EFFECT OF STRUCTURED RESISTANCE TRAINING AND VARIED INTENSITIES OF WEIGHT TRAINING ON SELECTED MOTOR FITNESS AND PHYSIOLOGICAL VARIABLES AMONG ATHLETES

SYNOPSIS

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By

RAJU SATHULURI

Under the Guidance of

Dr. P.P.S. PAUL KUMAR

Principal

University College of Physical Education and Sports Sciences

ACHARYA NAGARJUNA UNIVERSITY
NAGARJUNA NAGAR-522 510
GUNTUR DISTRICT, A.P., INDIA

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INTRODUCTION

Improving skill means that the performance of any motor task becomes more efficient thereby reducing the time taken to complete the task and the level of effort required. This increased level of skillfulness could also mean more enjoyment and satisfaction for the performer by increasing the ease with which the task can be completed or by allowing new, more complex skills to be attempted. If by understanding the processes that govern the control of movement, the researcher can show the way for all individuals to improve their ability to perform the myriad of motor tasks that they confront.

Sports in the present world has become extremely competitive. It is not the mere participation or practice that brings out victory to an individual. Therefore, sports life is affected by various factors like physiology, bio-mechanics, sports training, sports medicine, sociology and psychology etceteras. All the coaches, trainers, physical educational personals and doctors are doing their best to improve the performance of the players of their country. Athlete players of all the countries are also trying hard to bring laurels, medals for their countries in International competitions (Bompa, 1999).

STATEMENT OF THE PROBLEM

The purpose of the study was to investigate the “Effect of structured resistance training and varied intensities of weight training on selected motor fitness and physiological variables among college level athletes”.

OBJECTIVES OF THE STUDY

Generally the earlier researches proved that these are the benefits of weight training and resistance training. Increased muscle strength, power, endurance and size, Increased bone density and strength, Reduced body fat, Increased muscle-to-fat ratio, Boosted metabolism
(burning more kilojoules when at rest). Lowered heart rate and blood pressure after exercise, Improved balance and stability, Enhanced performance of everyday tasks, Reduced risk of developing some conditions like diabetes and improve the quality of life. In this way, weight training and resistance training carryover the lot of motor fitness and physiological changes among athletes.

Thus, the objective of this research is to assess the motor fitness variables, namely, speed, agility, flexibility, endurance and physiological variables resting pulse rate, breath holding time and VO\textsubscript{2} Max of college athletes. The effect of structured resistance training and varied intensities of weight training on each of these motor fitness and physiological variables were studied and compared these effects with control group to determine whether these training produce significant changes in selected variables. Under these interventional situations, (a) which of the training method is better than the other one? (b) and to which extent? were the current research focuses on the effects of structured resistance training and varied intensities of weight training on selected motor fitness and physiological variables among college level athletes.

**LIMITATIONS**

Uncontrollable factors associated with the study were accepted as limitation and the following were considered as limitation of the research study:

1. Certain factors like rational habits like life style, daily routine, diet and climatic conditions were not taken into account in the study.
2. The influence of vigorous academic activity of students could have discouraged or motivated the subjects during training and during testing period.
3. The heterogeneous characters of the subjects in hereditary and environmental factors were recognized as a limitations.

4. The subject’s body type and socio economic status of the students were not taken into consideration.

5. Uncontrollable changes in climate and whether conditions such as atmosphere, temperature, humidity and other meteorological factors during the training programme were regarded as limitations.

DELIMITATIONS

This research will be delimited to the following areas:

1. Sixty men sprinters who had represented their colleges in intercollegiate level sports meets in Andhra University and Acharya Nagarjuna University area in Andhra Pradesh were selected for this study.

2. The age of subjects for the study between 19 to 25 years and all the subjects were good in health.

3. Experimental period will be 12 weeks.

4. To test the hypothesis the following parameters will be analyzed.

SIGNIFICANCE OF THE STUDY

The present investigation will contribute significantly to the field of Physical Education and Sports in the following ways.

1. The study was significant in assessing the present state of college level athletes’ motor fitness and physiological levels.

2. The study was significant in experimenting with different strength training exercises, structured resistance training and varied intensities of weight training for athletes.
3. This study may help the Coaches and Physical Educators to train the athletes to improve the selected motor fitness and physiological variables.

