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## Effect of varied intensities of resistance training on explosive power

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### Abstract

Resistance training is recognised as one of the most effective and efficient trainings to enhance various aspects of motor fitness. Standard and scientific methods of resistance training are necessary in the field of sports to improve the levels of performance. The purpose of the present study was to find out the effect of varied intensities of resistance training on explosive power. The subjects for this study were randomly selected from among the first year bachelor of physical education students during the year 2017-2018, Department of Physical Education and sports sciences, Annamalai University. Their age ranged between 18 to 21 years and they were segregated into four groups, each group consisting of 15 subjects, following the routine procedures of selection of subjects. The first group underwent high intensity resistance training programme, the second group underwent medium intensity resistance training programme the third group underwent low intensity resistance training programme and the fourth group acted as control and did not undergo any systematic training programme. Thus the high, medium and low intensity resistance training were consisted as three experimental variables and explosive power consider as one criterion variable for the present study. All the subjects were tested on explosive power before the commencement of the training programme. Thereafter three varied intensities of resistance training were given 3 days a week for 10 weeks for the three experimental groups and the control group did not participate in any systematic programme. The subjects were tested again on explosive power after the completion of training programme. To nullify the variation in the pre-test means, analysis of covariance (ANCOVA) was applied and the adjusted post-test means were tested for significance. If the 'F' ratio was significant Scheffe's post-hoc test was applied to find out the significant differences if any, among the paired means. The level of significance was set at 0.05 level. the results shows that, high, medium and low intensity training groups showed significant improvement in explosive power as compared to control group. The medium intensity resistance training programme significantly improved explosive power when compared to high and low intensity groups. However there was no significant difference in the explosive power between high and low intensity groups. So it is concluded that the medium intensity training is better than high and low intensity resistance training in improving explosive power.

**Keywords:** High, medium, low, intensities, resistance training and explosive power

### Introduction

Sports training is a basic preparation of the sportsmen for better performance through physical exercise. It is based on scientific principles of aiming at education and performance enhancement. Sports activities consist of motor movement and action and their success depends to a great extent on how correctly they are performed. Techniques of training and improvement of tactical efficiency play a vital role in the training process (Fox, 1984) <sup>[1]</sup>.

Sports performance can be enhanced through training and competition. Performance not only depends upon the physiological, psychological, sociological aspects but also more on the physical characteristics of the individual. The recent trend is to improve the physical fitness standards through scientific and systematic training. In the present world of sports, the physical fitness factors have been regarded as one of the important measures for achieving elite levels of sports performance.

There are various sports training activities in the fields of sports. They are resistance training, interval training, fartlek training, circuit training and so forth. These training are meant for the improvement of specific physical and motor fitness qualities. The main purpose of resistance training is the development of strength and power parameters.

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The main components which influence the physical performance of an athlete are strength, endurance, power, speed and agility.

Moran and McGlynn (1990) [2] consider resistance training as an exercise programme where free or stationary weights are used for the purpose of increasing muscular strength, muscular endurance and power and body composition through which skills can be improved.

Specific training programmes can also lead to the development of cardio-respiratory endurance.

Speed and strength are integral components of fitness found in varying degrees in virtually all athletic movements. Combination of speed and strength is power. For many years coaches and athletes have sought to improve power in order to enhance performance.

Throughout this century and no doubt long before, jumping, bounding and hopping exercises have been used in various ways to enhance athletic performance. In recent years this distinct method of training for power or explosiveness has been termed plyometrics.

Whatever be the origins of the word, the term is used to describe the method of training which seeks to enhance the explosive power of the individual through powerful muscular contractions as a result of rapid eccentric contractions. The Resistance training is of utmost importance in most of the competitive sports, especially in intense and explosive nature of sports. Hence, the study was to find out the effect of varied intensities of resistance training on explosive power.

## Materials and Methods

### Subjects

Resistance training is recognized as one of the most effective and efficient trainings to enhance various aspects of motor fitness. Standard and scientific methods of resistance training are necessary in the field of sports to improve the levels of performance.

The purpose of the present study was to find out the effect of varied intensities of resistance training on explosive power. For this purpose, the subjects randomly selected from the first year Bachelor of physical education students during the academic year 2017-2018, department of physical education and sports sciences, Annamalai University.

Their age ranged between 18 to 21 years and they were segregated into four groups, each group consisting of 15 subjects, following the routine procedures of selection of subjects.

