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The Impact of Different Loading and Recovery Techniques on Maximum Strength Performance of Weightlifters During Off-Season

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Abstract
The purpose of the study was to find out the effect of different loading procedure on maximum strength performance of Weightlifters during off-season. The subjects were selected from institutions Christ College (Autonomous) Irinjalakuda, Mar Dionysius College, Pazhanji, Kerala and Thrissur weightlifting academy, Kerala. A total of thirty (N = 30) subjects were selected for the experimental purpose of this study and divided them equally in to three groups (n= 10) heavy loading group, moderate loading group and control group. The experimental group was selected from only the subjects those who had University performance within the last three years. Squat, Front press and Clean Dead performance were selected as the criterion variable (dependent) for this study. Heavy intensity exercises and Moderate intensity exercises were selected as the independent variables for this study. In heavy loading pattern the Weightlifters were undergone for 6 days heavy exercises. In moderate loading pattern the Weightlifters were undergone for 3 days heavy exercises and 3 days low intensity exercises. 1 RM test* was utilized for measuring the strength of selected players. In this study purposive random group design was utilized to determine the effect of heavy loading strengthening exercise and moderate loading strengthening exercise on maximum strength performance. Total duration of the training program was 3 months. The total duration of each training period was 120 minutes, including warm up, training and cooling down. There were three groups in this study named as heavy loading exercise group, moderate loading exercise group and control group. A pre-test was conducted at the beginning of the training programme. A mid-test was conducted at the end of the second month. A one week of active rest was given to the subjects before the administration of the final teat and it was conducted after the 4-month training programme. The control group hasn't taken part in any training programme. Analysis of co-variance ANACOVA was utilized to measure the difference between the heavy loading exercise group, moderate loading exercise group and control group. The finding of the study revealed that, comparatively the heavy loading exercise group and moderate loading exercise group were positively effective to the maximum strength performance of the selected players. These two groups scored more than the control group. The moderate loading exercise group had scored more than both heavy loading exercise group and control group in post-test scores.

Introduction

There are countless concepts of human strength and innumerable interpretations of its significance for will practically purposes no individual's total strength can be described completely. Strength is the ability of an organism or an individual to overcome or act against a resistance. In the ancient years humans were used many techniques to build strength and muscle mass for their military purposes. There are three types of strength namely maximum strength, explosive strength and strength endurance. Strength is an essential part of humans it can be used for different areas of their life. The different aspects of strength are using for sports activities, as part of the daily life and work. The intensive and repetitive movements with resistance can increase the strength and muscle mass in human body. The rate of increase in the strength depends up on several factors like Intensity, Volume, Sets, Nutrition, Heredity, Rest and Recovery... E.g.: Maximum strength is utilized powerlifting, Weightlifting… Strength endurance is useful for Wrestling, Judo, Climbing and explosive strength is useful for shot put, jumping... This study aims to find out the loading and recovery ratio for the maximum strength performance.

Selection of subjects:

The subjects were selected from institutions Christ College (Autonomous) Irinjalakuda, Mar Dionysius College, Pazhanji, Kerala and Thrissur Weightlifting Academy, Kerala. A total of thirty (N = 30) subjects were selected for the experimental purpose of this study and divided them equally in to three groups (n= 10) heavy loading group, moderate loading group and control group. The experimental group was selected from only the subjects those who had University performance within the last three years.

Selection of variables:

- Squat, Front Press and Clean Dead were selected as the criterion (dependent) variables for this study.
- Maximum strength training was selected as the independent variables for this study

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Selection of tests:
1 RM test* was utilized for measuring the posture of selected players.

Experimental design
In this study purposive random group design was utilized to determine the effect of different loading procedure on maximum strength performance of Weightlifters.

Administration of training program
In heavy loading pattern the powerlifters were undergone for 6-day heavy exercises. In moderate loading pattern the Weightlifters were undergone for 3-day heavy exercises and 3 days low intensity exercises. 1 RM test* was utilized for measuring the posture of selected players. In this study purposive random group design was utilized to determine the effect of heavy loading strengthening exercise and moderate loading strengthening exercise on maximum strength performance. Total duration of the training program was 3 months. The total duration of each training period was 120 minutes, including warm up, training and cooling down. There were three groups in this study named as heavy loading exercise group, moderate loading exercise group and control group. A pre-test was conducted at the beginning of the training programme. A mid-test was conducted at the middle of the second month. A one week of active rest was given to the subjects before the administration of the final and mid tests and it was conducted after the 3 month training programme.

Training exercises for experimental group

Table No: 1

Squat Day Training Schedule	Bench Press Day Training Schedule	Dead Day Training Schedule
Squat	Push Press	Clean Dead
Deep Squat	Front Press	Abs Crunches
Lunches	Dips	Stiff Leg Lift
Leg Extension	Dumbbell Lateral Fly's	Pull Ups
Leg Curls	Cable Push Down	Hip Thrust
Heal Raises	Dumbbell Kick Back	Shoulder Shrugs
Leg Raises		Biceps Curls

Monthly intensity setting chart for three months plan

Table No : 2

Sl.No.	Month	Intensities for HLEG*				Intensities for MLEG**			
		Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
1	I	90&80	95&85	85&75	99&90	90&30	95&35	85&30	99&35
2	II	90&80	Rest Mid Test	95&75	95&85	90&30	Rest Mid Test	95&30	90&35
3	III	90&80	95&85	85&75	Rest Post Test	90&30	95&35	85&30	Rest Post Test

*Heavy Loading Strengthening Exercise
**Moderate Loading Strengthening Exercise

The intensities mentioned in the above table were only for Squat, Front Press and Clean dead only. All other supporting exercises were performed with 60-70 of their 1 RM.