4. This research may help the sports scientists to suggest ways and means to improving better standard in sports through this specific type of strength training.

5. The results of this study would give a clear picture to the sports coaches that the particular strength training programme will help improve the strength of the athletes by altering selected motor fitness and physiological variables.

6. This study will give a clear conception to the researcher, whether the structured resistance training or varied intensities of weight training influences selected motor fitness and physiological variables of athletes.

7. This study also helps to find those, involved in research especially in sports and games.

8. This study stimulates the athletes’ interest in activities through self-evaluation of their motor fitness and physiological levels.

9. This study may provide clear guidelines in better performance to be groomed for higher levels of competition.

10. The result of the study may be helpful to physical education teacher, coach in designing the training programs to improve performance according to the individual concerned.

**HYPOTHESES**

Based on the findings of previous researches and the investigator’s understanding, the following hypotheses were made for the purpose of the study.

1. It was hypothesized that there would be significant differences due to structured resistance training and varied intensities of weight training on selected motor fitness variables.
2. It was hypothesized that there would be significant differences due to structured resistance training and varied intensities of weight training on selected physiological variables.

3. It was hypothesized that there would be no significant difference between structured resistance training and varied intensities of weight training exercises in altering selected motor fitness and physiological variables among college level men athletes.

DEFINITION OF EXPANSION TERMS

Weight Training

Weight training is the use of weights in exercising to develop muscle, power and strength by the over load principles (Neal, 1969). The weight training with different intensities were considered for this study as varied intensities of weight training.

Resistance Training

Resistance training can be defined as a practice where in the actual skills are performed against resistance by adding weights either on different members of the body or on the implements used in various games and sports (Hardayal Singh, 1991). The resistance training structured to suit the athletic performances were considered as structured resistance training for the purpose of this study.

Speed

The capacity of moving a limb or part of the body’s lower system or the whole body with the greatest possible velocity (Frank Dick, 1992). The maximal rate at which an individual is able to move the entire body over a specific distance is considered to be his speed movement (Eckert, 1974).
Agility

Agility is the capacity to change direction quickly and to control movements (Hardayal Singh, 1991).

Flexibility

The ability of an individual to move the body and its parts through a wide range of motion as possible without undue strain to the articulations and muscles attachments.

Cardio respiratory Endurance

It is the ability to persist in physical activity that requires oxygen for physical exertion (P.J. Strukic, 1981).

Resting Pulse Rate

The time from the end of one contraction to the end of the next contraction is a complete heart beat or pulse or cardiac cycle. The complete cardiac cycle takes less than one second (about 0.08 sec) in a normal adult at rest and it shortened by exercise (Eva Lurie Weinerb, 1984).

Breath Holding Time

Breath holding time is define as the duration of time through which one can hold his breath without the study of all living things.

VO₂ Max

VO₂ max is the maximal oxygen uptake or the maximum volume of oxygen that can be utilized in one minute during maximal or exhaustive exercise. It is measured as milliliters of oxygen used in one minute per kilogram of body weight.
METHODOLOGY

The purpose of the study was to find out the effect of structured resistance training and varied intensities of weight training on selected motor fitness and physiological variables. The selection of subjects, selection of variables, research design, orientation of the subjects, selection of tests, testers reliability, training schedule, test administration, and the statistical technique used are dealt in this chapter.

EXPERIMENTAL DESIGN

The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (n=60) were randomly assigned to three equal groups of twenty men sprinters in each group. The groups were assigned as Experimental Groups-I, II, and control group respectively. Experimental group-I was assigned as Structured Resistance Training (SRT) and Experimental group-II was assigned as varied weight training (VWT) and control group. The control group was not given any special treatment except of their routine. Pre-tests were conducted for all the subjects on selected motor fitness and physiological variables, namely, speed, agility, flexibility, cardiovascular endurance, resting pulse rate, breath holding time and VO₂ max. The experimental groups participated in their respective training protocols for a period of twelve weeks.

