risk for major pulmonary morbidities, including obstructive sleep apnea, pulmonary hypertension, dysphagia and recurrent respiratory infections. Down syndrome (DS) is the most common chromosomal abnormality with an occurrence of 11.8 per 10.000 live births. Approximately 50% of new-born with DS have congenital heart disease (CHD). For the past twenty years in Western Australia the prevalence has remained relatively stable at approximately 1/1000 live births. Down syndrome includes a combination of birth defects, mental retardation, characteristic facial features, heart imperfections, expanded infection and pulmonary problems, in addition to visual and auditory problems. Thus, the cruelty of these problems varies greatly among those children. Individuals with DS are commonly physically inactive. As with non-DS individuals, this sedentary lifestyle is associated with multiple health consequences and ultimately increased healthcare costs. A mean cost of $4,287 is spent every year on healthcare in the United States for every individual with DS, with diabetes and heart disease being two of the top costs. With an estimated 250,000 individuals having DS, costs in the US could surpass $1,071,750,000. Being an avertible risk factor, sedentary lifestyle contributes to disease development and decreases quality of life. The main value of sporting activity is in its prevention of heart and circulation disease. In innumerable studies it has already been proved that people who regularly do some kind of endurance sport suffer less often from coronary heart disease than non-sportsmen. Aerobic training include both cardiovascular and pulmonary benefits as lowering resting, submaximal heart rates (HR) and respiratory rates, while higher VO2 at maximal workloads. Over and above all this, Aerobic plays an important role in overcoming day to day. This study is to analyses the effect of adapted aerobic dance on lung capacity of obese children with Down syndrome. This review is based on the PRISMA guidelines (Preferred Reporting Items for Systematic reviews and Meta-Analyses). The main conclusion is that prescribing structured physical exercise intervention may be related to a greater variation in body composition. Some guidelines are proposed to

contribute to the improvement of knowledge in this field.

This study proposes the assessment in individuals with DS using the dual X-ray absorptiometry (DXA) technique, the current gold standard for comparison of its values with those found in general population. To investigate the effects of a 12-week aerobic dance on Lung Capacity of adolescents with Down syndrome. This study is to check cardio metabolic risk in Down syndrome (DS). We compared cardio metabolic risk measures in youth with DS and typically developing matched controls. The purpose of this article was to review the measurement, determinants and promotion of physical fitness and PA for youth (i.e., children and adolescents) with DS. The existing body of research indicates that youth with DS have low cardiovascular capacity. This paper is to investigate and compare the effect of proprioceptive neuromuscular facilitation of respiratory muscles with that of inspiratory muscle, spirometry and functional capacity in children with Down syndrome.

**METHODOLOGY**

To achieve the purpose of the study 30 obese Down syndrome children were selected using purposive random sampling technique from Coimbatore district. The demographic data of the Down's syndrome children, both sexes will be collected from the clinic from their medical history. The date will be stored in MS excel format with restricted access. The age of the subjects ranged between 10-15 years. The pre-test was conducted on the variable lung capacity. The first group was named as the Adapted Aerobic Dance Group (ADG). The second group was named as Control Group (CG). The training period was scheduled for 6 weeks (3 days a week). Experimental group (ADG) underwent Adapted Aerobic Dance practice and the Control Group (CG) did not undergo any specific training period post test was conducted for both the groups. All data were analyzed using Statistical Package for SPSS. The significance threshold was set to be at $p<0.05$ level of confidence for degrees of freedom 1. After completion of the pretest the subjects were randomly assigned into two groups equally so that each group has 15 subjects. The first group was named as the Adapted Aerobic Dance Group (ADG). The Second group was named as Control Group (CG). The

training period was scheduled for 6 weeks (3 days a week). Experimental group (ADG) underwent Adapted Aerobic Dance Practice and the control group (CG) did not undergo any specific training other than the regular work. After 6 weeks of the training period post test was conducted for both the groups. All data were analyzed using Statistical Package for SPSS. The significance threshold was set to be at supervision of the investigator.

Figure: 1

**Peakflow Meter**

## TRAINING PROGRAM

The training program was impaired for a period of 45 minutes which included warm down after the training programme for three days per week for period of six weeks. The length of training intervention for this study was based on the fact that six weeks has shown to be sufficient to prove significant changes of obese children with Down syndrome. The experimental group obese children with down syndrome. In order to find out the significant changes if any between pre and post test of control and experimental group dependent “t” test was applied at 0.05 level of confident.

## STATISTICAL TECHNIQUE

The statistics of mean and standard deviation was calculated to measure the status of selected lung capacities of obese children with Down syndrome. In order to find out the significant changes if any between pre and post test of control and experimental group dependent “t” test was applie at 0.05 level of confident.

## Results

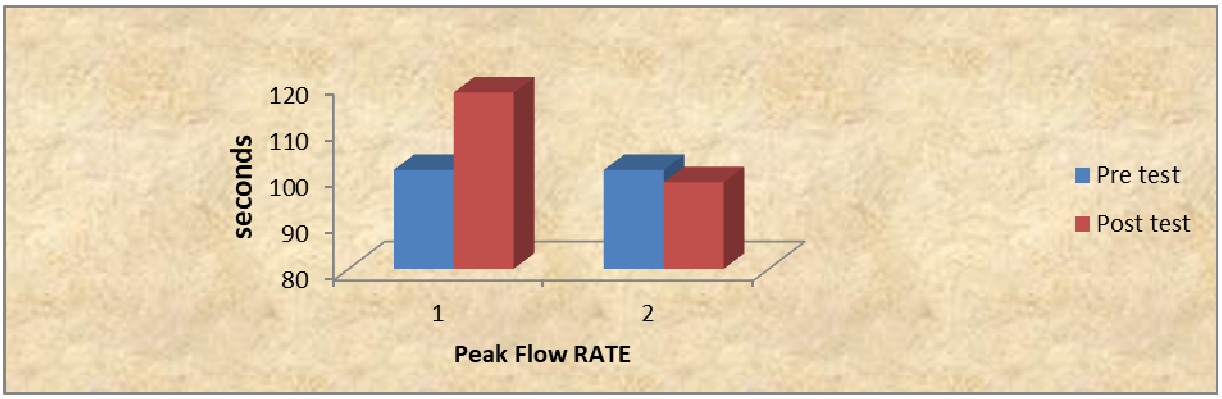
**Table - I**

Table Showing Obtained Mean Values for the Selected Variables

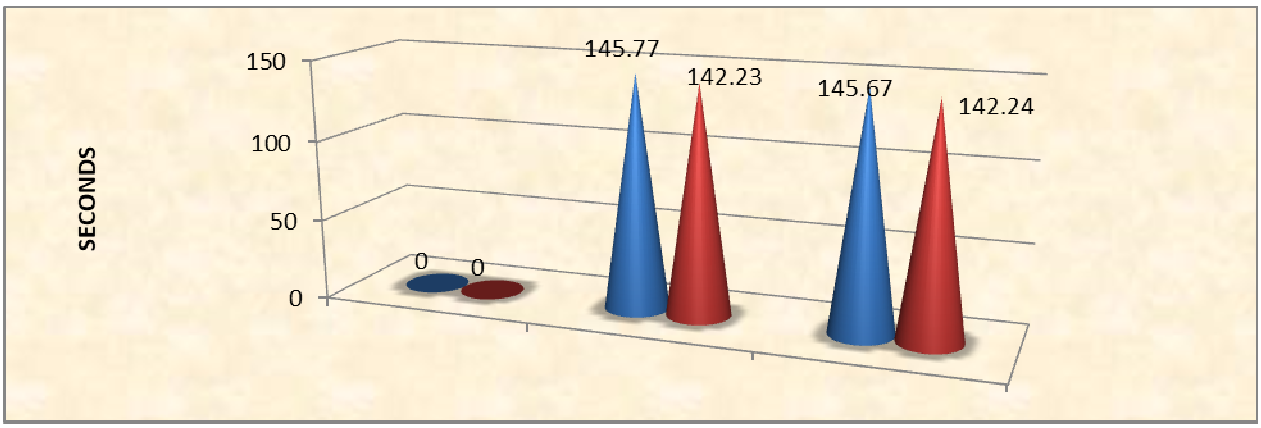
| S. No | Domain | Variable | Test | Pre test | Post test | Std deviation | | Std.Error Mean | | "t" Ratio |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. 7. | Lung capacities | Peak ex-piratory flow rate | Adapted aerobics group | 101.33 | 118 | 9.15 | 11.46 | 2.36 | 2.96 | 7.17 |
| | | | Control group | 101.33 | 98.66 | 11.87 | 9.90 | 3.09 | 2.55 | 1.74 |
| | | Breath holding time | Adapted aerobics group | 7 | 14 | 1.06 | 1.06 | 0.27 | 0.27 | 17.9 |
| | | | Control group | 7 | 7.06 | 1.25 | 1.09 | 0.32 | 0.28 | 0.56 |

Significant at 0.05 level of confidence 1 and 14.

**Graphical Representation showing the Pre and Post test mean values of experimental group and control group on Peak Expiratory Flow Rate**



**Graphical Representation showing the Pre and Post test mean values of experimental group and control group on Breath Holding**




## DISCUSSION

Aerobic Exercise is a beneficial for Down syndrome children. It shows that Physical activity / Exercise improvements in aerobic capacity. Parents of a child with Down syndrome will more likely provide their child with the opportunity of participating in physical activity because the benefits of aerobic exercise are proven. To find out if any significant difference exists between pre and post training, t-ratio was applied. The Adapted Aerobic Dance Group (ADG) had significantly improved (P<0.05) the selected variable Lung Capacity. The experimental group (ADG) Adapted Aerobic Dance Group was better than the control group. The control group did not show any significant improvement on the selected variables. Based on the results it was concluded that the implication of Adapted Aerobic Dance might have been the source of its dominance on the improvement of variable Lung Capacity of obese Children with Down syndrome. To find out if any significant difference exists between pre and post training, t-ratio was applied. The Adapted Aerobic Dance Group (ADG) had significantly improved (P<0.05) the selected variable lung capacity. The experimental group (ADG) Adapted Aerobic Dance Group was better than the control group. The control group did not show any significant improvement on the selected variables..

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**Conflict of interest**

None of the authors have any conflicts of interest to declare.



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# Assessment of Efficacy of Combined Asana and Pranayama Practices on Vital Capacity of College Men

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## Abstract

The vital capacity of the lungs is a decisive component of good health. Vital capacity is an important concern for those with asthma, heart conditions, and lung ailments; those who smoke; and those who have no known lung problems. The study was designed to investigate the efficacy of combined asanas and pranayama practices on vital capacity of college men. To achieve the purpose eighty college men randomly selected from Coimbatore district, Tamil Nadu as subjects and their age ranged between eighteen and twenty five years. They were divided into four groups. The treatment group I was considered as Asanas training group, group II was considered as Pranayamas training group, group III was considered as combined asanas and pranayamas training group and group IV was considered as control group. The investigator did not make any attempt to equate the groups. The control group was not given any treatment or exercises and the experimental groups were given Asanas and pranayama practices for three days per week. The experimental groups were given training for the period of sixteen weeks of Asanas, Pranayamas and combined asanas and pranayamas practices. Vital capacity was chosen as dependent variable and it was assessed before and after the training period of sixteen weeks. Data obtained were evaluated in SPSS package. The F value revealed that the vital capacity was significantly improved due to the influence of combined asanas and pranayama practices.

