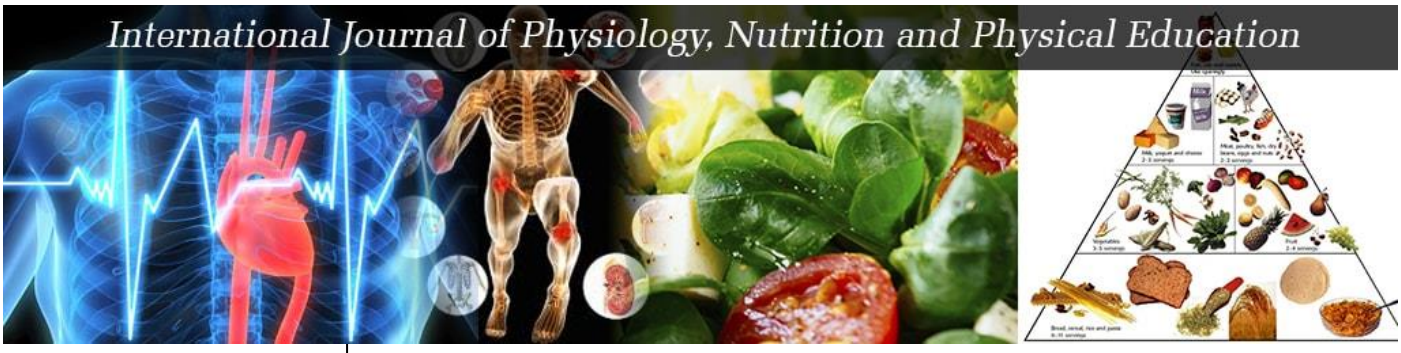


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# Effect of wall ladder exercise and circuit training on selected bio motor variables

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**Abstract**
The purpose of the research was to find out the effect of wall ladder exercise and circuit training on bio motor variables. To achieve the purpose of this research, 60 students at school level, male football players in the age group of 13 to 17 years. The selected subjects were divided into three groups of twenty each. Thus, wall ladder exercise and circuit trainings were selected as independent variables and bio motor variables namely Agility, Leg Strength, Abdominal Strength were selected as dependent variables. The training period was delimited to twelve weeks, in which wall ladder exercise and circuit trainings were given to respective experimental groups (Group-I & Group-II). The group-III acted as control and did not participate any systematic training. Data were collected before and after training programme on acceleration speed and speed endurance. The collected data were statistically treated by using ANCOVA. When the obtained 'F' ratio was significant, Scheffe's post hoc test was used to find out the significant paired mean differences. In all the cases, 0.05 level of confidence was fixed to test the significance. It is inferred that the twelve weeks of wall ladder exercise and circuit training programs have significantly improved Agility, Leg Strength and Abdominal Strength. The result further reveals that the wall ladder exercise group has shown significant improvement in Leg Strength, Abdominal Strength as compared to the circuit training group, circuit training group shows significant improvement in Agility when compared to wall ladder exercise group. Participation in wall ladder exercise and circuit trainings resulted in a significant development in experimental groups when compared to control group.

**Keywords:** Wall ladder exercise, circuit training, agility, leg strength, abdominal strength

## Introduction
Physical training is one of the most important requirements to achieve high performance. The purpose of physical training are to develop the athlete's Physiological potential, to develop bio-motor abilities to the highest standards (Tudor O. Bompa, 2005) [2].
Football is most likely the most popular game worldwide and millions of people play football across the world. In many countries, it has been ranked as one of the top-level competition sports. However, In India, the pace of football was a failure to appreciate the commercial and professional value attached to the sport. Also, there was little effort to become integrated with mainstream professional football centering on the World Cup (Gautam Ahuja & Eric, 2018) [1]. Since then, the advancements made have been impressive but there is still limited precise information available about advancement in training and. Football involves frequent bouts of intense activities such as dribbling, passing, shooting, jumping, and sudden change of direction, etc. the players need a good bio motor components to perform those skills. By the use of wall ladder exercises one can improve their bio motor skills like Agility, leg strength and abdominal strength. By doing a circuit training workouts one can improve their endurance and strength.