PILOT STUDY

A pilot study was conducted to assess the initial capacity of the subjects in order to fix the exercise load. For this purpose, ten sprinters who were not the subjects for this research were selected and weight training and resistance training were given to them. Thus, training schedules
for group-I and group-II were constructed. However, the individual differences were not considered. This enabled the investigator to adapt suitable training schedule for this study.

SELECTION OF SUBJECTS

To find out the effects of structured resistance training and varied intensities of weight training on selected motor fitness and physiological variables among college level athletes, the investigator randomly selected 60 sprinters, who competed at inter collegiate level sports meets representing different colleges in Andhra University & Acharya Nagarjuna University area in Andhra Pradesh. They were divided into three groups at random again consisting twenty subjects in each group and they were randomly assigned as experimental group- I (SRT – Structured Resistance Training) and Experimental group II (VWT – varied weight training), and control group (CG). The requirements of the experimental procedures, testing as well as exercise schedules were explained to them so as to avoid any ambiguity of the effort required on their part and prior to the administration of the study, the investigator got the individual consent from each subject.

SELECTION OF VARIABLES

The research scholar reviewed the various scientific literature pertaining to the weight training and resistance training exercises on selected motor fitness and physiological variables from books, journals, periodicals, magazines and research papers. Taking into consideration of feasibility criteria, availability of instruments and the relevance of the variables of the present study, the following variables were selected.

Dependent Variables

Motor Fitness Variables

1. Speed
2. Agility
3. Flexibility
4. Cardiovascular Endurance

**Physiological Variables**
1. Resting Pulse Rate
2. Breath Holding Time
3. VO₂ max

**Independent Variables**
1. Structured Resistance Training (SRT) for twelve weeks
2. Varied Weight Training (VWT) for twelve weeks.

**CRITERION MEASURES**

The following criterion measures were adopted to measure the test.

1. To find out the effect of 50 meters run, conducted by using stop watch and the scores were recorded in seconds.
2. To find out the agility of the subjects 4 x 10 M shuttle run test was conducted and scores were recorded in seconds.
3. To find out the flexibility of the subjects sit and reach test was conducted and the scores were recorded in centimeters.
4. To find out the cardiovascular endurance, Harvard Step Up test was administered and the scores recorded in Physical Efficiency Index.
5. To find out the resting pulse rate, through the radial artery beats and counted in numbers per minute.
6. To find out the breath holding time, nose clippings and the stop watch were used to record the time.
7. To find out the VO2 max, Cooper’s 12 Minutes Run / Walk test was conducted and the scores record based on the formulae suggested for this study.

RELIABILITY OF DATA

Before the commencement of experiment, the reliability of the data were established through reliability of instruments, reliability of tester, reliability of subjects by test and retest method.

RELIABILITY OF INSTRUMENTS

The research scholar used the following instruments for measuring various tests, stop watch, measuring tape, starting clapper, nose clip, etcetera were used to find out the reliability of the instruments. Further, those instruments has been calibrated in standard units, each of the variables are recorded. All the instruments were in good working condition. Their calibration were tested and found to be accurate enough to serve the purpose of the study.

STATISTICAL ANALYSIS

In this experimental study, the subjects were tested prior to and after the experimental period and hence the Analysis of Co-Variance (ANCOVA) as described by Clarke and Clarke (1972) was used:

\[ F = \frac{(MS_{y|x})_b}{(MS_{y|x})_w} \]

The Scheffe’s post, hoc analysis test was also applied to ascertain the significant difference between the adjusted means of experimental group-I and experimental group-II by Clarke and Clarke (1972).

\[ F = \frac{(M_1^1 - M_2^1)}{(MS)_w \left( (1/n) + (1/n) \right)} \]
COMPUTATION OF REPEATED ANALYSIS OF VARIANCE AND POST HOC TEST

Results on Speed

The statistical analysis comparing the initial and final means of Speed due to Structured Resistance Training and Varied Weight Training among athletes is presented in Table-IV.

Discussions on Findings on Flexibility

The effect of Structured Resistance Training and Varied Weight Training on Flexibility is presented in Table-VIII. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F-value 15.81 was greater than the required table F-value to be significant at 0.05 level.

Results on Flexibility

The statistical analysis comparing the initial and final means of Flexibility due to Structured Resistance Training and Varied Weight Training among athletes.