Keywords: sana, Pranayama, Physical Education, Vital capacity and Yoga.

## INTRODUCTION

Yoga is an ancient Indian mind body approach that has components centering on Asanas, Pranayamas, Shatkarmas, Meditation and Mudras with Bandhas. Yoga is an ancient tradition known to have existed in India before 3000 B.C. It is the holistic system for physical, mental and spiritual well-being. Gheranda Samhita as well as Hatha Yoga Pradipika contains instructions on the practice of postures (Asanas), breathing exercises (Pranayamas) and purification techniques (Kriyas) to overcome the obstacles in the route of Samadhi. According to **Tiwari (1984)** regular practice of 'Asanas' give strength, 'Mudras' give rise to steadiness, 'Shatkriyas' helps in purification and 'Pranayama' develop lightness. These practices ensure nourishment to tissues through their beneficial influence on various systems of the body and thus help in preserving and promoting mental and physical health. Yogasanas are not only to develop muscles and the body but mainly to regulate the proper activities of all the internal organs and glands to affect the nervous system which in turn controls the over well being of muscles to a greater degree than we actually suppose **(Devi, 1969)**.

The aim of cultural asanas is to produce physiological balance in the different systems working in the human body. So that it can possess the best organic vigour. The other aim is training the spinal cord and the digestive system can work elastic. Asanas like bhujangasana, shalabhasana, dhanurasana, yoga mudra, paschimotanasana and halasana are the best to give efficient exercise to abdominal muscles. Asanas are simple actions for keeping the internal and external body in good health. Asanas give sufficient exercise to the internal organs of the body. Consequently, an individual can maintain good health and longevity of life **(Kuvalayananda, 1933).** The control of breath is called pranayama in Sanskrit. The word pranayama is a compound word which consists of prana and ayama. Prana means life force, or the vital energy, or that forced by which we have our life. Ayama means control, i.e., control of breath. That is the literal meaning **(Abhedananda, 1999)**

Pranayama is essentially a breathing exercise against resistance and their positive effects on lung functions are well documented **(Saxena, & Saxena, 2009).** Pranayama is an art and has techniques to make the respiratory organs to move and expand in-

tentionally, rhythmically and intensively. It consists of long, sustained subtle flow of inhalation (puraka) exhalation (rechaka) and retention of breath (kumbhaka) Puraka stimulates the system's rechaka throws out vitiated air and toxic; kumbhaka distributes the energy throughout the body. The movements include horizontal expansion (dairghya), vertical ascension (aroha) and circumferential extension (visalata) of the lungs and the rib cage. This disciplined breathing helps the mind to concentrate and enables the practitioner to attain robust health and longevity **(Iyengar, 2010).**

Oxygen is vital for all bodily functions. Maintaining an ideal vital capacity is important because the larger the vital capacity, the more efficiently the body can distribute oxygen to the muscles during exercise **(Lung Anatomy, 2019)**. Regular exercise improves cardio-respiratory function by improving the $VO_2$ max, which is the maximum oxygen consumption during exercise. Increased oxygen intake and lung usage allow the lungs to grow in strength, and therefore can expand more readily to take in more air **(Gim and Choi, 2016).**

Lung function tests provide a clearer understanding of pulmonary function in subjects of different races, age, sex, occupation and profession. If there are functional abnormalities in the respiratory system, the deviation from normal can form a basis for diagnosis and assessment of progress in the management of chronic ventilator diseases **(Zurdari *et al.,* 1999).** The maximum amount of air that can be blown out of the lungs after taking a deep breath is known as vital lung capacity. The vital capacity of the lungs is a critical component of good health. Normal metabolic processes, tissue healing, and athletic performance all depend on effective breathing. There are at least 2 aspects to effective breathing: the proper use of breath control musculature, including the muscles of the abdomen, the diaphragm, and the intercostal muscle of the thorax and the functioning of the lungs themselves. After the age of 20 years the vital capacity decreases approximately 250 ml per 10 year **(Pellegrino *et al.,* 2005).**

The objective of this study was to document the effect of basic asana and pranayama techniques on the vital capacity of the group as a whole and the particular population studied. We aimed to create a standardized protocol to improve the vital capacity of college men students with this study. Hence,

the researchers as an experienced physical educators and very much interested in students fitness, selected this study.

## HYPOTHESIS

We will assume that if we use asanas and pranayamas protocol, we will get superior results in vital capacity. The hypothesis argued in this paper is that college men students can significantly increase the vital capacity by practicing asanas and pranayamas protocol over a consecutive sixteen weeks period. Therefore, the objective of this research was to investigate the changes in the vital capacity produced during sixteen weeks asanas, pranayamas, combined asanas and pranayama protocol in college men students.

## MATERIALS AND METHODS

### Participants

In order to address the hypothesis presented herein, we selected eighty college men randomly selected from Coimbatore district, Tamil Nadu, India as subjects. Their age ranged between eighteen and twenty five years. Subjects those who were active athletes, smoker/alcoholic, any cute illness, recent surgery, endocrine disorders, cardiovascular disorders or doing any type of regular physical exercise are excluded for the participation. Both the subjects and their parents were informed about this research and written consent was obtained from them. In accordance with the experimental research in the field of physical education and sports, we chose a small size target group. The selected subjects were divided into four groups. The treatment group I was considered as asana training group (n=20), group II was considered as pranayama training group (n=20), group III was considered as combined asana and pranayama training group (n=20) and group IV was considered as control group (n=20). The subjects in control group were not engaged in any training protocol other than their regular work.

### Research Design

All the subjects were instructed to maintain their normal sleep pattern. The evaluated parameter was vital capacity (Assessed by wet spirometer). The parameter was measured at baseline and after sixteen weeks, the effects of the yogic practices (AT, PT, CAPT) were examined. Before the tests, the subjects underwent five minutes of low intensity aerobic run and ten minutes of dynamic and static stretching of upper and lower extremity muscles for general warm-up.

**Training Protocol**

In each training session the training was imparted for a period sixty minutes. The training protocols, which included five minutes warming up and five minutes relaxation procedure after training programme for three days per week. Group I practiced the asanas mentioned in the Table I, Group II practiced the pranayama techniques indicated in the Table II, Group III practiced asanas and pranayama in the same session The treatment groups followed an original sixteen weeks asana and pranayama protocols created by the researcher of this study.

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**Results**

**Table 1**
**ASANA TRAINING PROTOCOL**

| Name of the Asanas | Duration of Asanas in each session* | Intensity |
|---|---|---|
| **Surya Namaskar** (12 poses – each pose being maintained for 5 secs) | 2 mins (2 rounds) | Increase 1 round for every 2 weeks |
| **Standing Asanas** | | Increase 10 seconds to all the asanas for every 2 weeks |
| Tadasana | 1 min | |
| Vrikshasana | 1 min | |
| Ardha Chakrasana | 30 sec | |
| Trikonasana | 1 min (each side) | |
| Garudasana | 1 min | |
| **Sitting Asanas** | | |
| Vajrasana | 2 mins | |
| Paschimottanasana | 1 min | |
| Ustrasana | 30 sec | |
| Ardha Matsyendrasana | 2 mins (each side) | |
| Kurmasana | 1 min | |
| **Prone Position Asanas** | | |
| Makarasana | 2 mins | |
| Ananthasana | 2 mins | |
| Bhujangasana | 1 min | |
| Dhanurasana | 30 sec | |
| Salabasana | 30 sec | |
| **Supine Position Asanas** | | |
| Utthi supta padangusthasana | 1 min | |
| Pavanamuktasana | 2 mins | |
| Halasana | 1 min | |
| Supta kapotasana | 1 min | |
| Jathra parivartanasana | 1 min | |
| Sarvangasana | 2 mins | |

**TABLE 2 – PRANAYAMA TRAINING PROTOCOL**

| Name of the Pranayama | Duration of Pranayama in each session* | Intensity |
|---|---|---|
| Sectional breathing (Three sections) | 9 min (Each sections 3 min) | Increase 10 sec for each section in every 2 weeks |
| Nadi Shuddhi Pranayama | 4 mins (6 cycles) | Increase 1 round for every 2 weeks |
| Anuloma-Viloma | 2 mins (2 cycles) | |
| Bhastrika | 2 mins (2 cycles) | |
| Bhramari Pranayama | 3 mins (3 cycles) | |
| Surya Bedhana Pranayama | 3 mins (6 cycles) | |
| Kapalapathi | 3 mins (3 cycles) | |

*5 - 10 seconds gap between each Pranayama

**TABLE 3-ASANA & PRANAYAMA TRAINING PROTOCOL**

| Name of the Asana & Pra-nayama | Duration in each session* | Intensity |
|---|---|---|
| **Surya Namaskar** (12 poses – each pose being main-tained for 5 secs) | 2 mins (2 rounds) | Increase 1 round for every 4 weeks |
| **Standing Asanas**<br>Tadasana<br>Vrikshasana | 1 min<br>1 min | Increase 30 seconds to all the asana for every 4 weeks |
| **Sitting Asanas**<br>Vajrasana<br>Paschimottanasana<br>Ustrasana | 2 mins<br>1 min<br>1 min | |
| **Prone Position Asanas**<br>Makarasana<br>Ananthasana<br>Bhujangasana | 2 mins<br>2 mins<br>1 min | |
| **Supine Position Asanas**<br>Utthi supta padan-gusthasana<br>Pavanamuktasana<br>Halasana | 1 min<br>2 mins<br>1 min | |
| **SAVASANA** | 2 MINS (For Relaxation) | |
| Sectional breathing (Three sections) | 9 min (Each sections 3 min) | Increase 30 sec for each section in every 4 weeks |
| Nadi Shuddhi Pranayama | 4 mins (6 cycles) | Increase 1 round for every 2 weeks |
| Anuloma-Viloma | 2 mins (2 cycles) | |
| Bhastrika | 2 mins (2 cycles) | |
| Kapalapathi | 3 mins (3 cycles) | |

*5 - 10 seconds gap between each asana & pranayama

**Statistical Analysis**

The collected data were analyzed with application of SPSS package. The 't' test was find out the individual effect from base line to post-test if any. Further Analysis of Covariance (ANCOVA) was used to determine the significant difference between the treatment means. Whenever the 'F' ratios were found to be significant, Scheffe's post hoc test was applied to test the significant difference between the paired adjusted means. 0.05 level of confidence was fixed to test the level of significance.

