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Effect of sub-maximal and maximal barbell weight training on selected physical parameters and squat performance of power lifters

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Abstract

The purpose of this study was to investigate the effect of sub-maximal and maximal barbell weight training on physical parameters and squat performance of power lifters. The study was conducted on sixty girls who were studying in St. Mary's Girls High School Athirampuzha, Kottayam, Kerala, India. Their age ranged from 11 to 15 years. They were randomly divided into three equal groups. Group I concentrated sub-maximal barbell weight training Group II underwent maximal weight training and Group III acted as control group. The duration of training programme restricted to twelve weeks. The data collected from the experimental groups were statistically examined using Analysis of Covariance (ANCOVA).

Keywords: Physical parameters, power lifters, barbell weight, squat performance

Introduction

Power lifting is a strength sport, consisting of three events: the squat, the bench press, and the dead lift. Power lifting requires specialized training techniques that are focused on strength and explosive power. Traditional training methods dictated low repetitions with maximal weight. These practices are still true today.

A well-known training method is known as the Westside barbell method developed by Louie Simmons, or the high volume routines developed by Boris Sheiko. Other approaches to power lifting training include Metal Militia style training for bench press, Mike Tuscherers RPE-based training, and the classical progressive overload approach.

However the training methods after effects are remaining unclear. Hence, the investigator was much interested to conduct a study to compare the effect of different intensity of barbell weight training, such as sub-maximal barbell weight training, maximal barbell weight training and control group on physical parameters and squat performance after twelve weeks of training period.

Methodology

The purpose of the study will be determining the effect of sub-maximal and maximal barbell weight training on physical parameters and squat performance of power lifters. To achieve this purpose, sixty girls students aged between 11 to 15 years studying at St. Mary's Girls High School Athirampuzha, Kottayam, Kerala, India were randomly selected as subjects. They were divided into three groups of twenty subjects each (n=20). The investigator specified the following training methods to the three Groups; Group I Sub-Maximal Barbell weight training (SMBW), Group II Maximal Barbell weight training (MBW) and Group III Control Group (CG), which did not participate in any special training programme.

Training Programme

During the training period, the experimental groups underwent their respective training programmes in addition to their regular routine. The duration of training sessions in all the days were between one hour to one and half hour approximately which include warm-up and warm-down.

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Table 1: Training schedule for group I (SMBW)

Periods	Requirement	Duration	Work Load	Set	Repetition	Rest Between Set
Conditioning	Endurance	2 Weeks	50 to 60 % of 1 Rep. Max.	4 to 6	15 to 30	2 Min.
Preparatory Period	Strength/Endurance	4 Weeks	70 to 80% of 1 Rep. Max.	4 to 6	10 to 15	3 Min.
Competition Period	Size/Strength	6 Weeks	80 to 90 % of 1 Rep. Max.	3 to 5	8 to 12	6 Min.

Table 1 A): Training schedule for group II (MBW)

Periods	Requirement	Duration	Work Load	Set	Repetition	Rest Between Set
Conditioning	Endurance	2 Weeks	60 to 70 % of 1 Rep. Max.	4 to 6	15 to 30	2 Min.
Preparatory Period	Strength/Endurance	4 Weeks	70 to 80% of 1 Rep. Max.	3 to 5	8 to 12	3 Min.
Competition Period	Size/Strength	6 Weeks	95 to 99 % of 1 Rep. Max.	2 to 3	4 to 6	6 Min.

Data Collection

The maximum amount of weight that can be lifted one time, generally referred to as one repetition maximum (1RM). Subject clear his maximum squat will be recorded as his 1RM. The Wilks Formula is used as the basis to determine the co-efficient of the lifter. To determine the Wilks Formula Total (WFT) of each lifter, multiply lifters co-efficient by his

1RM. Wilks formula total value is used for the data analysis.

Analysis of the data

The data were collected prior and immediately after the 12 week training programme. The collected data were analyzed statistically by using analysis of covariance (ANCOVA) and level of confidence, fixed to test the significance 0 .05 level.

Table 2: Adjusted post-test mean on explosive power, shoulder strength, abdominal strength and squat of experimental groups and control group

Variable	Group I SMBW	Group II MBW	Control Group	SV	SS	df	MS	F- ratio
Explosive Power	62.7	60.76	59.97	B: W:	43.39 40.69	2 56	21.70.73	29.86*
Shoulder Strength	13.95	13.36	12.89	B: W:	11.32 25.61	2 56	5.66.46	12.38*
Abdominal Strength	59.69	58.72	58.29	B: W:	20.65 35	2 56	10.33.63	16.52*
Squat	87.76	91.65	75.95	B: W:	2667.11 1270.94	2 56	1133.5622.70	58.76*

*Significant at 0.05 level of confidence.

The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 56 is 3.16. The result of this study shows that there is a significant difference existing between experimental and control groups, since the obtained ‘F’ ratio on adjusted post-test means on explosive power, shoulder strength, Abdominal strength and

squat is greater than the required table value of 3.16 for given degrees of freedom at 0.05 level of confidence. Since, the adjusted post-test ‘F’ ratio value is found to be significant; Scheffe’s post hoc test was applied to find out the paired mean difference.

Table 2 A): Scheffe’s test for paired mean difference on explosive power, shoulder strength, abdominal strength and squat

Variables	Experimental Group I SMBW	Experimental Group II MBW	Control Group	Mean Difference
Explosive Power	62.07	60.76	59.97	1.31
Shoulder Strength	13.95	13.36	12.89	0.79
Abdominal Strength	59.69	58.72	58.29	0.59
Squat	87.76	91.65	75.95	1.06
				0.47
				0.97
				1.40
				0.43
				3.89
				11.81
				15.7

*Significant at 0.05 level of confidence.

Table II (A) shows that both the training groups are significantly contributing to the improvement on explosive power, shoulder strength, Abdominal strength and squat, however Sub-Maximal barbell weight training group has better impact on explosive power, shoulder strength, Abdominal strength than that Maximal barbell weight training group. And Maximal barbell weight training group has better impact on squat than that Sub-Maximal barbell weight training group.

barbell weight training group has better impact on explosive power, shoulder strength and abdominal strength than that Maximal barbell weight training group. And Maximal barbell weight training group has better impact on squat than that Sub-Maximal barbell weight training group. Hence it is suggested that the explosive power, shoulder strength and abdominal strength of power lifters adapted to a systematic training of Sub-Maximal barbell weight training and for the squat of power lifters adapted to a systematic training of Maximal barbell weight training.

Conclusion: It is concluded from the result of the study that the explosive power, shoulder strength, abdominal strength and squat can be developed by both Sub-maximal and Maximal barbell weight training; however Sub-Maximal

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