



A STUDY ON RELATIVE PERFORMANCE OF DIFFERENT CATEGORY POWERLIFTERS

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ABSTRACT

The purposes of the study were to find out the existing status of performance considering specific item, as a total performance and to compare them among the power lifters in different body weight categories. The study would be provided information to the coaches that which are the influential factors to promote gradually according to different body weight categories regarding performance enhancement. To conduct this study total 27 inter university and state level male power lifters, age ranging between 18 to 28 years were considered. All subjects were equally divided into three groups as light weight (66 kg.), middle weight (83 kg.) and heavy weight (105 kg.). The selected variables were Bench press, Squat, Dead lift performance. Standard processes were followed to measure said variables. Considering the different aspects of performances it may be concluded that the heavy weight lifters and the middle weight lifter were significantly better than the light weight lifters. The heavy weight category was not significantly better than the middle weight category except the squat performance

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INTRODUCTION

Powerlifting is a strength sport that consists of three attempts at maximal weight on three lifts: Squat, Bench press, and Dead lift had become one of the most popular disciplines in sports spectrum. Like different other disciplines, such as bodybuilding, strongman and Olympic weightlifting, powerlifting requires participants to engage extensively with resistance training to develop specific aspects of fitness. The training practices and subsequent phenotypes developed by powerlifters have been used infrequently as a model for researchers to investigate topics such as the joint loading capacity of the human body [6][9][12][13]. The results from powerlifting competitions have also been used to model the relationship between strength and body mass (Cleather 2006, Markovic and Sekulic 2006). As these results have consistently demonstrated strong positive relationships between competition performance and body mass, some researchers have suggested that powerlifting is a sport mainly concerned with inducing muscular hypertrophy [1][3].

Powerlifting originates from strength training and has a long past history since the Greek and Roman period. In the earlier stage the governing body of powerlifting in UK and USA had recognized various 'odd lifts' for competition and record

popularity. Powerlifting is a strength sport that consists of three attempts at maximal weight on three lifts: Squat, Bench Press, and Deadlift. As in the sport of Olympic weightlifting, it involves the athlete attempting a maximal weight single lift of a barbell loaded with weight plates. In powerlifting, lifters compete in various divisions based on age, body mass, and gender with the aim of lifting the greatest possible loads for one repetition (one-repetition maximum, 1-RM) in the squat, bench press, and deadlift exercises. The squat is performed with a loaded barbell on the shoulders and requires the lifter to flex the hip and knee joints until the superior surface of the thigh at the hip joint is lower than the knee joint. From this position, the knee and hip joints are extended so that the lifter is again standing upright. The bench press is performed with the lifter lying supine on a bench and involves the barbell being lowered to the chest (where it is paused momentarily) and then pressed upwards so that the bar finishes above the shoulders. When performing the deadlift, the lifter is initially crouched over the barbell, and via knee and hip extension the bar is pulled (with straight arms) off the ground so that the lifter is standing upright with the bar resting across the upper thighs. The current IPF (International Powerlifting Federation) world records reveal that male powerlifters in the lighter bodyweight (body mass) classes can lift over five times their body mass in the squat and deadlift and over three times their body mass in the bench press.

Relative performance evaluation (RPE) is an evaluation of an individual's performance that is based on the difference between an individual's measurable output and an aggregated

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amount of the same measurable output observed in a group of the individual's peers. The present study was concerned with the impact on relative performance characteristics among different weight category of power lifters. The objectives of the study were to find out the existing status of performance of the powerlifter in different body weight categories and to compare them. The study would provide information to the coaches that which are the influential factor to promote different body weight categories. The study can be provided detailed information regarding performance enhancement of different category of power lifter. Provide information about the influential performance variables to identify the potentials in different body weight category.

METHODOLOGY

To conduct this study total 27 inter university and state level male power lifters, age ranging between 18 to 28 years were considered. All subjects were equally divided into three groups as light weight (66 kg.), middle weight (83 kg.) and heavy weight (105 kg.). All the subjects were selected from "Balaksangha" and "Kalighatsuryosangha" at south Kolkata.

To conduct the study at first instruction was given to all the subjects. In the Gymnasium, they were given 30 minutes for general and specific warm up and then the Bench press, Squat, Deadlift performance were taken in a suitable and relevant multy Gym.