**RESULTS**

**Table 4 - Computation of 't' ratio on vital capacity of college men students (Scores in liters)**

| Groups | Pre - test mean | Post - test mean | Mean Difference | StandardError of the Mean | 't' ratio |
|---|---|---|---|---|---|
| Asanas Training (AT) | 3.42 | 3.57 | 0.15 | 0.026 | 5.92* |
| Pranayama (PT) | 3.40 | 3.66 | 0.26 | 0.027 | 9.49* |
| Combined Asanas and Pranayama Training ( CAPT) | 3.42 | 3.78 | 0.36 | 0.031 | 11.46* |
| Control Group(CG) | 3.40 | 3.41 | 0.01 | 0.021 | 0.36 |

*Significant at 0.05 level for the degrees of freedom (1 and 19), 2.09

Table 4 shows that the't' ratio's on Vital Capacity of AT, PT, CAPT were 5.92, 9.49, and 11.46 respectively. Since these values were higher than the required table value of 2.09, it was found to be statistically significant at 0.05 level of confidence for degrees of freedom1 and 19. And the obtained 't' ratio between pre and post test of control group 0.36 was lesser than the required table value of 2.09, found to be not statistically significant.

**Table 5 - Analysis of covariance on pre, post and adjusted posttest means on vital capacity of AT, PT and APT and control group (Scores in liters)**

| Test | ATG | PTG | CAPT | CG | Source of variance | df | Sum of Square | Mean Square | F-ratio |
|---|---|---|---|---|---|---|---|---|---|
| Pre-test Mean | 3.42 | 3.40 | 3.42 | 3.40 | B / S | 3 | 0.006 | 0.002 | 0.03 |
| | | | | | W / S | 76 | 4.699 | 0.062 | |
| Post-test Mean | 3.57 | 3.66 | 3.78 | 3.41 | B / S | 3 | 1.390 | 0.463 | 6.96* |
| | | | | | W / S | 76 | 5.064 | 0.067 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Adjusted Post-test Mean | 3.56 | 3.67 | 3.77 | 3.42 | B / S | 3 | 1.327 | 0.442 | 31.14* |
| | | | | | W / S | 75 | 1.032 | 0.014 | |

* Significant at 0.05 level for the degrees of freedom (3, 76) and (3, 75), 2.72

Table 5 reveals the computation of 'F' ratios on pre test, post test and adjusted post test means of AT, PT, CAPT and CG on Vital Capacity.

The obtained 'F' ratio for the pre test means of AT, PT, CAPT and CG on Vital Capacity was 0.03. Since the 'F' value was less than the required table value of 2.72 for the degrees of freedom 3 and 76, it was found to be not significant at 0.05 level of confidence. Further, the post test 'F' ratio 6.96 after AT, PT, CAPT and CG on Vital Capacity was higher than the required table value of 2.72 for the degrees of freedom 3 and 76, hence it was found to be statistically significant at 0.05 level of confidence.

The obtained 'F' ratio for the adjusted post test means of AT, PT, CAPT and CG on Vital Capacity was 31.14. Since the 'F' value was higher than the required table value of 2.72 for the degrees of freedom 3 and 75, it was found to be statistically significant at 0.05 level of confidence.

**Table 6 - Scheffe's post hoc test for the differences between the paired adjusted post-test means of vital capacity**

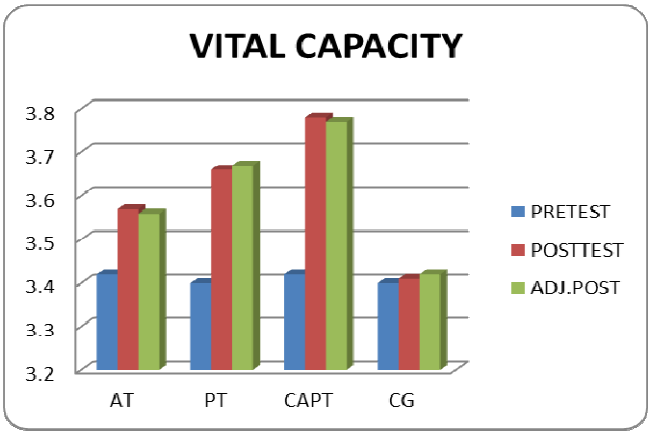
| ATG | PTG | CAPT | CG | Mean difference | Confidence Interval |
|---|---|---|---|---|---|
| 3.56 | 3.67 | | | 0.11* | 0.11 |
| 3.56 | | 3.77 | | 0.21* | |
| 3.56 | | | 3.42 | 0.14* | |
| | 3.67 | 3.77 | | 0.10 | |
| | 3.67 | | 3.42 | 0.15* | |
| | | 3.77 | 3.42 | 0.25* | |

* Significant at 0.05 level

Table 6 revealed that the mean differences between the paired adjusted post test means of all groups.

The mean difference between AT and PT, AT and CAPT, AT and CG, PT and CG, CAPT and CG were 0.11, 0.21, 0.14, 0.15 and 0.25 respectively. The values of mean difference of adjusted post test means were higher than that of the required confidence interval value of 0.11 and it was found to be significant. Thus, the mean differences of paired adjusted post test means between PT and CAPT (0.10) was less than the required confidential interval value, it was found to be not significant at 0.05 level of confidence. From these results it was inferred that CAPT produced better improvement on Vital Capacity of vital capacity than the other training groups of AT, PT and CG.

**Figure 1.** Bar diagram showing pre, post and adjusted post test means of asanas training group, pranayama training group and combined asanas and pranayama training and control group on vital capacity




**Discussion on Findings**

Pulmonary function testing has been widely used in clinical practice for the past 30 years and is now regarded as a necessary prerequisite for the diagnosis of a number of obstructive and restrictive disorders. The present study has examined how the vital capacity was determined by the impact of combined asanas and pranayama practices on college men students. The findings are consistent with other research studies reporting the positive effect of yogic practices on the vital capacity of the lungs. The results of the present study indicate that the combined asanas and pranayama practices are effective methods to improve vital capacity in college men students. The effects of asana training, pranayama training may actually be synergistic, with their combined effects being greater than each programme performed alone.

Slow breathing techniques like anulom-viloma and brahmari augment cerebral blood flow and oxygenation, improve neuronal activities in the brain centres, including those present in the limbic areas, hypothalamus, and medulla, and improve sympathovagal outflow (Pal, 2016). Thus, decreased tracheobronchial smooth muscle tone activity, may lead to decreased air flow resistance and increased airway calibre, which causes more efficient perfusion of alveoli and hence, improvement of dynamic parameters of the lung function test (Soni, et al., 2012). Various factors affecting diffusion capacity are endothelial surface area (increases with size of subject), thickness of alveolar-capillary membrane, pulmonary capillary blood volume and hemoglobin concentration, and distribution of ventilation and ventilation-perfusion relationships. Yoga improves the circulation; thereby causing better perfusion of tissues. Another advantage of yogic breathing is that it is a kind of vertical breathing resulting in

alveoli opening of both the lungs evenly and adequately thus providing larger alveolar surface for exchange of gases. Hence, larger the surface available for gas exchange, better is diffusion (Rai, 2010).

Forty days of pranayama combined with asanas training improved forced vital capacity (FVC), peak expiratory flow rate (PEFR) and forced expiratory volume in 1second (FEV1) of Non insulin dependent diabetes mellitus patients (Malhotra et al., 2002). When the lungs inflate nearer to total lung capacity by deep yogic breathing, it releases surfactants and prostaglandins into the alveolar space. This will, in turn, increase the lung compliance and decrease bronchial smooth muscle tone, thereby increasing total lung capacity and volume (Yadav & Das, 2001). In addition, this inflation of the lungs stimulates the pulmonary stretch receptors which reflexively relax the smooth muscles of the larynx and tracheobronchial tree. This, in turn, modulates the airway caliber and reduces airway resistance and probably this could be one of the possible reasons for the improvement in PEFR after pranayama practice (Bora et al., 2013). A study suggests that 6 months of yoga training has a favourable effect on the respiratory muscle strength and pulmonary function in an adolescent subject that supports our findings as well (Mandanmohan et al., 2003).

According to the present study, it is possible to report that the combined asanas and pranayama protocol has positive effects on vital capacity of college men students. But as a limitation, it is not possible to reveal the mechanisms of effects through this study. We could only guess, and comment on possible effect mechanisms..

**Conclusions**

Our lungs mature by the time we are about 20-25 years old. After about the age of 35, it is normal for our lung function to decline gradually as we age. This can make breathing slightly more difficult as we get older. There are several natural body changes that happen as we get older that may cause a decline in lung capacity. Muscles like the diaphragm can get weaker. Lung tissue that helps keep our airways open can lose elasticity, which means our airways can get a little smaller. Also our rib cage bones can change and get smaller which leaves less room for our lungs to expand. A decrease in lung function is a

normal part of the aging process but there are steps we can take to stay as healthy as possible. The regular practice of asana and pranayama is an excellent way to keep our lungs in good health.

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PHYSICAL EDUCATION AND EXERCISE SCIENCES

# Impacts of Complex with Ladder Training on Cardio Respiratory Endurance and Resting Pulse Rate among Kho-Kho Players

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## Abstract

The purpose of the study was to find out the impacts of complex with ladder training on cardio respiratory endurance and resting pulse rate among kho-kho players. To achieve this purpose, thirty women kho-kho players were selected as subjects, their age between 21 to 25 years, they are studying in the Department of Physical Education, Avinashilingam Institute for Home Science and Higher Education for Women, Tamilnadu, India. The selected subjects were divided into two equal groups of fifteen subjects each, namely Complex with ladder training group and control group. The selected subjects had undergone the Complex with ladder training for eight weeks, with three days per week in alternate days. Cardio respiratory endurance and resting pulse rate were selected as criterion variables and they were tested by using cooper's 12 minutes run and walk test and radial pulse rate respectively. ANCOVA was used to find out the significant difference if any between the groups. The level of significance was fixed at 0.05 of confidence for all the cases. The results of the study showed that there was a significant difference on Cardio respiratory endurance and resting pulse rate between complex training with ladder training group and control group.

Keywords: Complex with Ladder Training, Cardio Respiratory Endurance, Resting Pulse Rate, Kho-Kho Players.

## INTRODUCTION

Kho-Kho is one of the most popular traditional sports in India. The origin of Kho-Kho is difficult to trace, but many historians believe,

that it is a modified form of 'Run Chase, which in its simplest form involves chasing and touching a person. History of Kho-Kho in India goes back a long way as it was first started in the state of Maharashtra. The first Kho- Kho Championships were arranged at Vijay Wada in 1959-60 under Kho-Kho Federation of India. The championship was won by the then Mumbai province under the leadership of Rajabhau Jeste who was a champion player, expert commentator and redoubtable coach made in one. 1960-61 featured Women's Championships for the first time. In the year 1982, the game was included as part of Indian Olympic Association and few years later in 1989 saw the game as a 'demonstration' in 'Asian Games' Festival. The year 1998 saw the first ever International Championship organized in the Indian city of Kolkata. **(A.Mahaboobjan et.al., 2022).**

The activities using ladder drills can make the body to respond rapidly some level of movements that are used in the competition. Enhancement of athletes speed, agility, and quickness can be done with some exercises including ladder drills. The advantages of ladder drill exercises are speed legs that are needed by athletes in order to change direction quickly. **(Kusnanik. N. W, & Rattray. B. 2017).**

**Methodology**

The purpose of the study was to find out the impacts of complex with ladder training on cardio respiratory endurance and resting pulse rate among kho-kho players. To achieve this purpose, thirty women kho-kho players were selected as subjects, their age between 21 to 25 years, they are studying in the Department of Physical Education, Avinashilingam Institute For Home Science and Higher Education for Women, Tamilnadu, India. The selected subjects were divided into two equal groups of fifteen subjects each, namely Complex with ladder training group and control group. The selected subjects had undergone the Complex with ladder training for eight weeks, with three days per week in alternate days. Cardio respiratory endurance and resting pulse rate were selected as criterion variables and they were tested by using cooper's 12 minutes run and walk test and radial pulse rate respectively. ANCOVA was used to find out the significant difference if any between the groups. The

level of significance was fixed at 0.05 of confidence for all the cases.

