



IMPACT OF DIFFERENT LOADS OF WEIGHT TRAINING ON SELECTED STRENGTH PARAMETERS AMONG UNTRAINED MEN

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ABSTRACT

The purpose of the study was to find out the impact of varied intensities of weight training on selected strength parameters. To achieve this purpose of the study 60 untrained men students studying in the faculty of medicine and dental, Annamalai University, Chidamdaram were selected as subjects at random. Their age ranged between 18 to 24 years. The selected subjects were divided into four equal groups of fifteen each. The experimental group- I underwent high intensity weight training, group- II underwent medium intensity weight training, group-III underwent low intensity weight training for three days per week for twelve weeks whereas the group-IV act as control group. The following variable namely arm strength, leg strength and back strength was selected as criterion variable. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find out the significant difference, if any among the groups. Whenever the obtained "F" ratio was found to be significant, the scheffe's test was applied as post hoc test to find out the paired mean difference, if any. The 0.5 level of confidence was fixed to test the level of significance which was considered as an appropriate. The results of the study showed that there was a significant difference exists among high, medium, low intensity weight training groups and control group on strength parameters. And also high intensity weight training group, medium intensity weight training group and low intensity weight training group showed significant improvement on strength parameters when compared to control group.

Key Words: weight training, arm strength, leg strength and back strength.

INTRODUCTION

Training is a systematic process of repetitive progressive exercise of work involving learning and acclimatization. Training is the net summation of adaptations induced by regular exercise. Students on the exercises with reference to fitness state that it enables the bear more effectively, subsequently stresses of similar nature. The process of stressing the sports-man and his adaptation to these stress is called sports training and it is the mean by which sports performance is improved. Strength training is the use of resistance to muscular contraction to build the strength, anaerobic endurance, and size of skeletal muscles.

Sports training is a pedagogical process, based on scientific principles, aiming at preparing a sportsman for higher performances in sports competition. Some experts understand that sports' training is basically doing physical

exercise. For performing these physical exercises, the following factors are essentials such as sports equipment and implements, verbal instructions, means of recovery, means of assessment of performance capacity, nutrition, psychological means etc. Further advanced training of sports persons significantly supported by several sports disciplines like sports medicine sports psychology, nutrition, physiotherapy sports physiology, sports biomechanics and other allied sciences.

In addition, personality of the sportsman has to be improved in order to improve his performance. The personality of a person has several dimensions like physical, physiological, social and psychological. Hence, to improve sports performance in addition to physical and physiological characteristics the social and psychic capacities of the sports person also have to be improved.

Tudor Bompa consider resistance training as an exercise programme where free or stationary weights are needed for the purpose of increasing muscular strength, muscular endurance and power through which skills can be improved. For several years athletes have lifted weights to gain strength. For the muscles to gain weight, the principle of progressive resistance are followed. The investigator makes an attempt to study the effects of different intensities of weight trainings on selected strength parameters.

STATEMENT OF THE PROBLEME

The purpose of the study was to find out the impact of varied intensities of weight training namely high intensity weight training, medium intensity weight training and low intensity weight training on selected strength parameters namely arm strength, leg strength and back strength,

DEFINITIONS AND EXPLANATIONS OF THE TERMS

Arm Strength

“Arm strength is the ability of a person to exert force on physical objects using muscles. Increasing strength is the goal of strength training

Leg Strength

The capacity of the lower limb to exert muscular force. Leg strength measures the limb of lifting resistance in lowering and arising from sitting position.

Back Strength

Back strength may be defined as “the capacity of a person to exert muscular force of the lower back muscles

METHODOLOG

Selection of the subjects

The purpose of the study was to find out the impact of different loads of weight training

on selected strength parameters. To achieve this purpose of the study sixty untrained men students studying in the faculty of medicine and dental, Annamalai University, Chidamdaram were selected as subjects at random. Their age ranged between 18 to 24 years. The selected subjects were divided into four equal groups of fifteen each. The experimental group- I underwent high intensity weight training, group-II underwent medium intensity weight training, group-III underwent low intensity weight training for three days per week for twelve weeks whereas the group-IV act as control group. The following variable namely arm strength, leg strength and back strength was selected as criterion variable. The subjects of the four groups were tested on strength parameters at prior and immediately after the training period.