## Wall Ladder Exercise
Wall ladder (also known as gymnastic wall bar, Swedish ladder or stall bars) was invented during the 19th century which is used for therapeutic needs (Broomfield, 2011) [9]. It is a multifunctional device which is used for resistance training, abdominal exercise, coordination skills and flexibility training. It can be used for advanced training in sports (Rouchhausen, 2009) [11]. Football players can make great use of the wall ladder for improving isometric strength and also a great tool for improving overall fitness (Mitchell & Wildenthal, 1974) [5]

**Circuit training**

Circuit training is the most and efficient way to enhance cardiovascular fitness and muscle endurance. Circuit training is a method of body conditioning or resistance training using high intensity aerobic exercise. It targets strength building and muscular endurance. Circuit is an exercise in one completion of all prescribed exercises in the program. When one circuit is completed, the subject begins the first exercise again for the next circuit. Traditionally, the time between the exercises in circuit training is shorter, often with faster movement to the next exercise. Circuit training is often erroneously portrayed as an intensive and stressful form of exercise, with a drill sergeant-type in the middle of a circuit bellowing orders at weary recruits. Circuit training is very safe and effective but fun approach to training that can be enjoyed by variety of people: it is attractive to men and women, younger and older age groups, sports people and the general populations. (Lawrence and Hope, 2002) [7] Agility has recently been defined as a rapid, whole body change of direction or speed in response to a stimulus, and can be broken down into subcomponents of agility, therefore is the ability to change the direction rapidly and accurately (Jay Dawes, 2019) [8].

**Methodology**

The purpose of the study was to find out the effect of wall ladder exercises and circuit training on selected bio motor variables among school level male football players. The subjects selected were sixty students at school level, male football players in the age group of 13 to 17 years. The subjects were from the St. Peter's (ICSE) School, Mumbai, Maharashtra, India. The selected subjects were assigned into two experimental group and a control group. Each group consisted of twenty subjects (n=20). Group I acted as Experimental Group I - (Wall Ladder Exercise), Group II acted as Experimental Group II - (Circuit Training) for a period of 12 weeks and Group III acted as a Control group. Pre-test was conducted for all the subjects on selected bio motor variables namely Agility, Leg Strength, Abdominal Strength.

For both experimental group, exercise were explained and demonstrated to the subjects.10 minutes was allotted for warm up and 5 minutes for stretching was performed by the subjects prior to the training sessions. After the warm up the wall ladder exercise were given for 45 minutes. During the first three weeks the intensity was fixed 60% for their training and the subjects was performed in 45 minutes. The intensity was increased by 5% once in every three weeks.

**Results on Agility**

**Table I:** Computation of Analysis of Covariance on Agility

| Test | EX1 | EX2 | CG | SV | SS | df | MS | F |
|---|---|---|---|---|---|---|---|---|
| Pre test | 20.16 | 20.11 | 20.37 | Between | 0.80 | 2 | 0.399 | 0.50 |
| | | | | Within | 45.24 | 57 | 0.79 | |
| Post test | 19.12 | 19.48 | 20.07 | Between | 9.18 | 2 | 4.59 | 10.14 |
| | | | | Within | 25.79 | 57 | 0.45 | |
| Adjusted | 19.15 | 19.54 | 19.97 | Between | 6.59 | 2 | 3.29 | 21.15 |
| | | | | Within | 8.721 | 56 | 0.16 | |

*Significant at 0.05 level of confidence for df (2, 57) and (2, 56) are 3.16

The table I shows that the obtained F value on pre test scores on Agility was 0.50 lesser than the required value of 3.16 to be significant at 0.05 level. This proves that there is no significant difference between the groups at the initial stage and the randomization at the initial level are equal. The obtained post test F value of 10.14 was greater than the required F value of 3.16. Further the obtained F value of 21.15 was greater than the required F value of 3.16.

**Table II:** Scheffe's Post Hoc Test On Agility

| EX1 | EX2 | CG | MD | CI |
|---|---|---|---|---|
| 19.15 | 19.54 | - | 0.39 | 0.31 |
| 19.15 | - | 19.97 | -0.43 | 0.31 |
| - | 19.54 | 19.97 | -0.82 | 0.31 |

*Significant at 0.05 level of confidence

The multiple mean comparison showed in Table II proved that there were significant differences exists between the adjusted means of wall ladder training group, circuit training group and control groups, and there was significant difference between wall ladder training group and circuit training group as the mean difference were greater than the obtained confidence interval 0.31.