**Results**

**Table – I**

**Selection of variables and criterion measures**

| S.No | | Experimental Group | Control Group |
|---|---|---|---|
| 1 | Cardio Respiratory Endurance | Cooper's 12 Minutes Run and Walk Test | Meters |
| 2 | Resting Pulse Rate | Radial Pulse Rate | Beats/Minute |

## STATISTICAL TECHNIQUE

The investigational design used for the current study was random group design involving 30 subjects for training result. Analysis of Covariance (ANCOVA) was used as a statistical technique to determine the significant difference, if any, existing between pre test post test and adjusted post test data on selected dependent variables separately and presented in Table-II

**Table – II**

F-ratio for Pre-Test and Post-Test among The Complex with Ladder Training (CWLT) Group and Control Group (CG) on Cardio Respiratory Endurance and Resting Pulse Rate.

| Variables | Test | Complex with Ladder Training Group (CWLT) | Control Group (CG) | Source ofVariance | SS | df | Mean Square | F Ratio |
|---|---|---|---|---|---|---|---|---|
| Cardio RespiratoryEndurance | Pre test | 2276 | 2267.35 | Between<br>Within | 0.53<br>132.92 | 1<br>28 | 0.53<br>4.75 | 0.11 |
| | Post test | 2292 | 2268 | Between<br>Within | 218.70<br>126.67 | 1<br>28 | 218.70<br>4.53 | 38.34* |
| | Adjusted post | 2292.46 | 2268.25 | Between<br>Within | 233.78<br>56.08 | 1<br>27 | 233.78<br>2.07 | 102.55* |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | test | | | | | | | |
| Rest-ing Pulse Rate | Pre test | 79.23 | 78.20 | Be-tween Within | 0.03 1.25 | 1 28 | 0.03 0.04 | 0.74 |
| | Post test | 72.20 | 78.10 | Be-tween Within | 0.38 0.49 | 1 28 | 0.38 0.01 | 20.04* |
| | Adjust-ed post test | 72.27 | 78.14 | Be-tween Within | 0.33 0.44 | 1 27 | 0.33 0.01 | 18.30* |

*Level of Significance 0.05* Table value for df 1 and 28 was 3.75 Table value for df 1and 27was 3.78.

BG- Between Group, WG- Within Group & df- Degrees of Freedom

Table-II shows the results of pre test, post-test and adjusted post-test mean scores of complex with ladder training group (CWLT) and control group on Cardio Respiratory Endurance and Resting Pulse Rate. The adjusted post-test mean scores of complex with ladder training group and control group on Cardio Respiratory Endurance were 2292.46 and 2268.25 respectively.

The adjusted post-test mean scores of complex with ladder training group (CWLT) and control group on Resting Pulse Rate were 72.27 and 78.14 respectively. The obtained F value of adjusted post test means of on Cardio Respiratory Endurance and Resting Pulse Rate were 102.55 and 18.30 respectively, the obtained adjusted post test means were significant and these were greater than the required table F value of 3.75 at 0.05 level of confidence.

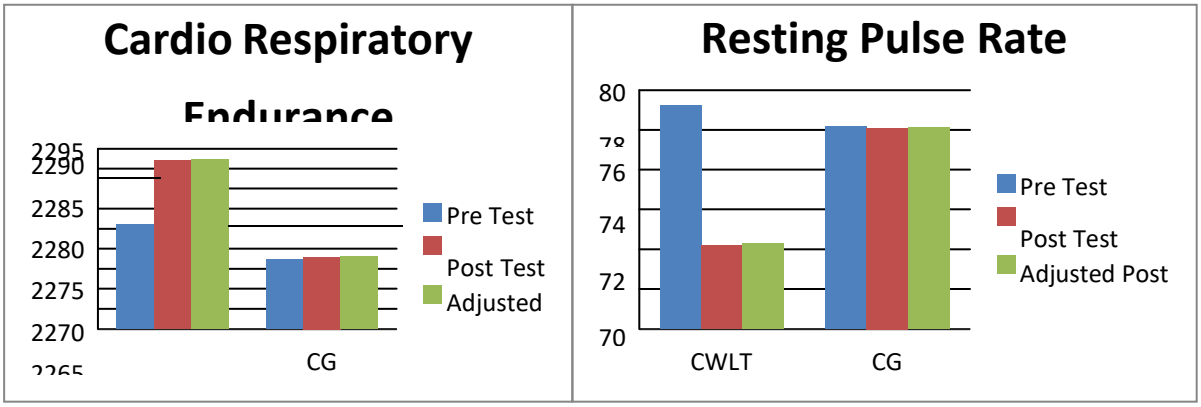


Fig-1 Pre, Post and Adjusted Post Test Means of complex with Ladder training group and control group on Cardio Respiratory Endurance and Resting Pulse Rate

**Discussion on Findings**

There was significant improvement on Cardio Respiratory Endurance and

Resting Pulse Rate due to eight weeks of complex with Ladder training programme among the kho- kho players. The results of the study in line with the studies of Abdul Halik, Senthil Kumaran, Arun Kumar, Rajesh, Princy. (2021). Baker D. (2003).

## Conclusions

From the analysis of the data, the following conclusions were drawn.

1. The kho-kho players of control group had not shown significant changes in any of the cardio respiratory endurance and resting pulse rate.
2. The complex with ladder training group shown significant development in cardio respiratory endurance and resting pulse rate among kho-kho players.
3. There kho-kho players who had undergone twelve weeks of complex with ladder training showed significant step up in cardio respiratory endurance and resting pulse rate when compared with control group.

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**Conflict of interest**

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# Effect of High Intensity and Low Intensity Aerobic Training on Selected Body Composition and Physical Fitness Variables among College Level Obesity Girls

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## Abstract

The measure of obesity is done with BMI calculation. BMI is the Body Mass Index which has three grades. When the BMI rates above 25 it is considered as overweight. The best treatment for obesity is not by drugs but by the modification of one's life style. Daily exercise may help people to reduce obesity. Having a proper diet may prevent people from being obese. Avoiding to take fried items, fast food may help them reach out from over-cholesterol. Diet containing protein, carbohydrates, dairy products at appropriate levels will keep people healthy. The purpose the study was find out the influence of 12 weeks high intensity aerobic training and low intensity aerobic training on body composition, physical fitness and anthropological variables of college level obese girls. To achieve the purpose of the study 120 students were selected. Based on the BMI calculation Sixty students (N=60) were selected from KG College of Health Sciences, Coimbatore. The subjects aged ranged between 17-22 years with moderate obesity who were able to perform the exercises were included for the study. Subjects were given high intensity training and low intensity training for three days a week, for a period of 12 weeks. The following formula was applied for selection of subjects. The selected participants were clearly explained about the procedures and a written consent is obtained from them. The research is approved by the ethical committee of the KG College of Health Sciences and no objection letter is obtained from the KG College of Health Science students. Once the participants accepted they were divided into three groups as Group A (Experimental Group), Group B (Experimental Group) and Group C (Control Group)

through lottery method were lotteries contained the Group name equal in number. So each group consists of twenty participants .Group A (Experimental group I) – participants received High intensity Aerobic training, Group B (Experimental group II) – participants received Low intensity aerobic training Group C (Control group) – participants received nothing, they remain controlled. All the training is given as one day per session on four days for twelve weeks only in the evening 06.00PM – 07.00PM. Each session consisted of one hour.

Keywords: Aerobic training, obesity, flexibility, Body weight.

## Introduction

Obesity is the major worldwide problem. Obesity has become main cause for many other diseases such as cardiac diseases and disorders, hypertension, Types II diabetes mellitus, bladder problems, orthopedic problems such as knee pain, back pain. The measure of obesity is done with BMI calculation. BMI is the Body Mass Index which has three grades. When the BMI rates above 25 it is considered as overweight. The best treatment for obesity is not by drugs but by the modification of one's life style. Daily exercise may help people to reduce obesity. In addition to exercise yoga and meditation may help to reduce the hypertension and overweight.

## Methodology

Sixty students (N=60) were selected and the study duration was two years and individual training duration was twelve weeks. Simple random sampling method was used. The selected participants were divided into three groups and each group consists of twenty participants. Group A (Experimental group I) – participants received Low intensity Aerobic training. Group B (Experimental group II) – participants received High intensity aerobic training. The subjects were only females with age of 17-22 years with moderate obesity who were able to perform the exercises were included for the study. Among the various body composition variables, Body weight and Flexibility were analyzed using Digital Body Composition Analyzer before and after the twelve weeks of the training.

## Statistical Technique

The data was collected from the selected 60 college student's prior to and after the training programme on the selected criterion variables. This data is statistically analyzed by Dependent 't' test to find out the significant improvement between pre & post-test. In order to find out significant different , among the three groups ANCOVA is used whenever 'F' ratio is found to be

significant, Scheffe's test is used as post hoc test determine which of the paired means differed significantly in all cases the criterion for statistical significance is set at 0.05 level of confidence (P<0.05).

**TABLE 1**

**ANALYSIS OF COVARIANCE AMONG THE HIGH INTENSITYAEROBIC TRAINING GROUP LOW INTENSITY AEROBIC TRAINING GROUP AND CONTROL GROUP BODY WEIGHT**

| | Group | Mean | Source | Sum of Square | df | Mean Square | F-ratio |
|---|---|---|---|---|---|---|---|
| **Pre-test** | HIATG | 75.24 | B/S | 7.82 | 2 | 3.91 | 0.17 |
| | LIATG | 75.35 | W/S | 1265.06 | 57 | 22.19 | |
| | CG | 76.05 | | | | | |
| **Post test** | HIATG | 71.61 | B/S | 151.11 | 2 | 75.55 | 3.22* |
| | LIATG | 72.62 | W/S | 1336.03 | 57 | 23.43 | |
| | CG | 75.63 | | | | | |
| **Adjusted Mean** | HIATG | 71.61 | B/S | 213.71 | 2 | 106.85 | 185.27* |
| | LIATG | 72.62 | W/S | 32.29 | 56 | 0.577 | |
| | CG | 75.36 | | | | | |

*Significant at 0.05 level (2.09)

*Required table value at 0.05 level of significant with df 2 and 57 is 2.76 and df 2 and 56 is 2.76.

