

COMPARISON OF THE EFFECTIVENESS OF TRAINING ON MACHINES: WITH A VARIABLE-CAM AND WITH A DISC PLATE

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Introduction

In human joints only rotary movements are possible, so muscle length and strength depends on the muscle's angular position in the joint. The values of peak torque for various muscle groups arrange as a function of the angle joint - the differences between the maximum and the minimum values can reach several dozen percent [Oliveira 2009, Philippou 2003]. In strength or muscle mass training, it is essential to exercise with an optimally selected external load such as free weights and weight machines. The use of round plates in the training machines, translates into the external moment of a fixed value. The use of the variable-cam approaching the characteristics of the external load to the muscle possibility in function of the angle joint [Folland 2003].

The cam shape was developed on the basis of measurements of the force moments in the function of joint angle and adjusted by means of EMG examinations.

The aim of this research was to assess the effectiveness of training on 2 machines: one with a constant radius plate (Fig. 1.b - circle) and the other one with a variable-cam adjusted to muscle strength abilities (Fig. 1.a).

Methods

The experiment included 75 men (21 ± 1 yrs) divided into 5 equal groups. Training was carried out on a machine for training flexor muscles in the elbow joint (Fig. 1).

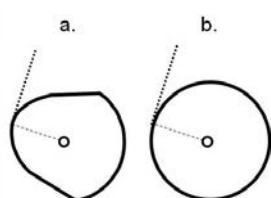


Figure 1: Training on machine. a. variable-cam (group A and C), b. circle (group B and D).

Training lasted for 8 weeks with training sessions 3 times a week. Group A and B bodybuilding training performed and group C and D strength training performed. Group E participated only in the control measurements.

In order to control the effects, the values of peak torque and power of the flexor muscles of the elbow were measured under isokinetic conditions. Also taken were anthropometric measurements of the arm.

Results

Larger changes in strength and power occurred in bodybuilding training than in strength training and on the machine with the variable-cam than on the machine with the circle (Table 1). After bodybuilding training, circumferences of arm increased more than after strength training. After strength training, was noted the largest reduction skinfolds on the shoulder.

Gr.	Peak torque $60^\circ \cdot s^{-1}$	Av. Power $60^\circ \cdot s^{-1}$	circumferences arm at rest	skinfolds biceps
A	$\Delta = 13\%$	$\Delta = 20\%$	$\Delta = 5,4\%$	$\Delta = -7,0\%$
B	$\Delta = 7\%$	$\Delta = 10\%$	$\Delta = 3,7\%$	$\Delta = -2,8\%$
C	$\Delta = 6\%$	$\Delta = 8\%$	$\Delta = 1,0\%$	$\Delta = -20\%$
D	$\Delta = 6\%$	$\Delta = 4\%$	$\Delta = 0,7\%$	$\Delta = -17\%$
E	$\Delta = 0,8\%$	$\Delta = 0,6\%$	$\Delta = 0,3\%$	$\Delta = -0,9\%$

Table 1: Differences between pre and post training biomechanical and anthropometric values.

Discussion

Based on the results of this study, it can be concluded that training elbow flexors on a machine with a variable-cam is more effective at increasing strength and power and selected anthropometric parameters than training on a machine with a disc plate (circle).

References

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