

CASE REPORT

EFFECTS OF ISOKINETIC STRENGTH TRAINING ON SUBJECTIVE AND OBJECTIVE KNEE PERFORMANCE OF AN ANTERIOR CRUCIATE LIGAMENT (ACL) INJURED ATHLETE

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ABSTRACT

This case study reports the effects of isokinetic strength training on subjective evaluation, knee range of motion, hamstring and quadriceps strength, hamstring and quadriceps peak torque production. Biodex System 3 Pro was used to train an anterior cruciate ligament -injured athlete for 15 sessions at five different velocities in both knee flexion and extension. 2000 International knee documentation Committee score improved by 147% while hamstring and quadriceps strength increased by 358% and 305% respectively. Speed-specific hamstring peak torques showed marked increments (132% - 408%). Similarly, quadriceps' peak torques increased by 81% to 213%).

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INTRODUCTION

Anterior cruciate ligament (ACL) injuries can cause knee instability and restrict athlete's ability to re-participate in sports¹. Such injuries cause severely diminished knee range of motion, hamstring and quadriceps strength, and knee musculature torque production capacity. Surgical reconstruction is considered to be an effective treatment in athletes which helps in restoring normal function and return to sports.^{2,3,4} Traditional rehabilitation regimes involved immobilization for prolonged periods and non-weight bearing exercises with gradual progression to everyday activities. Recently, there has been a shift of paradigm towards immediate mobility, early weight bearing exercises, and early return to sports participation.^{5,6}

CASE REPORT

A 29-year old martial-arts athlete, weighing 63 kg with height of 172 cm, presented with complaint of severe right knee pain, swelling and giving way during activities of daily living. The athlete sustained the injury

as a result of unilateral, repetitive, cyclic loading of the knee. The injury was diagnosed through detailed history, physical examination and was confirmed through magnetic resonance imaging (MRI) demonstrating complete ACL tear. Reconstruction surgery for the ACL

Table 1: Peak torque produced at knee joint at various movement velocities during flexion and extension before and after rehabilitation (PRE = baseline; POST = after 15 sessions)

Peak Torque (ft. lbs)			
Flexio			
	Pre	Post	Δ%
30 °/sec	22.1	51.2	131.7
90 °/sec	9.6	44	358.3
150 °/sec	9.7	49.3	108.2
210 °/sec	9.5	31.5	231.6
270 °/sec	11.5	31.5	173.9
Extension			
	Pre	Post	Δ%
30 °/sec	32.9	59.4	80.5
90 °/sec	16.1	41	154.7
150 °/sec	10.7	33.5	213.1
210 °/sec	11.1	27.8	150.5
270 °/sec	9.651.2	30.7	219.8

Δ % indicates percent improvement from baseline to 15th training session.

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was planned and he was recruited for the study four months after the surgery.

DISCUSSION

International Knee Documentation Committee (2000 IKDC) subjective knee evaluation form was used to assess the athlete's knee at the baseline with an IKDC score of 30 indicating severely compromised functional status even 4 months after reconstruction surgery. Athlete's muscular strength was assessed on Biodex System 3 Pro (Biodex Medical Systems, Inc. NY, USA) on isokinetic mode. His hamstring (flexion) strength was 8.0 foot-pound (FT-LBS) and quadriceps (extension) strength was 8.2 FT-LBS. The athlete underwent isokinetic strength training for 15 sessions on five different speeds (30 °/sec, 90 °/sec, 150 °/sec, 210 °/sec, 270 °/sec,) for both knee flexion and extension using Biodex System 3 Pro. After warming up for 5 minutes on Biodex gait trainer and treadmill, sustained stretches for hamstrings and quadriceps muscles were performed. Patient was positioned in the dynamometer with upright back while hip and knee flexed to 90 degrees. Unilateral isokinetic contractions were performed according to a preset protocol.

The outcome variables comprised IKDC score, knee range of motion, hamstring strength, quadriceps strength, hamstring peak torque, and quadriceps peak torque. Post-training IKDC score was 74 indicating 147% increment. Knee range of motion improved by 29% (71.2 – 91.5). Furthermore, hamstring strength showed an increase of 358% (8 – 36.6 ft.lbs) while quadriceps increased by 305% (8.2 0 33.2 ft.lbs). Comparison of knee flexion and extension peak torques at all speeds

before and after isokinetic training is presented in Table 1.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Masood T: Conception and design of the work,

Khan HMM: Analysis and interpretation of data.

Awan WA: Revising it critically and Final approval of the article to be published, accountable for all aspects of the work.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.