



P-ISSN: 2394-1685  
E-ISSN: 2394-1693  
Impact Factor (RJIIF): 5.38  
IJPESH 2023; 10(6): 258-259  
© 2023 IJPESH  
[www.kheljournal.com](http://www.kheljournal.com)  
Received: 07-09-2023  
Accepted: 13-10-2023

**Dr. P Selvakumar**  
Physical Director (TF),  
University College of  
Engineering Thirukkuvilai, (A  
Constituent College of Anna  
University Chennai)  
Nagapattinam, Tamil Nadu,  
India

**Dr. S Velkumar**  
Assistant Professor, Department  
of Physical Education, Tamil  
Nadu Physical Education and  
Sports University, Chennai,  
Tamil Nadu, India

**Corresponding Author:**  
**Dr. P Selvakumar**  
Physical Director (TF),  
University College of  
Engineering Thirukkuvilai, (A  
Constituent College of Anna  
University Chennai)  
Nagapattinam, Tamil Nadu,  
India

## Impact of ballistic training on selected physical fitness components of volleyball players

**Dr. P Selvakumar and Dr. S Velkumar**

### Abstract

The purpose of the study was to find out the Impact of ballistic training on selected Physical fitness components of volleyball players. To achieve this purpose, forty (N=40) sub-elite volleyball players who had participated at inter- university level volleyball tournaments from SRM IST, Tamil Nadu in the year of 2022-2023. were randomly selected as subjects. The selected subjects were aged between 20 to 27 years and divided into two equal groups namely, experimental (group-I) and control (group-II) groups consisting of twenty (n=20) each. Group I was treated with packages of ballistic training for five days in a week for eight weeks and group II acted as control group. The subjects were tested prior to and after the experimentation on selected physical fitness components such as agility and strength - endurance. The obtained data from the experimental and control groups were statistically analyzed with dependent 't' test. The level of significance was fixed at 0.05. The findings of the study showed that there was a significant difference found between the experimental and controls groups. The findings of the present study have also strongly indicated that ballistic training has significant influence on selected Physical fitness components in comparison to the control group.

**Keywords:** Ballistic training, physical fitness, volleyball

### Introduction

Ballistic training is a form of strength training in which an athlete accelerates and then releases the weight, rather than slowly lowering it, as in other forms of weight training. It is also called power training, was first used among sub-elite athletes who were looking for a method to develop explosiveness, which is frequently programmed for power development. Frost (2010) <sup>[5]</sup> highlighted that, ballistic lifts are used for power development, noting that the mean acceleration force and power achieved are higher which should lead to greater adaptations. There are three forms of ballistic training: They are (i) Isoinertial (ballistic resistance training), (ii) Isokinetic resistance training and (iii) Variable resistance training.

### Review of related literature

Clark and Paterson (2014) <sup>[6]</sup> evaluated the feasibility of applying ballistic principles to conventional leg strengthening exercises in individuals with mobility limitations as a result of neurologic injuries. Eleven individuals with neurological injuries completed seated and reclined leg press using conventional ballistic techniques. The findings revealed that when compared with conventional strengthening exercises, the incorporation of ballistic principles was associated with increased peak height velocities.

Zaras *et al.* (2013) <sup>[2]</sup> investigated the effects of 6 weeks strength vs. ballistic-power (power) training as on shotput throwing performance in seventeen novice throwers. The result suggested that shotput throwing performance could be increased after six weeks of either strength or ballistic power training in novice throwers.

Mangine and others (2008) <sup>[3]</sup> reported that the inclusion of ballistic exercises into a heavy resistance training program for increasing IRM bench press and enhancing lower-body power.

### Methodology

To achieve the purpose of the present study, forty (N=40) volleyball players who had participated at Inter university level volleyball tournaments from SRM IST, Tamil Nadu in the year 2022-2023 were randomly selected as subjects.

The selected subjects were aged between 20 to 27 years and were divided into two equal group namely ballistic training group (group-I) and control group (group-II). Each group consisting of twenty subjects (n=20). The selected dependent variables of the present study were agility and strength-endurance, which was assessed by standardized tests such as semo agility test and bent- knee sit ups. During the training period, group-I was treated with ballistic training i.e. push-up beep test, medicine ball throw such as overhead, bench press, crunch test, jump squat and chest pass for five days in a week for a duration of 50 to 60 minutes in the evening sessions between 5.15 to 6.15 pm for eight weeks. The obtained data (pre and post) from the experimental and control groups were statistically analyzed with dependent 't'- test. The level of significance was fixed at 0.05.