Training programme

The experimental group- I underwent high intensity weight training, group- II underwent medium intensity weight training, group-III underwent low intensity weight training for three days per week for twelve weeks. Every day the workout lasted for 45 to 60 minutes approximately including warming up and warming down periods. Group- IV acted as control who did not participate in any strenuous physical exercises and specific training throughout the training period.

Analysis of the Data

The collected data were analyzed statistically through analysis of covariance (ANCOVA) to fund out the significant difference, if any among the groups. Whenever the obtained “F” ratio was found to be significant, the scheffe’s test was applied as post hoc test to find out the paired mean difference, if any. The 0.5 level of confidence was fixed to test the level of significance which was considered as an appropriate.

RESULTS

Table - 1
Computation of Analysis of Covariance on Arm Strength

| Test | HIWTG-1 | LIWTG-2 | MIWTG-3 | CG - 4 | Sum of variance | Sum of squares | Df | Mean square | F |
|-------------------------|---------|---------|---------|--------|-----------------|----------------|----|-------------|---------|
| Pre test | 23.72 | 23.53 | 23.07 | 23.53 | B | 5.73 | 3 | 1.91 | 2.01 |
| | | | | | W | 53.60 | 56 | 0.95 | |
| Post test | 35.13 | 29.80 | 24.87 | 23.13 | B | 1311.13 | 3 | 437.04 | 224.12* |
| | | | | | W | 109.60 | 56 | 1.95 | |
| Adjusted post test mean | 34.79 | 29.63 | 25.10 | 23.42 | B | 1060.37 | 3 | 353.46 | 280.51* |
| | | | | | W | 69.66 | 55 | 1.26 | |

(The table values required for significance at .05 level of confidence for 3 and 56 and 3 and 55 are 2.776 and 2.78 respectively).

The table - I shows that the pre-test mean values on arm strength of high intensity weight training, medium intensity weight training, low intensity weight training and control groups are 23.73, 23.53, 23.07 and 23.53 respectively. The obtained 'F' ratio of 2.01 for pre-test scores is less than the table value of 2.776 for df 3 and 56 required for significance at .05 level of confidence on arm strength. The post-test mean values on arm strength of high intensity weight training, medium intensity weight training, low intensity weight training and control groups are 35.13, 29.80, 24.87 and 23.13 respectively. The obtained "F" ratio of 224.12 for post-test scores is more than the table value of 2.776 for df 3 and 56 required for significance at .05 level of confidence on arm strength.

The adjusted post-test means high intensity weight training, medium intensity

weight training, low intensity weight training and control groups on arm strength are 34.79, 29.63, 25.10 and 23.42 respectively. The obtained "F" ratio of 280.51 for adjusted post-test means is greater than the table value of 2.78 for df 3 and 55 required for significance at .05 level of confidence on arm strength.

The results of the study indicated that there was a significant difference between the adjusted post-test means of high intensity weight training, medium intensity weight training, low intensity weight training and control groups on arm strength. Since, four groups were compared, whenever the obtained 'F' ratio for adjusted post test was found to be significant, the Scheffe's test to find out the paired mean differences and it was presented in table-2.

Table - 2
Scheffe'S Paired Mean Test Scores on Arm Strength

| High Intensity Weight Training Group | Medium Intensity Weight Training Group | Low Intensity Weight Training Group | Control Group | Mean Differences | Confidence Interval Value |
|--------------------------------------|--|-------------------------------------|---------------|------------------|---------------------------|
| 34.79 | 29.63 | - | - | 5.16* | 1.19 |
| 34.79 | - | 25.10 | - | 9.69* | 1.19 |
| 34.79 | - | - | 23.42 | 11.37* | 1.19 |
| - | 29.63 | 25.10 | - | 4.53* | 1.19 |
| - | 29.63 | - | 23.42 | 6.21* | 1.19 |
| - | - | 25.10 | 23.42 | 1.68* | 1.19 |

* Significant at .05 level of confidence.