Weekly workout sessions chart

Table No: 3

Days	Sessions		
	Heavy Loading Strengthening Exercise	Moderate Loading strengthening Exercise	Control group
Sunday	No Treatment	No Treatment	No Treatment
Monday	Treatment	Treatment	No Treatment
Tuesday	Treatment	Treatment	No Treatment
Wednesday	Treatment	Treatment	No Treatment
Thursday	Treatment	Treatment	No Treatment
Friday	Treatment	Treatment	No Treatment
Saturday	Treatment	Treatment	No Treatment

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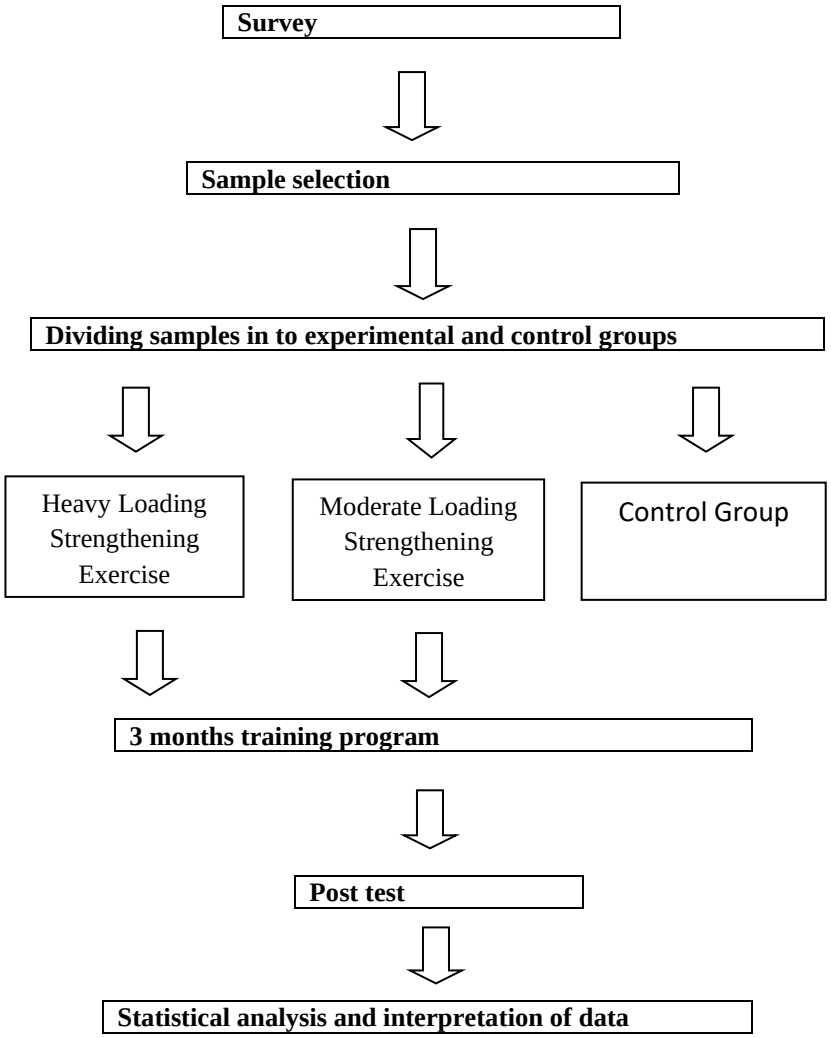
Flow chart



Statistical technique:
Analysis of co-variance ANACOVA was utilized to measure the difference between the elastic band exercise group, medicine ball exercise group and control group.

Analysis of Co-variance or ANACOVA of the performance of experimental groups and control group

Source	Sum of Squares	Df	Mean Square	F Ratio	Sig.
Between	33.10	2	16.30	15.20*	0.000
Within	24.70	27	1.25		
Total	57.80	29			

*$F_{.05}(3.35)$
To measure the variance between the experimental groups and control group the statistical technique employed was ANACOVA. The table value obtained indicates that there is a significant difference between the experimental groups and control group. The level of significance established at 0.05. Hence it is recommended to compute the paired mean difference of the group by using schefie's post hoc analysis.

Table 4
Schefie's post hoc analysis or Adjusted mean difference scores

E B G	M B G	C G	MD	Sig. (0.05 level)
54.55	53.65		1.05*	0.030
54.55		52.80	2.50*	0.000
	53.65	52.80	1.50*	0.003

*Significant at .05 level of confidence

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RESULT AND CONCLUSION

Under the conditions and the limitations of the present investigation the following conclusions were drawn.

1. The Moderate Loading Exercise Group and Heavy Loading Exercise Group have shown effective changes in the maximum strength capacity.
2. Comparatively, Moderate Loading Exercise Group had good performance than the Heavy Loading Exercise Group and Control Group.

RECOMMENDATIONS

Based on the findings of the study following recommendations are made;-

1. Similar study may be conducted for different levels of Weightlifters.
2. Similar study may be conducted on different sports events.
3. Similar study may be conducted for both sexes separately.
4. Similar study may be conducted by giving different supporting exercises and intensities.

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