

# COMPARISON OF BATTLE ROPE EXERCISE AND UPPER BODY PLYOMETRICS ON UPPER BODY POWER

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## Abstract

*Upper body power holds significant influence on performances of various sports. The battling rope exercises achieved the highest peak and mean VO<sub>2</sub>, highest energy expenditure and highest exercise heart rate when compared to the other exercises<sup>8</sup>. Plyometric exercise has evidence of improvement in isokinetic shoulder power, throwing velocity, serve velocity in hand ball and tennis players<sup>7</sup>. These exercises can have a great impact in athletics and power gaining fitness programs which can help people get a better result in their performance. Though we have various implements to gain upper body power, still it remains as a question, which one is better on improving the upper body power and hence new tools like battle rope exercise and upper body Plyometrics is yet to be explored further. Objective: To evaluate the effectiveness of battle rope exercise and upper body Plyometrics in upper body power with help of medicine ball explosive power test. Procedure: An Experimental study was conducted on 30 subjects with 15 in Battle Rope (BR) BR Group and 15 in Upper Body Plyometrics (UBP) BR Group all were subjected to medicine ball explosive power test at the end of 4 weeks. Statistical Analysis: Mean and Standard deviation are calculated. Paired t-test and Unpaired t-test is used for testing statistical significance. Result: From the statistical analysis, both groups showed extremely satisfied statistical significance between their pre and post-exercise values ( $p < 0.0001$ ). Also, there is a significant difference in post-exercise values of both groups ( $p < 0.01$ ) which denotes that BR group values are higher than the UBP group values. Conclusion: Thus, the study concludes that the Battle Rope Exercise is more effective in improving the upper body power than the Upper Body Plyometrics.*

**Keywords:** Upper body Power, Battle rope, Core Muscles, Plyometrics.

## 1. INTRODUCTION

Upper body power has several components namely shoulder complex, elbow complex, wrist complex and whole thorax region. Increasing the power of these components will enhance the whole upper body power. Battling Ropes or undulation training is a relatively new modality within dynamic specific action training. Rope training typically consists of creating waves with rope, which is looped around a fixed object. The rope is then vigorously undulated in a series of waves for a set interval, usually ranging from 10 to 30 seconds. Rope undulation options are truly limitless as the upper body may move with a fixed lower body. Proponents of rope training highlight this challenging low-impact upper-body exercise as an intense metabolic workout that will result in improvements ranging from improved body composition to increases in aerobic and anaerobic capacity and overall grip, shoulder, core and total body conditioning[15]. Upper-body complex training has not received substantial attention compared with lower body complex training. Moreover, results for the upper body seem more equivocal and less favorable than results for the lower body. Plyometrics is an exercise that enables a muscle to reach maximum strength in as short a time as possible [2]. Implements such as weighted balls, basketballs, elastic bands can be used for various catch or throw drill exercises such as power drops, backward throws, overhead throws, pullover passes and side throws can increase the upper body power. Plyometrics may be incorporated as an integral component of an exercise program that can produce good outcomes [7]. Thus, the purpose of this study is to find whether battle rope exercise or upper body plyometrics is more effective in upper body power.

## 2. METHODS

A total of 30 male aged between 18 and 25 collegiate level athletes were selected and randomly assigned into two groups. Participants with acute pain on any joint, existing cervical or lumbar radiculopathy and who are already into structured training were excluded from the study

## 3. PROCEDURE

**Data collection procedure:** A total of 30 people were selected from the above-mentioned study setting based on the inclusion and exclusion criteria after a clear explanation about the study with the inform consent. They are then subjected to medicine ball explosive power test to determine their upper body power. 30 people are then equally divided in to BR and UBP with random sampling method. BR group was trained with battle rope exercise and UBP group was trained with Upper Body Plyometric exercise for a period of 4 weeks. At the end of 4<sup>th</sup> week both the BR Group re examined for the change in their upper body power. **Outcome measure procedure:** Medicine Ball Explosive Power Test, participants Start with both the knees behind the marked line and bring the ball to the chest with the both hands, perform a slight hip hinge and then toss the ball from the chest as far as possible, after the ball is released its allowed to fall across the lines or touch any body part across the start line. The measurement was taken at the beginning of 1<sup>st</sup> week and at the end of 4<sup>th</sup> week.