The table-II shows that the mean difference values between high intensity weight training group and medium intensity weight training group, high intensity weight training group and low intensity weight training group, high intensity weight training group and control group, medium intensity weight training group and low intensity weight training group, medium intensity weight training group and control group and low intensity weight training group and control group on arm strength 5.16, 9.69, 11.37, 4.53, 6.21 and 1.68 respectively which were greater than the required confidence

interval value 1.19 for significance at .05 level of confidence.

The results of this study showed that there was a significant difference between high intensity weight training group and medium intensity weight training group, high intensity weight training group and low intensity weight training group, high intensity weight training group and control group, medium intensity weight training group and low intensity weight training group, medium intensity weight training group and control group and low intensity weight training group and control group on arm strength.

Table - 3

Computation of Analysis of Covariance on Leg Strength

| Test | HIWTG-1 | LIWTG-2 | MIWTG-3 | CG - 4 | Sum of variance | Sum of squares | Df | Mean square | F |
|-------------------------|---------|---------|---------|--------|-----------------|----------------|----|-------------|---------|
| Pre test | 92.80 | 92.87 | 93.27 | 92.87 | B | 1.92 | 3 | 0.64 | 0.96 |
| | | | | | W | 37.07 | 56 | 0.66 | |
| Post test | 97.33 | 95.07 | 94.33 | 93.13 | B | 140.60 | 3 | 46.86 | 74.38* |
| | | | | | W | 35.33 | 56 | 0.63 | |
| Adjusted post test mean | 97.49 | 95.16 | 94.10 | 93.12 | B | 154.92 | 3 | 51.64 | 303.76* |
| | | | | | W | 9.74 | 55 | 0.17 | |

(The table values required for significance at .05 level of confidence for 3 and 56 and 3 and 55 are 2.776 and 2.78 respectively).

The table-III shows that the pre-test mean values on leg strength of high intensity weight training, medium intensity weight training, low intensity weight training and control groups are 92.80, 92.87, 93.27 and 92.87 respectively. The obtained 'F' ratio of 0.96 for pre-test scores is less than the table value of 2.776 for df 3 and 56 required for significance at .05 level of confidence on leg strength. The post-test mean values on leg strength of high intensity weight training, medium intensity weight training, low intensity weight training and control groups are 97.33, 95.07, 94.33 and 93.13 respectively. The obtained "F" ratio of 74.38 for post-test scores is more than the table value of 2.776 for df 3 and 56 required for significance at .05 level of confidence on leg strength. The adjusted post-test means high intensity weight training group, medium intensity weight training group, low

intensity weight training group and control group on leg strength are 97.49, 95.16, 94.10 and 93.12 respectively. The obtained "F" ratio of 303.76 for adjusted post-test means is greater than the table value of 2.78 for df 3 and 55 required for significance at .05 level of confidence on leg strength. The results of the study indicated that there was a significant difference between the adjusted post-test means of high intensity weight training, medium intensity weight training, low intensity weight training and control groups on leg strength.

Since, four groups were compared, whenever the obtained 'F' ratio for adjusted post test was found to be significant, the Scheffe's test to find out the paired mean differences and it was presented in Table - VI.

Table – 4

Scheffe’S Paired Mean Test Scores on Leg Strength

| High Intensity Weight Training Group | Medium Intensity Weight Training Group | Low Intensity Weight Training Group | Control Group | Mean Differences | Confidence Interval Value |
|--------------------------------------|--|-------------------------------------|---------------|------------------|---------------------------|
| 97.49 | 95.16 | - | - | 2.33* | 0.44 |
| 97.49 | - | 94.10 | - | 3.39* | 0.44 |
| 97.49 | - | - | 93.12 | 4.37* | 0.44 |
| - | 95.16 | 94.10 | - | 1.06* | 0.44 |
| - | 95.16 | - | 93.12 | 2.04* | 0.44 |
| - | - | 94.10 | 93.12 | 0.98* | 0.44 |

Significant at .05 level of confidence.