**Analysis of data**

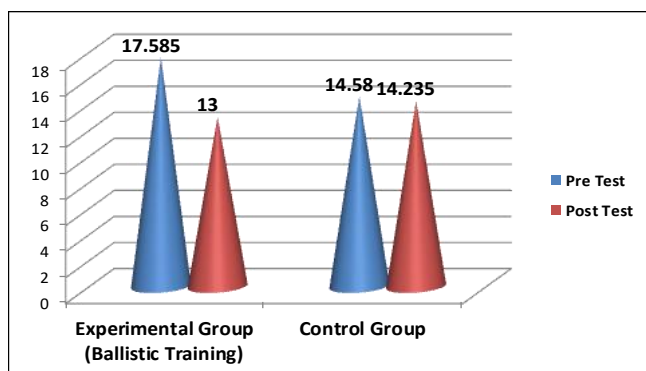
The analysis of dependent 't' test on the data obtained from the pre and post-test means of ballistic training and control groups have been analyzed and presented in table 1.

**Table 1:** Computation of dependent 't' - test for the pre and post tests on agility and strength – endurance of ballistic trainig and control groups

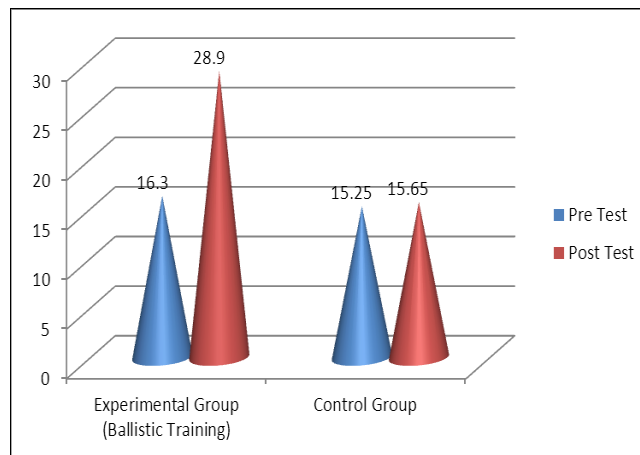
| Variable           | Group                    | Mean       |           | DM    | 6DM  | 't' ratio |
|--------------------|--------------------------|------------|-----------|-------|------|-----------|
|                    |                          | Pre - test | Post test |       |      |           |
| Agility            | Ballistic Training Group | 17.585     | 13        | 4.585 | 0.95 | 4.83*     |
|                    | Control Group            | 14.58      | 14.235    | 0.345 | 1.07 | 0.32*     |
| Strength Endurance | Ballistic Training Group | 16.30      | 28.9      | 12.6  | 3.53 | 3.57*     |
|                    | Control Group            | 15.25      | 15.65     | 0.4   | 3.69 | 0.11      |

Number = 40\* Significant at 0.05 level of confidence. 't' ratio required to be significant at 0.05 level was 2.04 with df 39.

The table 1 indicates the dependent 't' test values of agility and strength – endurance of ballistic training group are 4.83 and 3.57 respectively, which are greater than the table value of 2.04 with df 39. It indicates that, there is a significant improvement due to the effect of eight weeks of ballistic training. Further, the obtained't' test values of agility and strength – endurance of control group are 0.32 and 0.11 respectively, which are less than the table value 2.04 with df 39 at 0.05 level of confidence. This shows that there is no improvement in the control group.



**Diagram 1:** Showing the pre and post test means on agility of ballistic training group and control group



**Diagram 2:** Showing the pre and post test means on strength - endurance of ballistic training group and control group

**Discussion on the findings**

The study was attempted to assess the effect of ballistic training on selected physical fitness components of volleyball players. The results of the study revealed that, the ballistic training has significantly improved the selected Physical fitness components such as agility and strength – endurance of sub – elite volleyball players. Earlier studies reported by Mangine and others (2008) [3] and Zaras *et al.*, (2013) [2] stated that, the inclusion of ballistic exercises into a heavy resistance training or independently administered could either increase the lower body power or throwing distance. The results of the present study also indicated that, the Physical components such as agility and strength – endurance of volleyball players have significantly shown better performance after eight weeks of ballistic training. Therefore, that the sports trainers may include the power training along with weight training in the process of organizing the work schedule for better performance in sports competitions.

**Conclusion**

Based on the results of the study, it was concluded that ballistic training has significant influence on the selected Physical components such as agility and strength – endurance of volleyball players when compared to their counterpart (control group). Therefore it is suggested that the ballistic training (exercises) can also be included in the regular training programme in the process of preparing sportsman for higher competitions.

**References**

1. Hooks G. Application of Weight of Athletics, Engle wood cliffs, New Jersey; Prentice Hall, INC; c1962. p.1-2.
2. Zaras, *et al.*, Sports science medicine e-collections 2013. 2013 Mar 1;12(1):130-7.
3. Mangine GT, Ratanans NA, Hoffman JR, Faigenbaum AD, Kangal, Chilalwsa, Strength Cond Res. 2008;22(1):132-9.
4. Dick F, Johnson C, Paist W. Strength training for Athletes, London: British Amateur Athletic board; c1978. p. 6.
5. Frost J. Strength conditioning resistance; c2010.
6. Williams, Clark, Paterson H. AMJ Physics, Med, Rehabil. 2014 Sep;93(9):828-33.