**Battle Ropes Group:** All participants used a nylon rope 11.5-m long, weighing 16.33 kgs, and 4.00 cm in diameter. The rope was anchored at the base of a post, making the participant hold 5.75 m of rope in each hand. Subjects performed in an athletic position, feet shoulder width apart, with the trunk flexed forward to approximately 30–45° angle. Training parameter were three sets of 30-second bouts with 2-minute rest intervals. Each of the sets is divided into three: 1. 10-second bouts of single-arm alternating waves, 2. 10 seconds of double-arm waves with a one-half squat and 3. 10 seconds of double-arm slams with a half squat. **Upper body Plyometric Group: 1. Push Press:** A rapid bending of the hips, knees, and ankles creates a strong eccentric loading of the lower and upper body musculature which elicits the myotatic reflex. The motion is then halted, quickly stretching the connective tissues thus storing elastic energy. Finally, the weight is driven overhead with the aid of these reactions. **2. Rotational Slams against a Wall:** An example of a multi-planer exercise, Participant stood before trampoline which was positioned at 45° inclined against wall. Medicine ball was thrown onto trampoline, rotational slams started with a quick backward rotation of the torso. Then an explosive unwinding hurls the ball forward to the trampoline. Catch the ball on the fly and repeat. **3. Medicine Ball Slams (can progress to One Arm Slams):** The quick raising of the ball overhead and explosive slamming of the ball to the floor, can progress from using two hands to using just one. **Outcome Measure:** A medicine ball of 1 Kg was given to the subject and the test was started with both the knees behind the marked line. The subjects were then asked to bring the ball to the chest with the both hands, perform a slight hip hinge and then toss the ball from the chest as far as possible, after the ball is released its allowed to fall across the lines or touch any body parts. The distance between the marked line and the point of contact of the ball thrown is measured. The measurement is taken in meters. The procedure is repeated for 3 times and the highest value is taken as the subject's upper body power. **Statistical Analysis:** The pre-exercise and post-exercise values of both the group were collected using the medicine ball explosive power test. The collected data was tabulated and analyzed using descriptive & inferential statistics. To all parameters mean and standard deviation (SD) was used. Paired t-test was used to analyze significant changes between pre-test and post-test measurements. Unpaired t-test was used to analyze significant changes between post-test measurements of both groups. P value <0.01 was assigned as statistically significant for both the tests. The table 1 mean values had standard error of difference 0.092 and the t value calculated by the paired t-test gave a P value <0.0001 which is less than assigned P value (<0.01). Hence, by conventional criteria, this difference is considered to be extremely statistically significant. Thus, this shows that there was a significant difference in mean value of pre-exercise and post-exercise values of BR Group. The table 2 mean values had standard error of difference 0.116 and the t value calculated by the paired t-test gave P value <0.0001 which is less than assigned P value (<0.01). Hence, by conventional criteria, this difference is considered to be extremely statistically significant. Thus, this shows that there was a significant difference in mean value of pre-exercise and post-exercise values of UBP Group. The table 3 mean values had standard error of difference 0.486 and the t value calculated by the unpaired t-test gave P value <0.0001 which is less than the assigned P value (<0.01). So, by conventional criteria, this difference is considered to be very statistically significant. Thus, there was a significant difference in mean value of post-exercise values of BR and UBP group.

#### 4. RESULTS

From the statistical analysis, the difference between the pre and post exercise values was significant for both BR Group and UBP Group. In BR Group, the difference in the mean value of pre and post exercise equals -1.9947 which shows that mean value of post-exercise is greater than the pre-exercise value, clearly indicating increase in the upper body power by the use of Battle Rope Exercise. Similarly, for UBP Group, the difference in the mean value of pre and post exercise equals -1.05 which shows that mean value of post-exercise is greater than the pre-exercise value and this shows that Upper Body Plyometrics has effect on upper body power. By the use of unpaired test, the difference between the post-exercise values of BR Group and UBP Group was considered to be significant. The difference in their mean value is 1.3713. Thus, there was an increased outcome for BR group than UBP group. Hence, the result was that upper body power had been increased more in subject's undergone Battle Rope training than the Plyometric training at the end of 4weeks.

**Discussion:** The primary findings of this study are that Battle Rope training has significantly enhanced Upper Body Power than Upper Body plyometrics. When compared with lower-body exercise, upper-body exercises produce greater physiologic strain and a unique training regimen is necessary to get the desired effect. Since both the exercises are high intensity training and has fatiguing effect, proper rest interval has shown muscular adaptation. The design of the training protocol is another cause for the magnitude of improvement in Upper Body Power. As a previous study suggest that "In order to increase power, one should focus on implementing multijoint free weight exercises, rather than core-specific exercises, to adequately train the core muscles" is taken into consideration in this study.<sup>17</sup> Thus, the exercises were decided on the basis of free weight exercises which helped in improving whole upper body power rather than only the core. Battle Rope training is predominantly used for individuals acclimated to high habitual amounts of vigorous-intensity exercise as in athletes for sustaining their power as in handball players and for increasing throwing velocity hence it focuses more on enhancing power.<sup>18</sup> On the other hand, Plyometrics exercises are focused more on agility training because of its phenomenon of stretch shortening cycle rather than power training. In a previous study, it is said that 4-week of plyometric training is too short to show a significant effect on increasing power hence short duration of training is yet another reason for the hindrance of its complete effect.<sup>2</sup> Though the effect of Plyometrics in Upper Body Power is significant, it is still to be investigated more in the area of power training to upper body. Therefore, Battle Rope training is the most appropriate exercise to increase upper body power.

#### 5. CONCLUSION

From the result, null hypothesis is proved wrong and it is concluded that Battle Rope exercises is more effective than Upper Body Plyometrics in increasing the upper body power.

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**TABLE-I : Inter-group comparison of pre-exercise and post-exercise values of Medicine Ball Explosive Power Test**

<b>BR group</b>	<b>Mean</b>	<b>SD</b>	<b>t value</b>	<b>p value</b>
Pre-exercise	4.987	1.223	21.765	0.0001
Post-exercise	6.784	1.274		

**TABLE-II: Inter-group comparison of pre-exercise and post-exercise values of Medicine Ball Explosive Power Test**

<b>UBP group</b>	<b>Mean</b>	<b>SD</b>	<b>t value</b>	<b>p value</b>
Pre-exercise	4.163	1.439	9.029	0.0001
Post-exercise	5.413	1.388		

**TABLE-III: Intra-group comparison of post-exercise values of Medicine Ball Explosive Power Test (BR and UBP)**

<b>Groups</b>	<b>Mean</b>	<b>SD</b>	<b>t value</b>	<b>p value</b>
BR group	6.784	1.277	2.819	0.0087
UBP group	5.413	1.388		