The table - VI shows that the mean difference values between high intensity weight training group and medium intensity weight training group, high intensity weight training group and low intensity weight training group, high intensity weight training group and control group, medium intensity weight training group and low intensity weight training group, medium intensity weight training group and control group and low intensity weight training group and control group on leg strength 2.33, 3.39, 4.37, 1.06, 2.04 and 0.98 respectively which were greater than the required confidence

interval value 0.44 for significance at .05 level of confidence.

The results of this study showed that there was a significant difference between high intensity weight training group and medium intensity weight training group, high intensity weight training group and low intensity weight training group, high intensity weight training group and control group, medium intensity weight training group and low intensity weight training group, medium intensity weight training group and control group and low intensity weight training group and control group on leg strength.

Table - 5

Computation of Analysis of Covariance on Back Strength

| Test | HIWTG-1 | LIWTG-2 | MIWTG-3 | CG - 4 | Sum of variance | Sum of squares | Df | Mean square | F |
|-------------------------|---------|---------|---------|--------|-----------------|----------------|----|-------------|---------|
| Pre test | 92.93 | 92.87 | 92.93 | 92.87 | B | 0.32 | 3 | 0.01 | 0.18 |
| | | | | | W | 30.53 | 56 | 0.54 | |
| Post test | 96.47 | 94.93 | 94.00 | 93.27 | B | 85.73 | 3 | 28.57 | 58.30* |
| | | | | | W | 27.60 | 56 | 0.49 | |
| Adjusted post test mean | 96.48 | 95.00 | 94.01 | 93.17 | B | 90.41 | 3 | 30.13 | 188.31* |
| | | | | | W | 8.63 | 55 | 0.15 | |

(The table values required for significance at .05 level of confidence for 3 and 56 and 3 and 55 are 2.776 and 2.78 respectively).

The table - V shows that the pre-test mean values on back strength of high intensity weight training, medium intensity weight training, low intensity weight training and control groups are 92.93, 92.87, 92.93 and 92.87 respectively. The obtained ‘F’ ratio of 0.18 for pre-test scores is less than the table value of 2.776 for df 3 and 56 required for significance at .05 level of confidence on back strength. The post-test mean values on back strength of high intensity weight training, medium intensity weight training, low intensity weight training and control groups are 96.47, 94.93, 94.00 and 93.27 respectively. The obtained “F” ratio of 58.30 for post-test scores is more than the table value of 2.776 for df 3 and 56 required for significance at .05 level of confidence on back strength. The adjusted post-test means high intensity weight training,

medium intensity weight training, low intensity weight training and control groups on back strength are 96.48, 95.00, 94.01 and 93.17 respectively. The obtained “F” ratio of 188.31 for adjusted post-test means is greater than the table value of 2.78 for df 3 and 55 required for significance at .05 level of confidence on back strength. The results of the study indicated that there was a significant difference between the adjusted post-test means of high intensity weight training, medium intensity weight training, low intensity weight training and control groups on back strength. Since, four groups were compared, whenever the obtained ‘F’ ratio for adjusted post test was found to be significant, the Scheffe’s test to find out the paired mean differences and it was presented in Table- VI.

Table- 6

Scheffe’S Paired Mean Test Scores on Back Strength

| High Intensity Weight Training Group | Medium Intensity Weight Training Group | Low Intensity Weight Training Group | Control Group | Mean Differences | Confidence Interval Value |
|---|---|--|----------------------|-------------------------|----------------------------------|
| 96.48 | 95.00 | - | - | 1.48* | 0.42 |
| 96.48 | - | 94.01 | - | 2.47* | 0.42 |
| 96.48 | - | - | 93.17 | 3.31* | 0.42 |
| - | 95.00 | 94.01 | - | 0.99* | 0.42 |
| - | 95.00 | - | 93.17 | 1.83* | 0.42 |
| - | - | 94.01 | 93.17 | 0.84* | 0.42 |

* Significant at .05 level of confidence.