Results on Cardiovascular Endurance

The statistical analysis comparing the initial and final means of Cardiovascular Endurance due to Structured Resistance Training and Varied Weight Training among athletes is presented.

Results on Resting Pulse Rate

The statistical analysis comparing the initial and final means of Resting Pulse Rate due to Structured Resistance Training and Varied Weight Training among athletes is presented.

Results on Breath Holding Time

The statistical analysis comparing the initial and final means of Breath Holding Time due to Structured Resistance Training and Varied Weight Training among athletes is presented.
Results on Vo2 Max

The statistical analysis comparing the initial and final means of VO2 max due to Structured Resistance Training and Varied Weight Training among athletes is presented.

DISCUSSIONS ON HYPOTHESES

For the purpose of the study, the following hypotheses were formulated:

1. It was hypothesized that there would be significant differences due to structured resistance training and varied intensities of weight training on selected motor fitness variables.

2. It was hypothesized that there would be significant differences due to structured resistance training and varied intensities of weight training on selected physiological variables.

3. It was hypothesized that there would be no significant difference between structured resistance training and varied intensities of weight training exercises in altering selected motor fitness and physiological variables among college level men athletes.

SUMMARY

There are different types of training methods for the development of motor abilities of athletes. Understanding these training methods and the effectiveness of the training methods to suit a particular event is a challenging task for any coach or player. This helps coaches and athletes prevent injury and over-training while trying to maximize their physical ability, and analyze the strengths and weaknesses related to their specific training programs. If one failed to establish correct training patterns for young athletes, unfortunately, goes way back. Hence, the investigator was interested to find out the effects of structured resistance training and varied
intensities of weight training on the motor fitness and physiological variables of college men athletes.

**Level of Significance**

The subjects were compared on the effect of structured resistance training and varied intensities of weight training on selected motor fitness and physiological variables. The differences between means of initial and final scores on selected criterion variables, speed, agility, flexibility, cardiovascular endurance, resting pulse rate, breath holding time and VO₂ max, were subjected to statistical treatment using analysis of covariance (ANCOVA). In all the cases, 0.05 level of confidence was fixed to test the significance, which was considered as appropriate.

**CONCLUSIONS**

Within the limitations and delimitations of the study, the following conclusions were drawn.

1. It was concluded that structured resistance training and varied weight training exercises significantly improved motor fitness variable such as, speed of the college level athletes. Comparing between the treatment groups, it was found that structured resistance training was better than varied weight training group.

2. It was concluded that structured resistance training and varied weight training exercises significantly improved motor fitness variable such as, agility of the college level athletes. Comparing between the treatment groups, it was found that structured resistance training was better than varied weight training group.
3. It was concluded that structured resistance training and varied weight training exercises significantly improved motor fitness variable such as, flexibility of the college level athletes. Comparing between the treatment groups, it was found that structured resistance training was better than varied weight training group.

4. It was concluded that structured resistance training and varied weight training exercises significantly improved motor fitness variable such as, cardiovascular endurance of the college level athletes. Comparing between the treatment groups, it was found that there was no significant difference between structured resistance training and varied weight training groups.

5. It was concluded that varied weight training significantly improved physiological variable such as, resting pulse rate of the college level athletes. Comparing between the treatment groups, it was found that there was no significant difference between structured resistance training and varied weight training group.

6. It was concluded that structured resistance training significantly improved physiological variable such as, breath holding time of the college level athletes. Comparing between the treatment groups, it was found that there was no significant difference between structured resistance training and varied weight training group.

7. It was concluded that structured resistance training and varied weight training significantly improved physiological variable such as, VO$_2$ max of the college level athletes. Comparing between the treatment groups, it was found that there was no significant difference between structured resistance training and varied weight training group.
RECOMMENDATIONS

1. The findings of this study proved that structured resistance training and varied weight training significantly improved motor fitness variables of college athletes, hence, it was recommended that the protocols suggested in this study may be followed for athletes for their training.

2. The benefits of structured resistance training and varied weight training may be popularized among athletes and other sports persons.

3. The findings of this study proved that structured resistance training improved motor fitness variables, speed, agility and flexibility of athletes, the findings may be extended to similar other players.

4. Similar research may be conducted among women athletes.

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