**RESULTS OF BODY WEIGHT**

Table shows the obtained 'F' values on pre test, post test and adjusted post test means on speed of high intensity aerobic training group I, low intensity aerobic training group II, and control group

The pre test means on body weight were 75.24, 75.35 and 76.05 respectively. The 'F' value observed for the pre test on body weight was 0.17. It fails to reach the table value of 2.76 for degree of freedom 2, 56 at 0.05 level of confidence. Based on the results it was confirmed that the mean differences among the groups of high intensity aerobic training group I, low intensity aerobic training group II, and control group on body weight before

the start of the respective treatments were found to be not significant.

The post test means on body weight of high intensity aerobic training group I, low intensity aerobic training group II, and control group were 71.61, 72.62 and 75.36 respectively. The 'F' value observed for the post test on body weight was 3.22. It was higher than the table value of 2.76 for degree of freedom 2, 56 at 0.05 level of confidence. Since the observed F- value on post test means among the groups namely high intensityaerobic training group I, low intensity aerobic training group II, and control group on body weight was significant as the value was higher than required table value of 2.76.Thus the results obtained proved that the training on body weight produced significant improvements among the experimental groups.

The adjusted post test means on body weight of high intensity aerobic training group I, low intensity training group II, and control group were 71.61, 72.62 and 75.36 respectively. The 'F' value observed for the adjusted post test means on body weight was 185.27. It was greater than the table value of 2.76 for degree of freedom 2, 57 at 0.05 level of confidence. Since the observed F- value on adjusted post test means among the groups on body weight was highly significant as the value was higher than required table value of 2.76. Thus the results obtained proved that the training on body weight produced significant improvements among the experimental groups.

**FIGURE – 1**

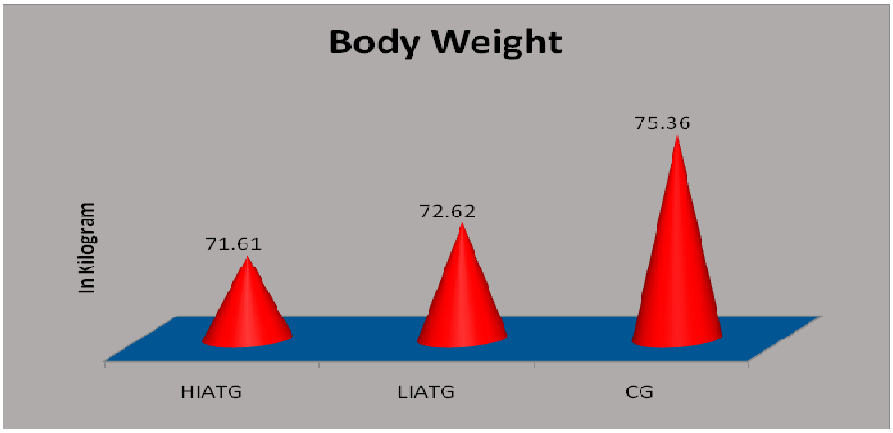


**TABLE 2**

**ANALYSIS OF COVARIANCE AMONG THE HIGH INTENSITYAEROBIC TRAINING GROUP, LOW INTENSITY AEROBIC TRAINING GROUP AND CONTROL GROUP ON FLEXIBILITY**

| | Group | Mean | Source | Sum of Square | df | Mean Square | F-ratio |
|---|---|---|---|---|---|---|---|
| **Pre-test** | HIATG | 15.60 | B/S | 0.93 | 2 | 0.46 | 0.12 |
| | LIATG | 15.70 | W/S | 215.80 | 57 | 03.78 | |
| | CG | 15.40 | | | | | |
| **Post test** | HIATG | 15.45 | B/S | 97.50 | 2 | 48.75 | 13.10* |
| | LIATG | 17.70 | W/S | 212.10 | 57 | 3.72 | |
| | CG | 18.45 | | | | | |
| **Adjusted Mean** | HIATG | 15.60 | B/S | 83.29 | 2 | 41.64 | 82.63* |
| | LIATG | 17.57 | W/S | 28.22 | 56 | 0.50 | |
| | CG | 18.41 | | | | | |

*Significant at 0.05 level (2.09)

*Required table value at 0.05 level of significant with df 2 and 57is 2.76 and df 2 and 56 is 2.76

**RESULTS OF FLEXIBILITY**

Table shows the obtained 'F' values on pre test, post test and adjusted post test means on speed of high intensity aerobic training group I, low intensity aerobic training group II, and control group

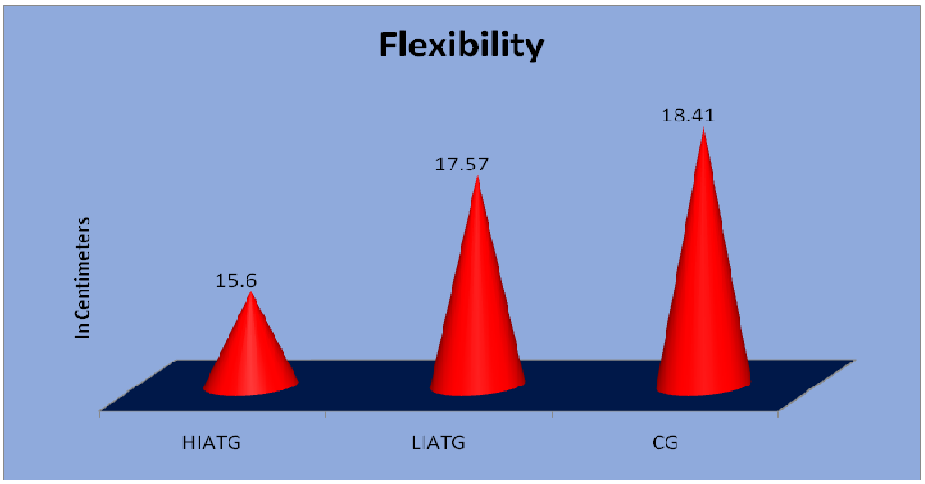
The pre test means on flexibility were 15.60, 15.70 and 15.40 respectively. The 'F' value observed for the pre test on flexibility was 0.12. It fails to reach the table value of 2.76 for degree of freedom 2, 56 at 0.05 level of confidence. Based on the results it was confirmed that the mean differences among the groups of high intensity aerobic training group I, low intensity aerobic training group II, and control group on flexibility before the start of the respective treatments were found to be significant.

The post test means on flexibility of high intensity aerobic training group I, low intensity aerobic training

group II, and control group were 15.45, 17.70 and 18.45 respectively. The 'F' value observed for the post test on flexibility was 5.63. It was higher than the table value of 13.10 for degree of freedom 2, 56 at 0.05 level of confidence. Since the observed F- value on post test means among the groups namely high intensity aerobic training group I, low intensity aerobicaerobic training group II, and control group on flexibility was not significant as the value was higher than required table value of 2.76.Thus the results obtained proved that the training on flexibility produced not significant improvements among the experimental groups.

The adjusted post test means on flexibility of high intensity aerobic training group I, low intensity aerobic training group II, and control group were 15.60, 17.57 and 18.41 respectively. The 'F' value observed for the adjusted post test means on flexibility was 82.63. It was greater than the table value of 2.76 for degree of freedom 2, 57 at 0.05 level of confidence. Since the observed F- value on adjusted post test means among the groups on flexibility was highly significant as the value was higher than required table value of 2.76. Thus the results obtained proved that the training on flexibility produced significant improvements among the experimental groups.

**FIGURE – 2**




## Conclusion

1. The twelve week high intensity aerobic training group and low intensity aerobic training group significantly improved the selected body composition variables in college level obesity girls.
2. From the findings of the study

the high intensity aerobic training group had better improvement than the low intensity aerobic training group in body weight.

3. From the findings of the study the high intensity aerobic training group had better improvement than the low intensity aerobic training group in flexibility.

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**Conflict of interest**

None of the authors have any conflicts of interest to declare.

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# Impact of Plyometric Training on Selected Physical Fitness Variables among Engineering College Students

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**Abstract**

This study was designed to impact of plyometric training on selected physical fitness variables among engineering college students . To achieve the purpose of the study 30 engineering college students were selected from Mepco Schlenk Engineering College, Sivakasi, Virudunagar. Their age ranged between 18 and 25 years and they were divided into two equal groups consists of 15 each. Group I underwent the Plyometric training and Group II acted as control group. The training was given to the experimental group for 3 days per week for the period of 12 weeks. The control group was not given any sort of training except their routine work. The data were collected from the subjects was statistically analyzed with dependent 't' test to find out significant improvement if any at 0.05 level of confidence. The results speculated that the muscular endurance and flexibility of engineering college students improved significantly due to the impact of plyometric training with the limitations.

Keywords: Plyometric training, Flexibility, Muscular endurance and Engineering College Students.

## Introduction

Plyometric, also known as jump training or plyos, are exercises in which muscles exert maximum force in short intervals of time, with the goal of increasing power (speed-strength). This training focuses on learning to move from a muscle extension to a contraction in a rapid or "explosive" manner, such as in specialized repeated jumping. Plyometric are primarily used by athletes, especially martial artists, sprinters and high jumpers, to improve performance, and are used in the fitness field to a much lesser degree. Plyometrics include explosive exercises to activate the quick response and elastic properties of the major muscles. It was initially adopted by Soviet Olympi-

ans in the 1950s, and then by sports-people worldwide. Sports using plyometrics include basketball, tennis, badminton, squash and volleyball as well as the various codes of football. The term "plyometrics" was coined by Fred Wilt after watching Soviet athletes prepare for their events in track and field. He began a collaboration with trainer Michael Yessis to promote plyometrics.

Since its introduction in the early 1980s, two forms of plyometrics have evolved. In the original version, created by Russian scientist Yuri Verkhoshansky, it was defined as the shock method. In this, the athlete would drop down from a height and experience a "shock" upon landing. This in turn would bring about a forced eccentric contraction which was then immediately switched to a concentric contraction as the athlete jumped upward. The landing and takeoff were executed in an extremely short period of time, in the range of 0.1–0.2 second. Explosive plyometrics describes the approach originally created by Verkhoshansky. He experimented with many different exercises, but the depth jump appeared to be the best for duplicating the forces in the landing and takeoff.

In the depth jump, the athlete experiences a shock on landing in which the hip, knee, and ankle extensor muscles undergo a powerful eccentric contraction. For the muscles to respond explosively, the eccentric contraction is then quickly switched to the isometric (when the downward movement stops) and then the concentric contraction, in a minimum amount of time. This allows the athlete to jump upward as high as possible.

In the eccentric contraction, the muscles are involuntarily lengthened, while in the concentric contraction, the muscles are shortened after being tensed. Most of the stretching and shortening takes place in the tendons that attach to the muscles involved rather than in the muscles. To execute the depth jump, the athlete stands on a raised platform, usually not greater than 20–30 inches (51–76 cm) high, and then steps out and drops down in a vertical pathway to make contact with the floor. The height used by most athletes is usually quite low in the early stages of training. The key is how high the athlete jumps in relation to the height of the take-off platform. Technique and jump height are most important at this time. While the body is dropping, the athlete consciously prepares the muscles for the impact by tensing the muscles. The flooring upon which the athlete drops

down on should be somewhat resilient, mainly for prevention of injury. Upon making contact with the floor, the athlete then goes into slight leg flex to absorb some of the force for safety. However, the main role played by the muscles and tendons is to withstand the force that is experienced in the landing. This force is withstood in eccentric contraction. When muscle contraction is sufficiently great, it is able to stop the downward movement very quickly.