The table - VI shows that the mean difference values between high intensity weight training group and medium intensity weight training group, high intensity weight training group and low intensity weight training group, high intensity weight training group and control group, medium intensity weight training group and low intensity weight training group, medium intensity weight training group and control group and low intensity weight training group and control group on back strength 1.48, 2.47, 3.31, 0.99, 1.83 and 0.84 respectively which were greater than the required confidence interval

value 0.42 for significance at .05 level of confidence. The results of this study showed that there was a significant difference between high intensity weight training group and medium intensity weight training group, high intensity weight training group and low intensity weight training group, high intensity weight training group and control group, medium intensity weight training group and low intensity weight training group, medium intensity weight training group and control group and low intensity weight training group and control group on back strength.

DISCUSSION ON FINDINGS

The results of the study showed that there was a significant difference among high intensity weight training, medium intensity weight training, low intensity weight training and control groups on selected strength parameters such as arm strength, leg strength and back strength. The benefits of strength training include increased muscle, tendon and ligament strength, bone density, flexibility, tone, metabolic rate and postural support. The results of the study further showed that there was a significant difference between high intensity weight training group and medium intensity weight training group, high intensity weight training group and low intensity weight training group, high intensity weight training group and control group, medium intensity weight training group and low intensity weight training group, medium intensity weight training group and control group and low intensity weight training group and control group on selected strength parameters namely arm strength, leg strength and back strength. And also it was found that there was significant improvement on selected strength parameters namely arm strength, leg strength and back strength. The present study was supported by **Millet** and **Jung** found the improvement on strength parameters due to strength training. **Avery D. Faigenbaum** stated heavy and low loads of resistance training programme have developed strength parameters.

CONCLUSION

1. There was a significant difference among high intensity weight training, medium intensity weight training, low intensity weight training and control groups on selected strength parameters such as arm strength, leg strength and back strength.
2. There was a significant difference between high intensity weight training group and medium intensity weight training group, high intensity weight training group and low intensity weight training group, high intensity weight training group and control group, medium intensity weight training group and low intensity weight training group, medium intensity weight training group and control group and low intensity weight training group and control group on selected strength parameters namely arm strength, leg strength and back strength.
3. And also it was found that there was a significant improvement on selected strength parameters namely arm strength, leg strength

and back strength due to high intensity weight training, medium intensity weight training and low intensity weight training.

REFERENCES

- Avery D. Faigenbaum., et.al. "*The Effects of Different Resistance Training Protocols on Muscular Strength and Endurance Development in Children*", Pediatrics, 104 :1, (July 1999).
- Azeem and A Al Ameer., "*Effect of weight training on sprinting performance, flexibility and strength*". *British Journal of Sports Medicine*, 2010.
- Bompa, Tudor O., *Periodization Training for Sports*. Illinois: The Human Kinetics Publishers, 1999.
- Clarke and Clarke, *Application of Measurement to Health and Physical Education*, Englewood Cliffs, New Jersey: The Prentice Hall Inc., 1976.
- Gene Hooks, *Weight Training in Athletics and Physical Education*. New Jersey : The Prentice Hall Inc., 1996.
- Hardayal Singh, *Science of Sports Training*. New Delhi: D.V.S. Publications, 1991.
- Jerry R. Thomas, Jack K. Nelson, *Research Methods in Physical Activity*, New Jersey: The Brown and Brown Publishers, 2001
- McBride JM, et.al. "*The effect of heavy- vs. light-load jump squats on the development of strength, power, and speed*". *Journal of Strength Conditioning*, (February 2002), 16:1.
- Thomas R. Baechle, *Essentials of Strength Training and Conditioning*. Champaign, Illinois The Human Kinetics Publishers, 1994.
- Tudor O. Bompa, *Periodization of Strength Training*. Champaign, Illinois: Human Kinetics Publishers, 1999.