

## **THE DIFFERENCE BETWEEN STANDING BICEPS CURL ON SMITH MACHINE AND STANDING BICEPS CURL ON MUSCLE STRENGTH IN YOUNG MEN**

*Holubiac Iulian Stefan*

Ștefan cel Mare University of Suceava, Romania  
holubiac.iulianstefan@usm.ro

**Keywords:** biceps curl, strength training, Smith Machine, biceps brachii

### **Abstract**

Increasing muscle strength in the biceps brachii can be done using different methods and different exercises. The purpose of the study was to compare two biceps curl variations (standing vs. Smith Machine) to evaluate which of the two is more effective in terms of increasing strength. Thirteen subjects were divided into 2 groups (standing vs. Smith Machine group) and participated in an exercise program for 6 weeks, 2 training sessions per week. After 6 weeks, the group that performed biceps curl on Smith Machine recorded a greater increase in muscle strength compared to the group that performed standing biceps curl.

### **Introduction**

It is known that resistance exercises offer numerous health benefits, in addition to the fact that they contribute to increasing strength and muscle mass [12]. When it comes to increasing strength and muscle mass, it is recommended that the intensities used reach at least 70% of 1RM for the results to be visible [1].

Biceps curl is a popular exercise among men who want to increase muscle strength in the arms. The variations of the exercises make this exercise very popular [8] but we do not know clearly which is the most effective exercise for developing strength at the level of the muscle groups when we have a choice between several variations of the exercises. The biceps curl on the Smith Machine is an isolation exercise that primarily targets the biceps brachii, allowing the use of a stabilized frame to control movement and reduce the risk of injury [4].

Using the Smith Machine for biceps curls provides stable support, which can be beneficial for beginners or those recovering from injury. Stabilization can allow greater focus on biceps activation without distracting from proper form. Studies suggest that the biceps curl on the Smith Machine activates the biceps brachii to a similar extent as other curls, but may not be as effective for activating other stabilizing muscles given its controlled nature. Maintaining proper form is essential during exercise. Execution angle and motion control are important to maximize

exercise efficiency and prevent injury. It is recommended to avoid using too much weight which could lead to poor form [7].

The biceps curl on the Smith Machine can offer unique benefits, but it is often compared to dumbbell or barbell curls, which involve a greater degree of stabilization and muscle activation. Exercise variety is essential for overall strength development [5].

It is advisable to include the biceps curl on the Smith Machine as part of a balanced training program that targets all muscle groups, ensuring a harmonious development of muscle strength [1].

### **Material-method**

Thirteen subjects were divided into 2 groups: a group that performed standing biceps curl ( $19.7 \pm 1.0$  years old,  $n = 6$ ) and a group that performed standing biceps curl on Smith Machine ( $19.3 \pm 0.5$  years old,  $n = 7$ ) for 6 weeks, with a frequency of 2 training sessions per week. All subjects used the same intensities (75% of 1RM), with a number of 6 series x 12 repetitions per series, 3-minute break between series; exercise was performed in a standing position, the grip used was in supination, and the distance between the hands was kept the same in all series and training sessions in order not to influence the results in any way. The initial testing was done at the beginning of the study and after 6 weeks. The statistics were done using the SPSS version 26 program. The Shapiro-Wilk test was used for data distribution. The *t*-test for parametric variables was performed to determine if there were significant intragroup differences (pretest vs. posttest), and the *t*-test for independent variables was performed to determine if there were significant intergroup differences (initial vs. final).

### **Results**

At the beginning of the study, there were no significant differences regarding the age of the subjects,  $t(9.48) = 0.91$ ,  $p = .38$ , a maximum repetition (1RM),  $t(10.22) = 1.98$ ,  $p = .07$  or regarding body mass index (BMI),  $t(9.35) = 1.41$ ,  $p = .19$ .

After 6 weeks, the group that performed the standing biceps curl on Smith Machine recorded a significant increase ( $\Delta\% = 13.66$ ) in strength compared to the initial testing ( $48.9 \pm 3.8$  kg vs.  $43.0 \pm 3.6$  kg),  $t(6) = -15.16$ ,  $p < .001$ .

