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Analysis of Muscles Electrical Activities During Bench Press

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Abstract - The primary objective of the study was to compare the muscle electrical activity during Bench press for the different muscle groups.The amount of contribution of each mentioned muscle during bench press was alsoanalyzed.

For the purpose of the present investigation, totalof 10 male powerlifterswere chosen as the sample for the study.
The analysis showed that there is a significant difference in the muscle electrical activity during Bench press for the different muscle groups. The results pertaining to EMG data of 1RM bench press revealedmaximum muscle electrical activity in case of Pectoralis Major. Hence the Pectoralis Major displayed bettermuscle electrical activity than the Anterior deltoid and Triceps.

Keywords: EMG, Bench Press

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INTRODUCTION

The primary objective of the study was to see the muscle electrical activity of the different muscle groups while performingthe Bench press.In addition to this, the amount of contribution of each mentioned muscle during bench presswas alsoanalyzed.

Ten male subjects who have participated in the All India Intervarsity competitionwere selectedfor the purpose of this study.. Their age was between 18-25 years. The muscles included in the study were

- Pactoralis major
- Anterior Deltoid
- Triceps

PROCEDURE

Before the test could begin the scholar explained the aim and objectives of the present study undertaken. The doubts if anywere clarified. Finally, before the actual testing could begin an informed consent was signed by all the subjects.

For the purpose of the study, the athletes were tested for bioelectric activity and muscle activation time in Free EMG BTS system. It was recorded in the measurement system contains the following parts: analogy and digital form and transmitted to microprocessor circuit. The program allows you to synchronize data sampling measurement digital filtering and initial implementation for transferring data to computer. The digital signal representing the measured EMG activity is sent to computer.

Name of the test: One repetition maximum (RM) Bench Press

Purpose of the test: To measure the muscles electrical activity during bench press.

For the collection of data, the subjects were asked to do warm up for the prevention of any injuries during the test. Firstly, the scholar had demonstrated the full skill to the subjects. After the demonstration of the skill by the scholar, the first subject was called and the electrodes were placed on the respective places (Pactoralis major, Anterior Deltoid,Ttriceps). Then the barbell was loaded according to the subject's maximum strength capacity. The subject was asked to take position on the bench and hold the barbell only, two assistants were on the side of the bench for safety purpose. The assistant lifted the loaded barbell and place it on the subject hand until and unless the scholar gave the press command. On the command press of the scholar the subject was allowed to press the loaded barbell and place it back on initial position. The data of the muscles contraction of the respective muscles were detected by the EMG machine and displayed on the software installed in the Laptop. The same procedure had followed for the remaining subjects for the collection of data.

The objective of the study was toanalyze the muscles electrical activities during bench press, ANOVA was being used. For the analysis of the data SPSS-21.0 software was used.

FINDINGS AND DISCUSSION

- The statistical analysis of the data was collected on tenpowerliftersand the results of the study have been presented. Descriptive statistic test and one way ANOVA were used to analyse the results.

Table 1: Descriptive Statistics of Different Muscles Groups

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Pectoralis	10	37.9826	6.79813	2.14976	31.05	51.57
Triceps	10	29.1884	6.03188	1.90745	21.42	36.87
Anterior deltoid	10	33.9038	7.98464	2.52496	21.37	48.56
Total	30	33.6916	7.66663	1.39973	21.37	51.57
Model Fixed Effects			6.98457	1.27520		
Model Random Effects				2.54089		

pectoralis major 37.9826±6.79813, triceps 29.1884±6.03188, anterior deltoid 33.9038±7.98464.

In the same categories, the minimum and maximum values for different muscles group were: pectoralis major (31.05;51.57), triceps (21.42;36.87), anterior deltoid (21.37;48.56).

Table 2: Comparison of Muscle Groups Using One Way ANOVA

LINT(EMG)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	387.367	2	193.684	3.970	**.031**
Within Groups	1317.174	27	48.784		
Total	1704.541	29			

Less than 0.05 hence significant difference exist.
P=0.031

In the above-mentioned ANOVA table comparison of muscles activation between 3 muscles involves in bench press was done. The F (2,27) = 3.970 with a significant p value, p = 0.031 (p<0,05) hence it can be stated there exist a significant difference in muscle activation level or electrical activity in between pectoralis, triceps andanteror deltoid during bench press.

To find out the significant muscle activation in bench press and for multiple comparison Post Hoc test Least Significant Difference was applied between 3 muscle group.

Table 3: Multiple Comparisons

Dependent Variable: LINT(EMG)

(I) muscles		(J) muscles	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
LSD	PEC	triceps	8.79422*	3.12359	**.009**	2.3851	15.2033
		deltoid	4.07879	3.12359	.203	-2.3303	10.4879
	TRICEPS	pectoralis	-8.79422*	3.12359	**.009**	-15.2033	-2.3851
		deltoid	-4.71543	3.12359	.143	-11.1245	1.6937
	DELTOID	pectoralis	-4.07879	3.12359	.203	-10.4879	2.3303
		triceps	4.71543	3.12359	.143	-1.6937	11.1245

From the above table it can be stated there exists a significant difference between pectoralis and triceps with p = 0.009 which is less than 0.05. Further comparison of pectoralis and deltoid reveals no significant difference with p = 0.203 (p>0.05), hence no significant difference in muscle activity betweenpectoralis and deltoid was found. Comparisonbetween deltoid and triceps was found insignificant, p = 0.143 which is above the significant value of 0.05.

Further studying the data collected from the sample following discussions were made:

The results of the study showed that there exist a significant difference inmuscle electrical activity ofthe chosenmuscle group.

The group statistics also revealed that the mean for Pectoralis major was greater than the triceps and anterior deltoid. Findings byChris Barnett,(2016)Arthue A. Trebs, (2010)Juan Carlos Santana, (2007), ZhongquiJi, (2016) support the findings of the present study.

In light of the above findings, null hypothesis was rejected.

CONCLUSIONS

The overall results of this study showed that, that there was a significant difference inmuscle electrical activity among different muscles group. The maximum significance was seen in the pectoralis major thanin the other two muscles.

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