The performance variables were Bench press, Squat, Deadlift and the total of these

RESULTS AND DISCUSSION

The results are presented dimension wise in tabular form and descriptive form and discussion was made accordingly. Here for the sake of conveniences the present researchers considered the following denomination as:

Table no. 1 mean and S.D. of Bench Press Performance of different Body Weight Category

variables	category	N	Mean	Std. Deviation	Std. Error
Bench press (kg)	66kg	9	80.33	8.50	2.83
	83kg	9	93.44	12.15	4.05
	105kg	9	102.11	7.75	2.58
	Total	27	91.96	13.01	2.50

From table 1 it is clear that the mean and SD of bench press in 66kg body weight category was 80.33kg±8.50 kg. The mean and SD of bench press of 83kg body weight category was 93.44kg±12.15 kg and the mean and SD of bench press of 105kg body weight category was 102.11kg±7.75 kg. The findings of the presented study indicated that the mean bench press of the 105 kg body weight category is higher than the 66kg and 83kg group.

Table no. 2 ANOVA result of Bench Press Performance in different Body Weight Category

variables	Category	Sum of Squares	df	Mean Square	F	Sig.
Bench press (kg)	Between Groups	2163.852	2	1081.926	11.597	.000
	Within Groups	2239.111	24	93.296		
	Total	4402.963	26			

From table 2 can be said that there were significant differences among the mean scores of 66kg, 83kg, and 105kg body weight category groups in bench press performance, as

the calculated F value (11.597) is greater than tabulated F value 3.40 at 24 degree of freedom with 0.05 level of confidence.

Table no 3 the result of post hoc test

Variable	(I) category	(J) category	Mean Difference (I-J)	Std. Error	Sig.
Bench press (kg)	66kg	83kg	-13.11*	4.55	.008
		105kg	-21.78*	4.55	.000
	83kg	66kg	13.11*	4.55	.008
		105kg	-8.67	4.55	.069

*The mean difference is significant at the 0.05 level

Table 3 indicated that there was significant difference in bench press among 66 kg, 83 kg, and 105 kg body weight category power lifters. The bench press of 105 kg gr. was not significantly higher than the 83 kg group but significantly higher than 66kg also and this 83 kg group was significantly higher than the 66kg group.

Table no. 4 mean and S.D. of Squat Performance of different Body Weight Category

Variables	Category	N	Mean	Std. Deviation	Std. Error
Squat (Kg.)	66kg	9	122.11	16.25	4.54
	83kg	9	162.44	17.25	5.75
	105kg	9	186.33	29.06	9.69
	Total	27	156.96	34.09	6.56

From table 4 in case of squat it was shows that the mean and SD of squat in 66kg body weight category was 122.11 kg ± 16.25 kg. The mean and SD of squat of 83kg body weight category was 162.44 kg ± 17.25 kg and the mean and SD of squat of 105kg body weight category was 186.33 kg ± 29.07 kg. The findings of the presented study indicated that the mean squat of the 105 kg body weight category is higher than the 66kg and 83kg group.

Table no.5 ANOVA result of Squat Performance in different Body Weight Category

Variable	Group	Sum of Squares	df	Mean Square	F	Sig.
Squat (kg)	Between Groups	18965.852	2	9482.926	20.228	.000
	Within Groups	11251.111	24	468.796		
	Total	30216.963	26			

From table 5 can be said that there was significant difference among the means score of 66kg, 83kg, 105kg body weight category groups in total squat. Since the calculated F value (20.228) is greater than tabulated F value 3.40 which was required to be significant at 24 degree of freedom with 0.05 level of confidence.

Table no 6 the result of post hoc test

Variable	(I) category	(J) category	Mean Difference (I-J)	Std. Error	Sig.
Squat (kg)	66kg	83kg	-40.33*	10.21	.001
		105kg	-64.22*	10.21	.000
	83kg	66kg	40.33*	10.21	.001
		105kg	-23.89*	10.21	.028

*The mean difference is significant at the 0.05 level

Table 6 indicated that there were significant differences in squat performances among 66 kg, 83 kg, and 105 kg body weight category power lifters. The performance of 105 kg gr. was significantly higher than the 83 kg group and 66kg also

and this 83 kg group was significantly higher than the 66kg group.

Table no. 7 mean and S.D. of Dead Lift Performance of different Body Weight Category

variable	Category	N	Mean	Std. Deviation	Std. Error
Dead lift (kg)	66kg	9	141.67	12.23	4.08
	83kg	9	181.11	16.95	5.65
	105kg	9	197.11	25.05	8.36
	Total	27	173.30	29.86	5.74

From table 7 in case of dead lift it has shown that the mean and SD of dead lift in 66kg body weight category was 141.67 kg ± 12.23 kg. The mean and SD of dead lift of 83kg body weight category was 181.11 kg ± 16.95 kg and the mean and SD of dead lift of 105kg body weight category was 197.11 kg ± 25.05 kg. The findings of the presented study indicated that the mean dead lift of the 105 kg body weight category is higher than the 66kg and 83kg group.