A significant increase ( $\Delta\% = 12.04$ ) was also observed in the group that performed standing biceps curl ( $44.5 \pm 2.6$  kg vs.  $39.7 \pm 2.3$  kg),  $t(5) = -31.58$ ,  $p < .001$ .

At the end of the study, even if the progress registered by both groups was close, being a difference of only 1.62% between the two groups, the *t*-test for independent variables indicated a statistically significant difference,  $t(10.54) = 2.44$ ,  $p = .03$ , which may suggest that performing standing biceps curls on the Smith Machine may lead to greater strength gains compared to traditional biceps curls.

It should be noted that there were positive correlations between the values obtained at the initial test for a maximum repetition (1RM) and the age of the subjects,  $r(13) = .91, p < .001$  and between the values obtained at the final test for a maximum repetition (1RM) and subjects' age,  $r(13) = .86, p < .001$ , which suggests that older subjects obtained higher values in the 1RM test compared to younger subjects.

Also, there were positive correlations between the initial 1RM values and the final 1RM values,  $r(13) = .98, p < .001$ , which suggests that those who obtained higher values in the initial testing, obtained better values also at the final test compared to those who obtained the lower values at the initial test.

A positive correlation was also recorded between the variable body mass index (BMI) and the values obtained at the initial test at 1RM,  $r(13) = .64, p = .02$  and the values obtained at the final test at 1RM,  $r(13) = .60, p = .03$ , which suggests that subjects with a higher BMI obtained higher values both at the initial and at the final test for 1RM, compared to subjects who had a lower BMI.

### **Discussions**

Biceps curl on the Smith Machine is effective for the development of the biceps muscles, due to the possibility of using variable weights, which can lead to muscle hypertrophy. Studies show that isolation exercises, such as this curl, can significantly contribute to increasing muscle size [4].

Using the Smith Machine provides a safer environment for performing biceps curls, especially for beginners. It minimizes the risks associated with free exercise such as weight drops, allowing users to focus on the correct execution of the movement [15].

Compared to using dumbbells, the Smith Machine may reduce the activation of stabilizer muscles, which can be beneficial for focusing on the biceps, but it is important to combine the exercises for full development. A 2023 study concluded that if more emphasis is placed on the initial range of motion during elbow flexion against resistance, biceps brachial muscle hypertrophy will be more evident [9].

Gradual weight progression is essential to maximize the benefits of exercise. This may include increasing the weight used or the number of repetitions during training [13].

To maximize biceps development, it is recommended to combine bicep curls on the Smith Machine with other exercises, such as hammer curls or chin-ups, which activate the muscles from different angles and improve overall strength. It is important to pay attention to training antagonistic muscles, such as the triceps, to prevent muscle imbalances and ensure harmonious development. Balanced exercises help improve overall performance and reduce the risk of injury [1].

Studies suggest that using an intensity of 70-85% of your one-repetition maximum (1RM) is optimal for increasing muscle strength. This translates to a rep count between 6 and 12, which is ideal for hypertrophy [13].

To maximize biceps brachial hypertrophy, it is important to vary the intensity and volume of your training. Alternating between heavy weight training (4-6 reps) and moderate weight training (8-12 reps) can stimulate different muscle development pathways [17]. Adequate protein intake is essential for muscle repair and growth. Consuming around 1.6-2.2 grams of protein per kilogram of body weight is recommended for those looking to maximize muscle hypertrophy [16].

New methods are emerging that involve restricting blood flow to the biceps brachii to record additional strength increases during recovery [3] and these methods are of interest for future research. For bicep curls, strength gains appear to be greater in both women and men when eccentric contractions are performed with dumbbells or on specific machines [10]. Eccentric contractions are also preferred by coaches, as they are more effective in preventing injuries and are effective in rehabilitation [2], [14], [6] and Smith Machine contractions seem to put more tension on the biceps brachii during the eccentric phase.

### **Conclusions**

In conclusion, both standing biceps curl and biceps curl on Smith Machine lead to increases in muscle strength in the biceps brachii, but biceps curl on Smith Machine seems to bring an additional increase in muscle strength in the biceps brachii, compared to the classic method - standing biceps curl.

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