This phase is sometimes called the phase of amortization in which the athlete absorbs some of the force and stops downward movement by the strong eccentric contraction of the muscles. The strong eccentric contraction prepares the muscles to switch to the concentric contraction in an explosive manner for takeoff

**Methodology**

Purpose of the study was to find out the plyometric training on selected physical fitness variables among engineering college students . To achieve the purpose of the study 30 engineering college students were selected from Mepco Schlenk Engineering College, Sivakasi, Virudunagar. Their age ranged between 18 and 25 years and they were divided into two equal groups consists of 15 each. The selected physical fitness variables namely, muscular endurance was measured by push ups test and flexibility was measured by sit and reach test. Group I underwent the Plyometric training and Group II acted as control group. The training was given to the experimental group for 3 days per week for the period of 12 weeks. The control group was not given any sort of training except their routine work. All the subjects involved in this study were carefully monitored throughout the training program, none of the reported with tear and muscle soreness. The data was statistically analyzed with dependent‘t’ test to find out the significant improvement between pre and post test. In all cases the criterion for statistical significance was set 0.05 level of confidence.

**Results**

**TABLE - I**

**ANALYSIS OF ‘T’ RATIO FOR MUSCULAR ENDURANCE AND FLEXIBILITY**

| Variables | Group | Test | Mean | SD | SEM | t-ratio |
|---|---|---|---|---|---|---|
| **Muscular** | Experimental | Pre test | 18.38 | 0.41 | 0.10 | 10.42* |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Endurance** | Group | Post test | 19.45 | | | |
| | Control Group | Pre test | 18.40 | 1.65 | 0.41 | |
| | | Post test | 18.45 | | | |
| **Flexibility** | Experimental Group | Pre test | 12.09 | 0.51 | 0.01 | 11.22* |
| | | Post test | 12.23 | | | |
| | Control Group | Pre test | 12.15 | 0.12 | 0.03 | 0.77 |
| | | Post test | 12.17 | | | |

(Significance at 0.05 level of confidence for df of 14 is 2.14)

Table I shows that the pre test mean values of experimental group and control group 18.38, 18.40 and 12.09, 12.15 respectively and the post test mean values are 19.45, 18.45 and 12.23, 12.17 respectively. The obtained dependent t-test, t value on muscular endurance and flexibility of experimental group are 10.42* and 11.22* respectively. The table value required for significant difference with degrees of freedom 14 at 0.05 level of confidence is 2.14. The obtained 't' test value of experimental group was greater than the table value. The results clearly indicated that the muscular endurance and flexibility of the experimental group improved due to the plyometric training on engineering college students.

**FIGURE –I**
**BAR DIAGRAM OF EXPERIMENTAL AND CONTROL GROUP ON MUSCULAR ENDURANCE**

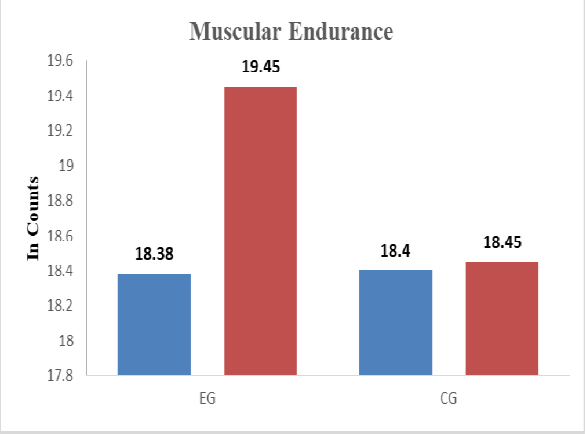
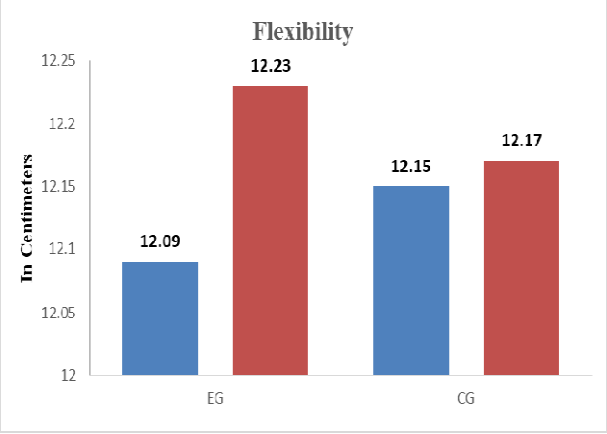



**FIGURE- II**
**BAR DIAGRAM OF EXPERIMENTAL AND CONTROL GROUP ON FLEXIBILITY**



## Discussions on Findings

The result of the study on selected physical fitness variables namely muscular endurance and flexibility indicates experimental group (Plyometric training) caused significant improvement after the plyometric training. Based on the mean value, the experimental group was found in better increasing on muscular endurance and flexibility when compared to the control group.

## Conclusion

Plyometric training has lot of exercises and movements related with muscular endurance and flexibility, the exercises can develop our flexibility and muscular endurance also. So plyometric training helped to develop the flexibility and muscular endurance. The results of
the study plyometric training group had significant improvement on muscular endurance and flexibility when compared to the control group.

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# Effect of Yoga on Mental Health among Sports Hostel Girls

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**Abstract**

Mental health of sports hostel girls were very much dislodged during the covid lockdown. Coaches went on looking for methods to engage them physically. Yoga is a traditional Indian science that promotes betterment of one's physical, mental, social, and spiritual well-being. The aim of the study used to find the influence of yoga practice on mental health among Sports hostel girls. To obtain the intended 40 participants were selected from the age of 14 to 17 years sports hostel girls. Further participants divided into the two equal group randomly. Group I intervention group underwent 6 week of yoga (asana) practice. Stress and Optimism were selected as criterion variables. Paired sample t test and ANCOVA test used at 0.05 level of significant. Statistical results concluded that Yoga asana practice had significant improvement on mental health at 0.05 level of significant.

Keywords: Yoga, Asana, Mental Health, Stress, Optimism, and Sports Hostel Girls.

## INTRODUCTION

Yoga is a traditional Indian science that promotes betterment of one's physical, mental, social, and spiritual well-being (Gururaja, et al., 2011). Sanskrit word yoga, which means "union of mind and body," has been practised in Eastern communities for more than 5000 years and has recently attracted a lot of interest from Western nations (McFann, et al., 2004). According to Patanjali, yoga is a technique for controlling calming the racing mind. Yoga is a methodical, deliberate approach for hastening a person's development and advancing that person's whole personality development (Kumar, 2016).

COVID-19, a disease caused by the SARS-CoV-2 virus, has been classified as a pandemic by the (WorldHealth Organization

[WHO](Roetert, et al., 2020).Sports represent the core activity of an athlete's weekly routine and their life. Practice is organized daily with frequently scheduled competitionseven throughout the weekends (Mohr, 2020). Home confinement, a result of COVID-19 restrictions, represents a partial or complete level of detraining that will impair an athletic person's performance and could determine an early conclusion to their career (Sarto, 2020).

Previous survey revealed that a majority ofstudent-athletes surveyed reported experiencing high rates of mental distress since the outset of the COVID-19 pandemic (National Collegiate Athletic Association [NCAA] (2020).Stress is a major factor affecting the mental health of a person irrespective of age (Cohen, et al., 1997). Yoga has been found useful for mental disorders like depression (Bennett, et al., 2008).

Methods

**Methodology**

**Sample**

By using simple random sampling method 40 Sports hostel girls were selected as participants from the age group of 14 to 17 years. Further to divide the participants into two equal groups such as Group I intervention group and Group II control group randomly.

**Variables and Test Procedure**

In this study Yoga practice (Asana) were selected as independent variables. Stress and Optimism. The criterion variables stress test with the stress scale for Sheldon Cohen consist of 10 paragraphs that dealt with thestress. This questionnaire modified from The Perceived Stress Scale. Each item is rated on a 5-point scale ranging from never (0) to almost always (4). Scores are obtained by reversing the scores on the four positive items4, 5, 7, and 8 are the positively stated items. Scores ranging from 0-13 would be considered low stress, 14-26 is moderate stress, 27-40 is high stress (Kailani, et al., 2021).Optimism test with optimism scale (Millstein, et al., 2019) questionnaire consist of 8 paragraphs that dealt with optimism (Kailani, et al., 2021).Each item is rated on a 5-point scale ranging from never (0) to Strongly disagree (5).

**Intervention**

Group I intervention group undergo 6 weeks of online yoga practice (Asana). Each session consists of 60 – 90 minutes. Intervention group involve practice yoga for 3 days per week. The asanas were used to practice in the

training programme from the Common Yoga protocol by Ministry of Ayush, Govt of India.

**Statistical Tools**

Paired sample t test and Analysis of Covariance (ANCOVA) were used to test the data at 0.05 level of significant

**Results**

Statistical results present below table.

Table 1: Paired Sample t test on Stress between Intervention group and control group.

| Group | Test | Mean | N | SD | t Ratio | df | P value |
|---|---|---|---|---|---|---|---|
| Intervention Group | Pre test | 25.55 | 20 | 2.373 | 8.810 | 19 | 0.000 |
| | Post test | 17.90 | 20 | 2.426 | | | |
| Control Group | Pre test | 24.80 | 20 | 2.648 | 0.728 | 19 | 0.475 |
| | Post test | 24.15 | 20 | 2.007 | | | |

Table 1 shows that the obtained P value of intervention group on stress is 0.00< 0.05 level of significant with df 19. Also,the obtained P value of control group on stress is 0.475 > 0.05 level of significant with df 19.The mean value of intervention and control group on stress present in the figure 1.

**Figure 1: Mean of pre and post test between intervention and Control Group on Stress.**

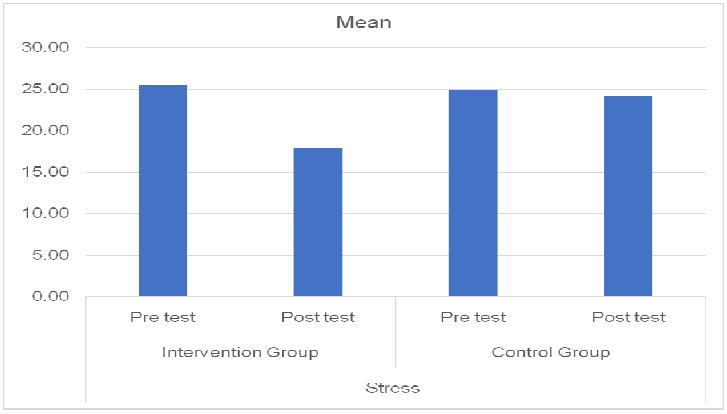

Table 2: Paired Sample t test on Optimism between Intervention group and control group.

| Group | Test | Mean | N | SD | t Ratio | df | sig |
|---|---|---|---|---|---|---|---|
| Intervention Group | Pre test | 19.80 | 20 | 1.281 | 28.219 | 19 | 0.000 |
| | Post test | 28.70 | 20 | 1.081 | | | |
| Control Group | Pre test | 19.90 | 20 | .912 | 1.221 | 19 | 0.237 |
| | Post test | 19.50 | 20 | 1.147 | | | |

Table 2 shows that the obtained P value of intervention group on Optimism is 0.00 < 0.05 level of significant with df 19. Also, the obtained P value of control group on stress is 0.237 > 0.05 level of significant with df 19. The mean value of intervention and control group on optimism present in the figure 2.