Table no.8 ANOVA result of Dead Lift Performance in different Body Weight Category

variables	Category	Sum of Squares	df	Mean Square	F	Sig.
Dead lift (kg)	Between Groups	14657.852	2	7328.926	20.655	.000
	Within Groups	8515.778	24	354.824		
	Total	23173.630	26			

From table 8, it can be said that there were significant differences among the mean scores of 66kg, 83kg, and 105kg body weight category groups in dead lift, as the calculated F value (20.655) is greater than tabulated F value 3.40 at 24 degree of freedom with 0.05 level of confidence.

Table no. 9 the result of post hoc test

Variable	(I) category	(J) category	Mean Difference (I-J)	Std. Error	Sig.
Dead lift (kg)	66kg	83kg	-39.44*	8.88	.000
		105kg	-55.44*	8.88	.000
	83kg	66kg	39.44*	8.88	.000
		105kg	-16.00	8.88	.084

*The mean difference is significant at the 0.05 level

Table 9 indicated that there were significant differences in dead lift performances among 66 kg, 83 kg, and 105 kg body weight category power lifters. The performance of 105 kg gr. was not significantly higher than the 83 kg group but significantly higher than 66kg group and this 83 kg group was significantly higher than the 66kg group.

Table no. 10 mean and S.D. of total Performances of different Body Weight Category

Group	N	Mean	Std. Deviation	Std. Error
66kg	9	344.11	31.91	10.64
83kg	9	437.00	41.06	13.69
105kg	9	464.56	72.24	24.08
Total	27	415.22	72.07	13.87

From table 10 it has shown that the mean and SD of total performance in 66kg body weight category was 344.11 kg ± 31.91 kg. The mean and SD of total performance of 83kg body weight category was 437.00 kg ± 41.06 kg and the mean and SD of total performance of 105kg body weight category was 464.56 kg ± 72.24 kg. The findings of the presented study indicated that the mean total performance of the 105 kg body

weight category was higher than the 66kg and 83kg group, and

Table no.11 ANOVA result of Total Performance of different Body Weight Category

Group	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	71683.556	2	35841.778	13.572	.000
Within Groups	63381.111	24	2640.880		
Total	135064.667	26			

From table 11 can be said that there were significant differences among the mean scores of 66kg, 83kg, and 105kg body weight category groups in total performance, as the calculated F value (13.572) is greater than tabulated F value 3.40 at 24 degree of freedom with 0.05 level of confidence.

Table no. 12 the result of post hoc test

(I) category	(J) category	Mean Difference (I-J)	Std. Error	Sig.
66kg	83kg	-92.89*	24.22	.001
	105kg	-120.44*	24.22	.000
83kg	66kg	92.89*	24.22	.001
	105kg	-27.56	24.22	.267

*The mean difference is significant at the 0.05 level

From table 12 it was clear that there were significant differences about total performances among 66 kg, 83 kg, and 105 kg body weight category power lifters. The total performance of 105 kg gr. was not significantly higher than the 83 kg group but significantly higher than 66kg and this 83 kg group was significantly higher than the 66kg group.

In powerlifting the lifts used are the bench press, squat, and deadlift, and the distinction among body types is less apparent since the three lifts are not closely related biomechanically. Individuals with short arms and large chest circumferences may excel in the bench press while shorter individuals with a lower leg length: height ratio is considered better squat lifters. Individuals with longer arm lengths relative to leg lengths may have better deadlifting ability. [18]

In case of power lifting performance such as bench press, squat, deadlift and total performance there were significant differences among 66 kg, 83 kg and 105 kg group of power lifters. Generally, the relationships between structural dimensions and lift performance were comparable for the bench press and deadlift. Body mass was the only dimensional variable to account for more than 50% of the explained variance in strength, and then it was only for the bench press. Arm and chest circumferences were the next highest correlates with strength performance. All of the muscle circumference measurements and skeletal lengths were significantly interrelated. Because of the high correlation of body mass with each lift, its effect was removed by expressing the lift relative to body mass and by the partial correlation technique. Expressing bench press strength relative to body mass reduced the number of significant correlations with structural dimensions. Expressing deadlift strength relative to body mass reduced the number of significant correlation coefficients with structural dimensions. Many of these correlations become negative. When body mass was controlled by the partial correlation technique, only 5 correlations between structural dimensions and bench press performance remained significant, and only 6 were significant for deadlift. A forward inclusion, stepwise multiple regression analysis using the most representative anthropometric variables was used to predict strength performance for each lift. [18][21][23][24][25]

As per the results and discussion there is a clear indication about the gradual development of relative performances considering different weight category. The differences were significant between the 66kg and 83kg, and 66kg and 105kg group in all cases but except squat performance there were no significant differences between 83kg and 105kg category.

CONCLUSION

Considering the different aspects of performances it may be concluded that the heavy weight lifters and the middle weight lifter are significantly better than the light weight lifters. The heavy weight category was not significantly better than the middle weight category except the squat performance.

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