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Effect of restricted blood flow on muscle hypotrophy & O^2 saturation level on weight training

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Abstract
The main purpose of the study was to find out the effect of the restricted blood flow on muscle hypotrophy and O^2 saturation level. Ten people from bharati vidyapeeth gym were selected randomly, age 23 to 26 years. For the purpose of establishing reliability of the data subject was asked to perform bicep curl of 4 sets 1st set 30 rep 2nd 3rd & 4th 15 rep each with 30sec rest in between sets. Second test (without occlusion) training was conducted after one week, proper rest was given to the working muscle (bicep).The test of left and right bicep was measured pre and post exercise (with and without) thera-band. O^2 saturation level was measured using pulse Oximeter pre and post exercise (with and without) thera-band. The average measurement of the various test conducted were as following left biceps pre workout ± 14.52, with occlusion training ± 14.91 and without occlusion training ± 14.67. The average measurement of right bicep pre workout ±14.68, with occlusion training ±15.02 and without occlusion training ±14.81. SpO^2 pre workout ±97%, occlusion training ±97%, and without occlusion training ±96%.The result was formulate using one way ANOVAs. The result revealed that there was a significant difference between the three variables of the SpO^2 F > Fcrit (F= 8.42 F crit = 3.35).While there was no significant difference found among the variables of left and right biceps. It was seen that restriction of blood flow caused increase in blood flow on the concentrated muscle group.

Keywords: Bicep curl, Occlusion training, Pulse Oximeter

Introduction
The American College of Sports Medicine recommends lifting a resistance of at least 65% of one's 1 repetition maximum (1RM) for 6–12 repetitions to achieve muscle hypertrophy under normal conditions. It is believed that anything below this intensity rarely produces substantial muscle hypertrophy or strength gains. Occlusion training can provide a unique beneficial mode of exercise in the clinical setting because it produces positive training adaptations, at the equivalent to physical activity of daily life (10–30% of maximal work capacity). Muscle hypertrophy has recently been shown to occur during exercise as low as 20% of 1RM with a moderate vascular occlusion. Low intensity occlusion training has also been shown to be quite beneficial to athletes, patients in postoperative rehabilitation specifically anterior cruciate ligament (ACL) injuries, cardiac rehabilitation patients, and the elderly. Some research indicates that occlusion training might also be beneficial for astronauts in space. Low-intensity occlusion training can benefit many in and out of the clinical setting. Occlusion training can be used by athletes to give them a break from all the stress associated with high-intensity resistance training. It could be an effective stimulus to use during an unloading phase for athletes because it results in a positive training adaptation, although causing little to no muscle damage. Many people are unable to withstand the high mechanical stress placed upon the joints during heavy resistance training, namely, the elderly. Low-intensity resistance training with occlusion may help decrease the risk of sarcopenia by allowing the elderly to train their musculoskeletal system while keeping the overall intensity very low.

Methodology
10 people from age group of 23-26 were selected from Bharati Vidyapeeth Gym. The test was conducted of bicep curl exercise of 4 sets 1st set 30 rep 2nd 3rd & 4th 15 rep each with 30sec rest in between sets. Second test (without occlusion) training was conducted after one week; proper

rest was given to the working muscle (bicep). O^2 saturation level was measured using pulse Oximeter pre and post exercise (with and without) thera-band. For the data analysis ANOVAs test was used as statistical tool. The level of significance was 0.05. The data was analyzed by using one way ANOVAs statistics.

Methods of measurement of Variable

For the purpose of establishment reliability of the data the tests held-bicep curl exercise of 4 sets 1st set 30 rep 2nd 3rd & 4th 15 rep each with 30sec rest in between sets. Second test (without occlusion) training was conducted after one week, proper rest was given to the working muscle (bicep)

Data Analysis

Table 1: Comparison of Spo^2 Pre and Post (with and without) occlusion training

Anova						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Between Groups	0.00098	2	0.00049	8.426752	0.001433	3.354131
Within Groups	0.00157	27	5.81481E-05			
Total	0.00255	29				

Table 2: Comparison of left bicep Pre and Post (with and without) occlusion training

ANOVA						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Between Groups	0.774	2	0.387	0.256568	0.775567	3.354131
Within Groups	40.726	27	1.50837			
Total	41.5	29				

*Significant F<F crit

Table 3: Comparison of Right bicep Pre and Post (with and without) occlusion training.

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.588666667	2	0.294333333	0.200677	0.819386	3.354131
Within Groups	39.601	27	1.466703704			
Total	40.18966667	29				

*Significant F<F crit

Discussion and Conclusion

Many researchers have clamed that the effect of restricted blood flow on muscle hypotrophy & O^2 will have an adverse effect on the increse in size and strength of the trained muscle group, similar to the regular weight training with 60 to 70% or one RM of 8 to 12 rep range. Even further claiming that occlusion training helps injured athlete during there rehabilitation phrase. Hence the experiment was conducted on one group of 10 subjects. Three variables thst was measured, SpO^2 and bicep size left and right.

On the basis of the analysis of all the data collected and during the study the following conclusion are drawn:

- There was slight difference found between the variables of the SpO^2, increase in the flow of the blood in the concentrated muscle group.
- There was no such significant difference found in the hypotrophy of the working muscle group.
- To find an adverse and drastic difference in the variables the test should be conducted for longer duration of time.

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