

Effects of isokinetic devices on lower limb

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Abstract

This review article mainly focuses on the advanced technology of isokinetic exercises which will help to increase range of motion, strength of muscles, endurance and many more advantages. These are the resistive machines which promote to bring back normal movements of a person daily life with significant results. Its advantage is that the group of muscles may be worked out at its maximum potential throughout a range of motion of joint. Different devices which promote resistance are studied in this article. Objective : To determine the evidence of rehabilitation by using ERIK , isokinetic dynamometer in lower limb.

Keywords: isokinetic devices, isokinetic dynamometer, lower limb rehabilitation.

INTRODUCTION

Isokinetic devices is passive devices which resist applied forces and sustain a predetermined rate of exercise. To test and measure muscle performance, numerous isokinetic instruments are used. An isokinetic machine is a rehabilitative exercise device designed for medical use, such as testing, analyzing, and improving. We evaluated a prototype of an isokinetic exercise device for the lower limb called the ERIK in the current investigations.

Essentially, these are devices that allow for maximum muscle contraction over the entire range of joint motion. An isokinetic machine is a rehabilitative exercise device used to assess, evaluate, and promote muscular strength and joint range of motion for medical purposes[1]. An electro-rheological fluid brake sensor is implemented in the ERIK to enhance the load quality. An electro-rheological fluid brake sensor is implemented in the ERIK to enhance the load quality. An electro- rheological fluid brake sensor is implemented in the ERIK to enhance the load quality. The following are some of the isokinetic devices.[1]

Discussion

ERIK allows for a single-limb squat exercise with a translational load on the swing leg in a closed kinetic chain, putting strain on the stance leg muscles in the standing position. ng muscular strength and joint range of motion. This training provides a load on the gluteal muscles, which helps to prevent excessive knee valgus moments, which are a major cause of anterior cruciate ligament injuries. An electro-rheological fluid brake sensor is implemented in the ERIK to enhance the load quality. We studied a prototype of an isokinetic rehabilitation device for the lower limbs in the current investigation.

The suggested device is a closed kinetic chain (CKC) style single-limb squat that places body weight on the muscles of the stance leg in the standing position. This type of training is known as a resistive leg reach exercise This sort of training places a load on the gluteal muscles and is useful in preventing knee valgus moment, which is a leading cause of ACL injury. The major purpose of this type of training is to heal and/or preserve the ACL while also providing an effective way for sports strength

training.[1]to improve the standard. Isotonic exercises use a constant load, isometric exercises use a constant posture, and isokinetic exercises use a constant angular velocity of the joint.

However, because isokinetic exercise training requires the use of a real-time controller to generate resistance, there are few licensed solutions available. The Cybex, HUMAC-NORM , and MARES devices, for example, target exclusively rotational movements of a joint in a seated position. Despite the inclusion of a real-time speed control mechanism using magneto-rheological fluid in a suggested stepper device, the equipment's recumbent design limited trainee postures and motion kinds.[1]

Closed kinetic chain training creates a closed-loop linkage with both legs and the floor. Importantly, because this type of exercise decreases the anterior shear and valgus forces on the knee joint, it has a high level of safety. Kimura et al. analysis. CKC training in the standing (loaded) posture for rehabilitation after ACL reconstruction, and applied it clinically to evaluate its safety and effects with a constant resistive force, as shown in Fig 1 during a single-leg squat using a device with a sliding table and a rubber band. The single leg squat includes the right knee bending during the lateral opening motion of the left leg. The reversal motion is conducted during the lift up. However, because the device used a rubber band, the resistant force could not be controlled.

Thus, improved training equipment is needed for isokinetic exercise, enabling easy and variable setting of the resistant force to provide acceptable levels of safety and effectiveness. [1]

The ERIK has the advantage of a high level of safety in isokinetic exercise, which conventionally requires controllable actuators, such as servomotors. In addition, the ERIK can load higher resistance within a wide motion area compared with conventional equipment.

Unlike other devices, the ERIK enables control of the velocity of the leg during translational motion in isokinetic training, such as the open–close leg exercise. The single leg squat using the ERIK provides the constant velocity motion of the sliding leg; therefore the knee joint flexion at a constant velocity as mentioned as the above benefit is not strictly produced.

Thus, whether the isokinetic mode of the ERIK has adequate training effectiveness is confirmed in “Experimental verification” section.[1]

Isokinetic dynamometers are passive devices which resist applied forces and control the speed of exercise at a predetermined rate. Such dynamometers generally provide a record of applied force throughout a joint range of motion. Some of the postulated advantages of isokinetic exercise include safety, accommodating resistance and the facility for muscle force analysis. In spite of the advantages that isokinetic dynamometry provides, there are a number of considerations that are important in the interpretation of force recordings. While the term "isokinetics" generally denotes a type of muscular contraction which accompanies a constant rate of limb movement, periods of acceleration and deceleration exist in the context of isokinetic exercise. The acceleration and subsequent oscillatory and deceleration periods of "isokinetic" exercise limit the duration of the period of constant velocity in exercises with isokinetic dynamometry.

Isokinetic belt stabiliser

The belt-stabilized handheld dynamometer (HHD) has been used to assess the strength of knee- and hip-muscle groups. We used reliability values provided by the intraclass correlation coefficient (2,3), standard error of measurement (SEM and percentage SEM), and minimal detectable change; correlation values comparing the belt- stabilized HHD and the isokinetic instrument using the Pearson correlation coefficient (r); and the mean difference in values comparing the 2 instruments using the Bland-Altman method. The belt- stabilized HHD measurements were reliable, and although they did not agree with those from the isokinetic dynamometer, the values were correlated for the hip- and knee-muscle groups[2-20].

ROX pro

Champs were created to help footballers think and respond more quickly. Adding interactive sensor pods to your football training sessions takes it to a whole new level. Teams compete in the modern game to gain an advantage over their opponents. Many products promise to provide this service. ROX Pro, an interactive training system developed by A-Champs, is the result of years of research into the science connecting physical and mental speed. The Sports Tech company is made up of "tech nerds" and "elite athletes." A mix of coloured lights, vibrations, and sounds are used to stimulate the brain. Research

has shown that this tech used in football training can improve reaction time, speed, focus, decision making, concentration, and memory of players. ROX Pro pods are controlled through their app. Pro-level football drills are loaded, with a function to track single-player & team performance. Starting at £298.66* for 3 ROX, it's definitely a serious investment. But for elite-level football equipment that adds variety and engagement to training sessions, it seems worth it. A fact confirmed by its use at some of the world's biggest pro clubs.[21-35]

Conclusion

This research identified and presented lower limb rehabilitation choices to help therapist to decide which technologies assisted therapy techniques is best for their needs. The findings shows that merging technologies such as isokinetic dynamometer and ERIK can work more effectively on lower limb rehabilitation.

The goal of this paper is isokinetic exercises use a constant angular velocity of the joint rehabilitation. To bring back the normal range of motion.

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