## Variables

Though many methods prevail to develop power, the role of progressive resistance training is an undisputed one. Hardly few explorations have been made in India in the area of varied intensities of resistance training and its effect on explosive power. In this context, the effect of three varied intensities namely high, medium and low intensities of resistance training were selected as experimental variables. Power is the key to success in sports and games. Each sport demands specific requirement of strength and power for successful performance; hence, the explosive power was selected as dependent variable and it measured by vertical jump in centimetres.

## Training Programme

The resistance training programmes used in the present investigation for three different intensity groups (high, medium and low) are described below.

High intensity group started with 70% of intensity, Medium intensity group started with 60% of intensity and Low intensity group started with 50% of intensity. The 5% of intensity was increased progressively for over load during once in two weeks for ten weeks. The individual load was fixed at their one reputation maximum. The subjects underwent their respective training programme under strict supervision.

## Statistical Procedure

The experimental design used for this study was random group design involving 60 subjects. All the subjects were tested prior to and after the experimental treatment on explosive power. No attempt was made to equal the groups before the commencement of training and hence variation in the initial means would influence the final means of the study. To nullify the variation in the pre-test means, analysis of covariance was applied and the adjusted post-test means were tested for significance. If the F ratio was significant, Scheffe's post-hoc test was applied to find out the significant differences if any, among any of the paired means. The level of significance was set at 0.05 level.

## Results

The pre and post test data collected from high, medium, low intensity groups and control group on explosive power were statistically analysed by ANCOVA and the obtained results are presented in table-1.

**Table 1:** Analysis of Covariance on Explosive Power of High, Medium, Low Intensity Groups and Control Group

Adjusted Post-Test									
	High intensity group	Medium intensity group	Low intensity group	Control group	So V	Sum of squares	df	Mean square	'F' ratio
Mean	47.65	52.29	48.82	45.24	B: W:	380.76 125.46	3 55	126.92 2.28	55.64*

\* Significant at 0.05 level of confidence.

df-degrees of freedom; SD-Standard Deviation; S.O.V.-Source of Variance. B-Between; W-Within

The table value required for significance at 0.05 level with df 3 & 55 is 2.78.

It is evident from table-1 that, the adjusted post-test mean values for high intensity group is 47.65, medium intensity group is 52.29, low intensity group is 48.82 and control group is 45.24. The obtained 'F' ratio 55.64 is more than the table value of 2.78 for df 3 and 55 required for significance at 0.05 level. The results of the study indicate that there are

significant differences among the adjusted post-test means of different intensities groups and control group. To determine which of the paired means had a significant difference, Scheffe's post-test was applied and the results are presented in table-2.

**Table 2:** Scheffe’s Test for the Differences between the Adjusted Post-Test Paired Means of Explosive power

Adjusted Post-Test Means				Means Differences
High Intensity Group	Medium Intensity Group	Low intensity group	Control group	
47.65			45.24	2.41*
	52.29		45.24	7.05*
		48.82	45.24	3.58*
47.65	52.29			4.64*
47.65		48.82		1.17
	52.29	48.82		3.47*

\* Significant at 0.05 level.

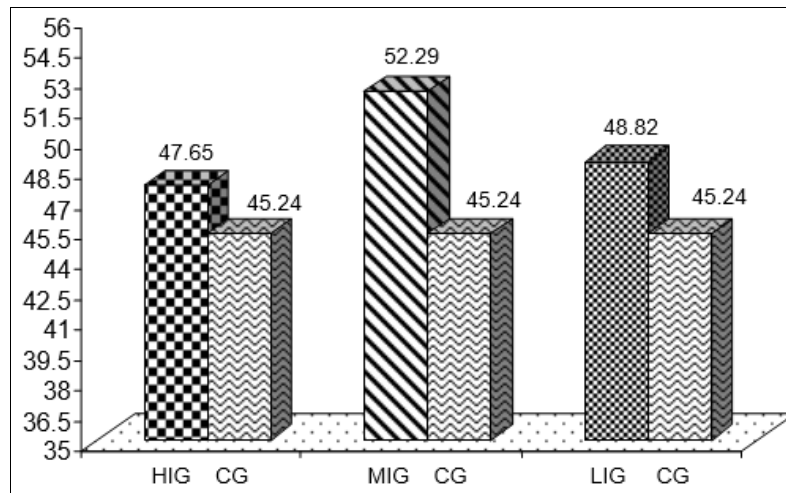
The confidence interval required for significance at 0.05 level is 1.57.