**Figure 2: Mean of pre and post-test between intervention and Control Group on Optimism**.

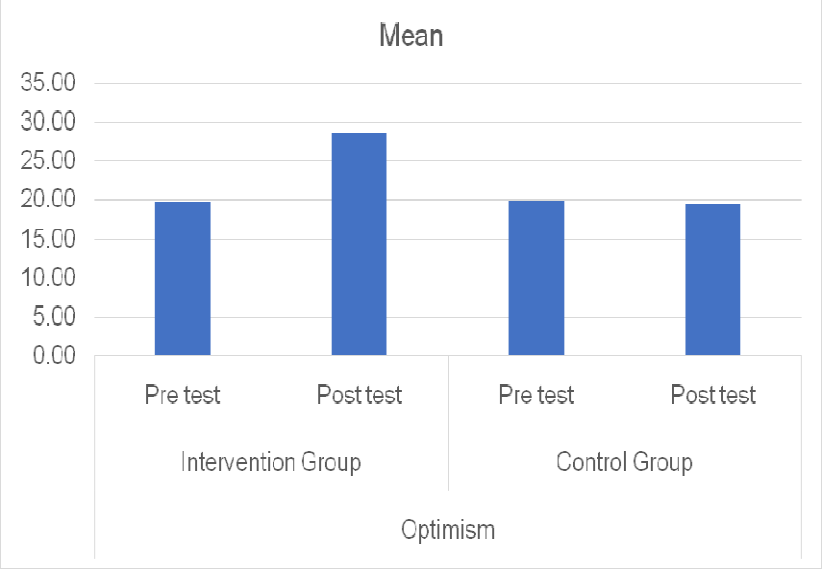

Table 3 ANCOVA on Stress between Intervention group and control group.

| Adjusted post test mean | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Intervention Group | Control Group | 351.669 | 1 | 351.669 | 80.568 | 0.000 |
| 18.025 | 24.025 | 161.500 | 37 | 4.365 | | |

Table 3 shows that the obtained ANCOVA P value of Stress is 0.00 < 0.05 level of significant with df 1 and 37.

Table 4 ANCOVA on Optimism between Intervention group and control group.

| Adjusted post test mean | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Intervention Group | Control Group | 847.653 | 1 | 847.653 | 683.211 | 0.000 |
| 28.708 | 19.492 | 45.906 | 37 | 1.241 | | |

Table 4 shows that the obtained ANCOVA P value of Optimism is 0.00 < 0.05 level of significant with df 1 and 37.

## DISCUSSION

Statistical results clearly indicates that table 1 shows there is a significant improvement between pre and post test mean on stress among the intervention group at 0.05 level of significance. Also, there is no significant improvement between pre and post test mean on stress among the control group. Table 2 shows there is a significant improvement between pre and post test mean on optimism among the intervention group at 0.05 level of significance. Also, there is no significant improvement between pre and post test mean on optimism among the control group. Table 3 indicates significant improvement difference between the intervention and control groups on stress. Also the table 4 indicates significant improvement difference between the intervention and control groups on optimism.

Previous finding also supports the present study results such asSharma, et al., (2008); Telles, et al., (2012); Telles, (2012); 15. Shohani, (2018).

## Conclusion

During COVID -19 the yoga asana practice makes the sports hostel girls good in the mental health such as stress and optimism. In COVID 19 sportsperson struggled and worried about their carrier, in such conditions Yoga asana provides and prevent the players from the mental illness especially during such unprecedented clueless situations.

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# Impacts of Weight Training on Strength Parameters among College Level Throwers

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**Abstract**

The motivation of this study was to discover the impacts of weight training on Leg strength and strength endurance among college level throwers. To achieve this purpose of the study thirty college level men throwers from Velalar College of Engineering and Technology, Thindal, Erode, Tamilnadu, India were randomly selected as subjects. Their age ranged in between 21 and 23 years. The subjects were separated into two groups namely weight training group and control group. The experimental group was subjected to weight training (for weekly three days monday, wednesday, friday) at evening session for eight weeks. Leg strength and strength endurance was selected as dependent variable. After the compilation of proper data, it was statistically analyzed by using paired't' test. The level of significance was set at 0.05. The result of the present study showed that the weight training has significant enhancement on leg strength and muscular strength of college level throwers.

Keywords: Weight Training, Strength Parameters, College Level Throwers.

## Introduction

Weight training is a popular sort of strength training for increasing skeletal muscle strength and size. It employs the force of gravity in the form of weighted bars, dumbbells, or weight stacks to counteract the force generated by muscle contraction, whether concentric or eccentric. Weight training employs a wide range of specialised equipment to target specific muscle groups and movement patterns. Bodybuilding, weightlifting, powerlifting, strongman, highland games, hammer throw, shot put, discus throw, and javelin throw are all sports that employ weight training. Weight

training also necessitates the use of proper or 'good form,' performing the movements with the right muscle group, and avoiding moving the weight to various body regions to move more weight (referred to as 'cheating'). Failure to use proper form throughout a training set can lead to injury or failure to accomplish training objectives. If the desired muscle group is not appropriately pushed, the overload threshold is never achieved, and the muscle does not build strength. However, at a high level, "cheating" can be employed to break through strength plateaus and induce neurological and muscular adaptation. Strength training is used in many other sports, including American football, baseball, basketball, canoeing, cricket, football, hockey, lacrosse, mixed martial arts, rowing, rugby league, rugby union, track and field, boxing, wrestling, and judo. As athletes involves more of muscular contraction. Which build the components for the game, as a researcher special planned weight training programme for the college level men throwers.

**Methodology**

The motivation of this study was to discover the impacts of weight training on Leg strength and strength endurance among college level throwers. To achieve this purpose of the study thirty college level men throwers from Velalar College of Engineering and Technology, Thindal, Erode, Tamilnadu, India were randomly selected as subjects. Their age ranged in between 21 and 23 years. The subjects were separated into two groups namely weight training group and control group. The experimental group was subjected to weight training (for weekly three days monday, wednesday, friday) at evening session for eight weeks. Leg strength and strength endurance was selected as dependent variable. After the compilation of proper data, it was statistically analysed by using paired‘t’ test.

For weight training group underwent their training programme as three days per week for eight weeks. Training was given in the evening session. The training session includes warming up and cool down. All day the workout lasted for 50 to 60 minutes approximately. The subjects underwent their training programmes as per the schedules such as pistol squat, biceps curl, row and front raise under the strict

regulation of the researcher. During experimental period control group did not contribute in any of the exceptional training

**Results**

**Table-I**

**RELATIONSHIP OF MEAN, SD AND‘t’-VALUES OF THE LEG STRENGTH BETWEEN PRE & POST TEST OF THE WEIGHT AND CONTROL GROUPS OF COLLEGE LEVEL THROWERS**

| | Groups | Test | Mean | S.D | ‘t’ Values |
|---|---|---|---|---|---|
| **Leg Strength** | Control Group | Pre Test | 78.80 | 17.12 | 0.26 |
| | | Post Test | 78.86 | 17.27 | |
| | Weight Group | Pre Test | 81.73 | 11.84 | 18.33* |
| | | | | | |
| | | Post Test | 88.46 | 12.18 | |

*Significant at 0.05 level of confidence

Table-I reveals that the mean values of per test and post test of control group for leg strength were 78.80 and 78.86 respectively; the obtained t ratio was 0.26 respectively. The tabulated t value is 2.14 at 0.05 level of confidence for the degree of freedom 14. The calculated t ratio was lesser than the table value. It is found to be insignificant change in leg strength of the college level throwers. The obtained mean and standard deviation values of pre test and post test scores of weight group were 81.73 and 88.46 respectively; the obtained t ratio was 18.33. The required table value is 2.14 at 0.05 level of confidence for the degree of freedom 14. The obtained t ratio was greater than the table value. It is found to be significant changes in leg strength of the college level throwers. The mean values of leg strength among weight group and control group are graphically represented in figure-1.

**Figure-1: Bar Diagram Showing the Pre Test and Post Test on Leg Strength of Control and Weight Groups**

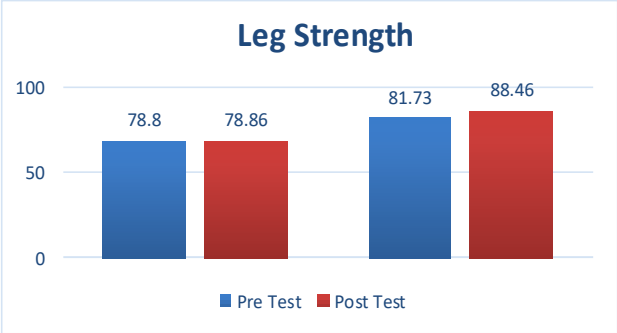



**Table-II**

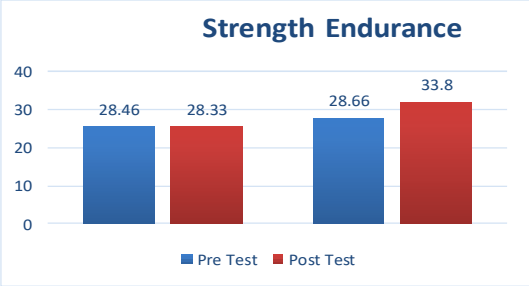
**RELATIONSHIP OF MEAN, SD AND 't'-VALUES OF THE STRENGTH ENDURANCE BETWEEN PRE & POST TEST OF THE WEIGHT AND CONTROL GROUPS OF COLLEGE LEVEL THROWERS**

| | Groups | Test | Mean | S.D | 't' Values |
|---|---|---|---|---|---|
| **Muscular Strength** | Control Group | Pre Test | 28.46 | 6.42 | 0.48 |
| | | Post Test | 28.33 | 6.52 | |
| | Weight Group | Pre Test | 28.66 | 5.16 | 7.19* |
| | | Post Test | 33.80 | 5.73 | |

*Significant at 0.05 level of confidence

Table-II reveals that the mean values of per test and post test of control group for muscular strength were 28.46 and 28.33 respectively; the obtained t ratio was 0.48 respectively. The tabulated t value is 2.14 at 0.05 level of confidence for the degree of freedom 14. The calculated t ratio was lesser than the table value. It is found to be insignificant change in strength endurance of the college level throwers. The obtained mean and standard deviation values of pre test and post test scores of weight group were 28.66 and 33.80 respectively; the obtained t ratio was 7.19. The required table value is 2.14 at 0.05 level of confidence for the degree of freedom 14. The obtained t ratio was greater than the table value. It is found to be significant changes in strength endurance of the college level throwers. The mean values of strength endurance among weight group and control group are graphically represented in figure-2.

