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Comparative Study on the Effectiveness of Training of the Leg Muscles Oriented to the Movement Speed

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Brief Outline

Summary

Among other things, the question about the extent to which the parameters “isometric and dynamic maximal strength” of the leg muscles show manifold changes after twenty

training units on the Desmotronic leg press and on the V2 leg press was dealt with in a pre-post control group design with a group of test subjects, consisting of 31 sport students without injury and 26 patients after a knee injury.
A measurement of the circumference of the thigh and the lower leg at the same time completes the presentation of the training-related changes in the test subjects' leg muscles.
Four training groups were formed, which have gone through extensive series of measurements at the start and after twenty training units. Furthermore, the subjective development of grievances was inquired about using questionnaires.
Through analyses of interference statistics, the hypotheses established have been reviewed in relation to the results of the strength, the mechanical performance as well as their relationship with changes in the thigh and lower leg circumferences.
Regardless of the training equipment used, based on the results, a significant improvement in the maximal isometric and dynamic strength can be demonstrated. If the results are considered in a training equipment-specific manner, it may be stated that the test subjects of the V2 leg press show a larger maximal increase in isometric strength in the training control implemented in this study through the subjective self-evaluation.
The dynamic maximal strength on the other hand shows a greater increase in the Desmotronic training groups at the highest movement speed.
The results of the circumference measurement show an increase of the thigh and lower leg circumferences for the entire group of test subjects. Test subjects training on the V2 show a significantly greater rate of increase in the thigh measurement.
By way of example, in one part of the test subjects, the energy exchange and the degree of effectiveness on the Desmotronic has been determined under the same conditions at two measurement times by means of respiratory gas analyses and the recorded mechanical performance. The average degree of effectiveness of the five test subjects lies at 28%. A general increase in the degree of effectiveness from the pre- to the post-measurement cannot be determined based on the results.
The serum creatine kinase as parameter of muscle tension has been determined at three measuring points in six test subjects of the Desmotronic patient group. An increase in creatine kinase from the first to the third measurement time within the movement speeds 3, 4 and 5 is only visible in one part of the test subjects. The expected greater increase in the serum creatine kinase from movement speed 5 is also not shown in the result.
To be able to assess changes in the muscle control, an EMG measurement was carried out in five test subjects at the same time as the respiratory gas analysis.
The changed muscle activity of the pre to post-measurement of one test subject was particularly noticeable in the patient group. A greater activity of the m.vastus medialis as well as a reduced activity of the lower leg muscles.
During the training units, moreover, the test subjects' heart frequency was recorded with a Polar® heart frequency meter and subject to device-specific comparison.
The mean heart frequency of the Demotronic Group, at 141min-1, shows higher value in comparison to the V2 training group (HR: 113min-1).
To complete the study, a questionnaire was filled in by the test subjects, which corroborates the results of the measurements.
Two years after the end of the study, 36 test subjects of the overall group took part in a revaluation. The question whether group differences emerge in a parameter of the maximal isometric strength was dealt with.

In the follow-up study, there was a significant fall in the maximal isometric strength of the tested group of test subjects. The significantly smaller decline in the strength values of the test subjects training on the Desmotronic in comparison with the test subjects who have trained on the V2 leg press was noticeable.

Key words: Desmotronic, Training, Respiratory Gas Analysis, Rehabilitation, Performance Diagnostics