It is evident from table-2 that the adjusted post-test mean difference in explosive power between control and high intensity groups is 2.41, control and medium intensity groups is 7.05 and between control and low intensity groups is 3.58 which are higher than the confidence interval value of 1.57. The results show that there is a significant increase in explosive power for all the three intensity groups as compared to control group.

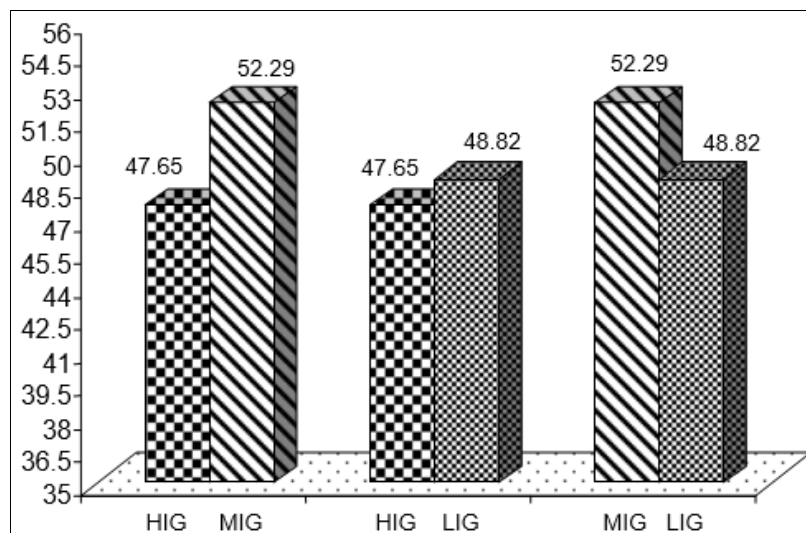
The mean difference between medium and high intensity groups is 4.64 and between medium and low intensity groups is 3.47. These two mean differences are higher than the confidence interval value of 1.57. This indicates that the increase in explosive power is significantly greater for low intensity group than high and medium intensity groups. The mean difference between high and low intensity groups is

1.17 and it is less than the confidence interval value of 1.57. It may be concluded from the results of the study that no significant difference exists between high and medium intensity groups.

It is concluded that elastic strength has significantly increased in different intensities group as compared to the control group. The medium intensity group showed significant improvement in explosive power as compared to high and low intensity groups. However there was no significant difference in the elastic strength between high and low intensity groups. So the medium intensity training is better than high and low intensity resistance training in improving explosive power. Graphical representation of explosive power of high, medium, low intensity groups and control group are presented in figures I & II.



**Fig 1:** Comparison of Adjusted Post-Test Means of Explosive Power of High, Medium and Low Intensity Groups with Control Group



**Fig 2:** Comparison of Adjusted Post-Test Means of Explosive Power among High, Medium and Low Intensity Groups

### Findings

In this present study, it was found that all three different intensity resistance training groups showed significant changes in explosive power as compared to control group. The medium intensity training programme resulted in significant increase in explosive power as compared to high and low intensity training programmes. The explosive power is the combination of speed and strength. The medium intensity training programme helps to improve the speed and strength simultaneously and ultimately there is an increase in explosive power. Hass and others, (2000)<sup>[4]</sup> conducted a study on single and multiple sets on explosive power in adult recreational weight lifters. They were divided into two groups of each 21 subjects and underwent their respective training. Both the groups significantly improved the explosive power, but no significant differences were found among the groups on the above variables. These findings support the results of the present study. Maxine Friedman (2000)<sup>[5]</sup> conducted a study on the effects of increasing volume from one set to three sets on explosive power. Twenty one subjects performed one set routine, and another 21 subjects performed 3 sets of 8 to 12 repetitions, 3 days per week for 13 weeks. Both the groups significantly improved their explosive power. The results of the above study are in conformity with the result of the present study. The study show that a 10-week in-season resistance training program with moderate volume and intensity loads increased vertical jump performance in adolescent male basketball players (Santos and Janeira, 2012)<sup>[7]</sup>. The resistance training influenced on vertical jump of basketball players (Sperlich, 2011) and the following literatures. Shalfawi *et al.*, (2011)<sup>[8]</sup>, Tsimahidis *et al.*, (2010)<sup>[10]</sup> and Santos, Harris *et al.*, (2000)<sup>[3]</sup> and Janeira (2010) are supported this study.

### Conclusion

The study concluded that, the high, medium and low intensity training groups showed significant improvement in explosive power as compared to control group. In further the study showed that, the medium intensity training programme resulted in a significant increase in explosive power than the other two intensity training programmes. However there was no significant improvement between High and low intensity training groups.

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