**Figure-2: Bar Diagram Showing the Pre Test and Post Test on Strength Endurance of Control and Weight Groups**




## Discussion on Findings

The weight training is an incredible training which has been found to be beneficial of the college level throwers. To study the kettlebell training on leg strength and strength endurance of college level men throwers, it was tested under to difference between weight group and control group. The weight training includes on leg strength and strength endurance. The weight exercises are namely pistol squat, biceps curl, row and front raise. It also improves the leg strength, muscular strength, muscle size and other than some physical fitness components are namely speed, agility, and power. The obtained result proved positively the weight training group significantly improved. The result of the present study showed that the weight training has significant improvement on leg strength and strength endurance of throwers. The results of the study are in line with the studies of **Ooraniyan and Senthil Kumaran (2018), Manocchia, P et al., (2015) & Joe girard et al., (2014)** The result of the study showed that the control group was not significantly improved weight training on leg strength and strength endurance of college level men throwers.

## Conclusions

Based on the findings and within the limitation of the study it is noticed that practice of weight training helped to improve leg strength and strength endurance of throwers at college level. It was also seen that there is progressive improvement in the selected criterion variables of weight training group of throwers after eight weeks of weight training programme. Further, it also helps to improve leg strength and strength endurance.

1. It was concluded that individualized impacts of weight training group showed a statistically significant positive sign over the course of the treatment period on leg strength and strength endurance of college level men throwers.
2. It was concluded that individualized impacts of control group showed a statistically insignificant positive sign over the course of the period on leg

strength and strength endurance of college level men throwers.

3. The results of comparative effects lead to conclude that weight training group had better significant improvement on leg strength and strength endurance of college level men throwers as compared to their performance with control group.

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# Asanas with Plyometric Training: An Experimental Study

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**Abstract**

The purpose of this study to find out an impact of asanas with plyometric training on selected motor fitness variables among football players. The selected twenty subjects were taken from the University College of Engineering, Ramanathapuram, Tamil, India. The student are selected within a age group between 21 to 25 years. The selected players were divided into two equal groups consists of ten football players each namely experimental group and control group. The experimental group underwent asanas with plyometric training for twelve weeks. The control group was not taking part in any training during the course of study. The following motor fitness variables are Flexibility, Explosive Power and Muscular Strength was taken as criterion variable in this study. The experimental group was treated with their respective training in the basis of one hour per day for three days a week for a period of twelve weeks of training. Statistical analyzed paired 't' ratio was used to analyses the means of the pre-test and post-test data of experimental group and control group. The results revealed that there was a significant difference found on the criterion variables. The difference was found due to asanas with plyometric training given to the experimental group on flexibility, explosive power and muscular strength when compared to control group.

Keywords: Asanas, Plyometric training, Flexibility, Explosive Power, Muscular Strength and Football Players.

## INTRODUCTION

Yoga signifies union or oneness with one's inner being. This unity results from the merging of intellect and matter into supreme reality. Yoga has the most effective treatments for both physical and psychological imbalances. It activates the organs of the body and has a positive influence on the internal functioning of the human body. Other systems of physical exercise do not

provide adequate exercise for the internal organs of the body, whereas yogic practises provide adequate activity for the internal organs of the body. Yoga techniques have a larger impact on the mind and sense control. Yogic techniques allow for not only physical and mental growth, but also intellectual and spiritual growth. Yoga is seen as a nonviolent activity.

Plyometric training is a highly effective strategy for increasing explosive power. Power training can assist a wide range of athletes, especially when combined with a strength training regimen. The goal of plyometric training is to improve the player's ability to deliver greater force more quickly. Plyometric training has recently gotten a lot of attention, but it has long been a part of the training of athletes in a range of sports. To bridge the gap between maximum strength and explosive power, it is utilized in conjunction with other power development strategies in a comprehensive training programme. Scientific study has provided us with a fundamental grasp of muscle's elastic characteristics and training ability.

**Methodology**

The purpose of this study to find out an impact of asanas with plyometric training on selected motor fitness variables among football players. The selected twenty subjects were taken from the University College of Engineering, Ramanathapuram, Tamilnadu, India. The student is selected within a age group between 21 to 25 years. The selected players were divided into two equal groups consists of ten football players each namely experimental group and control group. The experimental group underwent asanas with plyometric training for twelve weeks. The control group was not taking part in any training during the course of study. The following motor fitness variables are Flexibility, Explosive Power and Muscular Strength was taken as criterion variable in this study. The experimental group was treated with their respective training in the basis of one hour per day for three days a week for a period of twelve weeks of training. Statistical analyzed paired ‘t’ ratio was used to analyses the means of the pre-test and post-test data of experimental group and control group.

**Results**

**Table – I: Selection of variables and criterion measures**

| S.No | | Experimental Group | Control Group |
|---|---|---|---|
| 1 | Flexibility | Sit and Reach Test | Meters |
| 2 | Explosive Power | Standing Broad Jump | Meters |
| 3 | Muscular Strength | Sit-ups | Counts / Minutes |

**STATISTICAL TECHNIQUE**

The data will be composed before and after the experimental treatment. The data obtained from the experimental period will be statistically analyzed with paried 't' test at 0.05 level of significant improvement on flexibility, explosive power and muscular strength from base line to post treatment

**Table – II: The summary of t-ratio for the pre-test and post-test of experimental group and control group**

| S. No | Motor Fitness Variables | Groups | Test | Mean | 't' value |
|---|---|---|---|---|---|
| **1** | Flexibility | Experimental group | Pre-test | 22.40 | 22.00* |
| | | | Post-test | 26.70 | |
| | | Control group | Pre-test | 21.50 | 0.71 |
| | | | Post-test | 22.10 | |
| **2** | Explosive Power | Experimental group | Pre-test | 1.78 | 9.42* |
| | | | Post-test | 1.81 | |
| | | Control group | Pre-test | 1.75 | 0.83 |
| | | | Post-test | 1.77 | |
| **3** | Muscular Strength | Experimental group | Pre-test | 31.50 | 12.80* |
| | | | Post-test | 34.60 | |
| | | Control group | Pre-test | 27.50 | 1.08 |
| | | | Post-test | 30.50 | |

*Level of Significant at 0.05 level

Table –II shows that the obtained mean values of pre-test and post-test of experimental group for flexibility, explosive power and muscular strength were 22.40 and 26.70, 1.78 and 1.81, 31.50 and 34.60 respectively, the obtained 't' ratio were 22.00*, 9.42*, 12.80* respectively. The tabulated 't' value is 2.26 at 0.05 level for the degree of freedom 9. The calculated 't' ratio was greater than the table value. It is found to be significant change in flexibility, explosive power and muscular strength of the football players. The obtained mean values of pre-test and post-test of control group for flexibility, explosive power and muscular strength were 21.50 and 22.10, 1.75 and 1.77, 27.50 and 30.50. The required table value is 2.26 at 0.05 level for the degree of freedom 9. The calculated 't' ratio was lesser than the table value. It is found to be insignificant change in flexibility, explosive power and muscular strength of the football players. The mean values of selected motor fitness variables among experimental group and control group

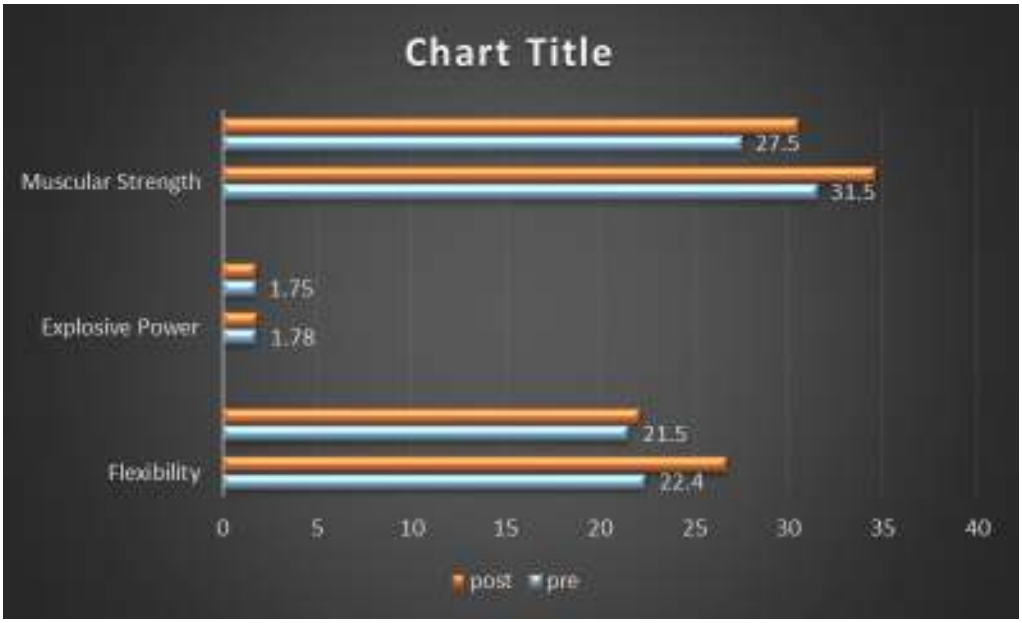


**Fig-1: Bar diagram shows the pre-test and post-test on selected motor fitness variables of experimental group and control group**

**Discussion on Findings**

The result of the study indicated that the selected motor fitness variables such as flexibility, explosive power and muscular strength were improved significantly after undergoing asanas with plyometric training. The changes in selected parameters were attributed for the proper planning, preparation and execution of the training package

given to the football players. The findings of the present study had similarly with the findings of Prasanna, T. A., & Vaithianathan, K. (2019), Arunprasanna, T., Sundar, M., & Jaskar, K. M. M. (2019), Prakash, J., & Nagarajan, S. The results of the present study indicates that the asanas with plyometric training methods is appropriate protocol to improve flexibility, explosive power and muscular strength of the football players. From the result of the present study it is clear that the selected motor fitness variables such as flexibility, explosive power and muscular strength improved significantly due to asanas with plyometric training.

## Conclusion

Based on the findings and within the limitation of the study it is noticed that practice of with asanas with plyometric training helped to improve motor fitness variable among football players. It was also seen that there is progressive improvement in the selected criterion variables of plyometric training group of college level men football players after twelve weeks. Further, it also helps to improve muscular strength, leg explosive power and flexibility. It was concluded that customized asanas with plyometric training group showed a statistically significant over the course of the treatment period on motor fitness variables of among men football players.

1. It was concluded that individualized effect of control group showed a statistically insignificant over the course of the period on selected motor fitness variables of among men football players.
2. The results of comparative effects lead to conclude that the asanas with plyometric training group had better significant improvement on selected motor fitness variables of men football players as compared to their performance with control group.

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**Conflict of interest**

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