**Results on Leg Strength**

**Table III:** Computation of Analysis of Covariance on Leg Strength

| Test | EX1 | EX2 | CG | SV | SS | df | MS | F |
|---|---|---|---|---|---|---|---|---|
| Pre test | 2.06 | 2.01 | 2.00 | Between | 0.05 | 2 | 0.025 | 1.13 |
| | | | | Within | 1.26 | 57 | 0.02 | |
| Post test | 2.48 | 2.25 | 2.00 | Between | 2.28 | 2 | 1.14 | 35.92 |
| | | | | Within | 1.81 | 57 | 0.03 | |
| Adjusted | 2.44 | 2.26 | 2.02 | Between | 1.71 | 2 | 0.85 | 58.39 |
| | | | | Within | 0.818 | 56 | 0.01 | |

*Significant at 0.05 level of confidence for df (2, 57) and (2, 56) are 3.16

The table III shows that the obtained F value on pre test scores on Leg strength was 1.13 lesser than the required value of 3.16 to be significant at 0.05 level. This proves that there is no significant difference between the groups at the initial stage and the randomization at the initial level are equal. The obtained post test F value of 35.92 was greater than the required F value of 3.16. Further the obtained adjusted post mean F value of 58.39 was greater than the required F value of 3.16. This proved that the differences between the posttest means and adjusted mean of the subjects were significant.

**Table IV:** Scheffe' s Post Hoc Test on Leg Strength

| EX1 | EX2 | CG | MD | CI |
|---|---|---|---|---|
| 2.44 | 2.26 | - | 0.18 | 0.10 |
| 2.44 | - | 2.02 | 0.42 | 0.10 |
| - | 2.26 | 2.02 | 0.23 | 0.10 |

*Significant at 0.05 level of confidence

The multiple mean comparison showed in Table IV proved that there were significant differences exists between the adjusted means of wall ladder training group, circuit training group and control groups, and there was significant difference between wall ladder training group and circuit training group as the mean difference were greater than the obtained confidence interval 0.10.

**Results on abdominal strength**

**Table V:** Computation of Analysis of Covariance on Abdominal

Strength

| Test | EX1 | EX2 | CG | SV | SS | df | MS | F |
|---|---|---|---|---|---|---|---|---|
| Pre test | 24.25 | 23.75 | 23.80 | Between | 3.03 | 2 | 1.517 | 0.56 |
| | | | | Within | 154.70 | 57 | 2.71 | |
| Post test | 35.45 | 29.60 | 23.70 | Between | 1380.63 | 2 | 690.32 | 213.91 |
| | | | | Within | 183.95 | 57 | 3.23 | |
| Adjusted | 35.41 | 29.62 | 23.72 | Between | 1351.26 | 2 | 675.63 | 207.93 |
| | | | | Within | 181.959 | 56 | 3.25 | |

*Significant at 0.05 level of confidence for df (2, 57) and (2, 56) are 3.16

The table V shows that the obtained F value on pre test scores on Leg strength was 0.56 lesser than the required value of 3.16 to be significant at 0.05 level. This proves that there is no significant difference between the groups at the initial stage and the randomization at the initial level are equal. The obtained post test F value of 213.91 was greater than the required F value of 3.16. Further the obtained adjusted post mean F value of 207.93 was greater than the required F value of 3.16. This proved that the differences between the posttest means and adjusted mean of the subjects were significant.

**Table VI:** Scheffe's Post Hoc Test on Abdominal Strength

| EX1 | EX2 | CG | MD | CI |
|---|---|---|---|---|
| 35.41 | 29.62 | - | 5.79 | 1.42 |
| 35.41 | - | 23.72 | 11.70 | 1.42 |
| - | 29.62 | 23.72 | 5.91 | 1.42 |

*Significant at 0.05 level of confidence

The multiple mean comparison showed in Table VI proved that there were significant differences exists between the adjusted means of wall ladder training group, circuit training group and control groups, and there was significant difference between wall ladder training group and circuit training group as the mean difference were greater than the obtained confidence interval 1.42.

## Conclusion

Within the limitations and delimitations of this study, the following conclusions were drawn based on the results of the study. It was concluded that the wall ladder exercise and circuit training groups significantly improved Agility, Leg strength and Abdominal strength. However, Group I (wall ladder exercise) has significant increase in Leg strength and Abdominal strength, when compared to Group II (circuit training). Group II (circuit training) significant increase in Agility when compared to Group I (wall ladder exercise). Hence, it is put forward that, performed appropriately, the wall ladder exercise and circuit training can afford significant improvement on selected biomotor variables on experimental group compared to the control group.

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