



❖ SPORT AND PERFORMANCE

ISOKINETIC ANALYSIS OF HAMSTRINGS AND QUADRICEPS MUSCLES IN TURKISH SECOND DIVISION BASKETBALL PLAYERS

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Abstract

Objective. The purpose of this study was to examine the maximal voluntary peak torques of the quadriceps and hamstring muscles, and the torque ratio between these muscle groups in second division basketball players.

Material and Methods. Isokinetic peak torques were measured using the Isomed 2000 dynamometer at 60 and 180°s⁻¹. Twent-three second division basketball players (age: 22,7±4,14 years, height: 195,9±6,59cm, weight: 94,3±13,4kg, BFP: %11,98±3,6) involved in this study.

Results. Table 1 shows the maximal voluntary peak torques of the quadriceps (Q) and hamstring (H) muscles and the torque ratio between these muscle groups

Table 1 Peak isokinetic knee torques and H/Q Values at 60 and 180°s⁻¹(Concentric /Concentric) (Con/Con) The average right and left H:Q ratios at 60°s⁻¹ were above the normal isokinetic range of 60%–69%. However, at 180°s⁻¹, the mean right and left H: Q ratios were within the normal range.

Conclusion, The normal Hcon/Qcon ratio is 0.60. This ratio has been used to assess thigh muscle imbalance, but the functional Hcon/Qcon ratio is related with velocity of the test it increased above 1.00 with increasing velocity and more extended knee joint positions, it means the more velocity the more ratio (Burkett, 1970; Coombs and Garbutt, 2002).. Coaches and physical therapists may use results of the present study in order to evaluate and plan exercise programs of ankle musculature during training and rehabilitation.

Key Words: Isokinetic muscle function, basketball, the torque ratio.

Introduction:

Many different kind of techniques have conventionally been used for describing knee joint and thigh muscle function in clinical and scientific research (Portes et al, 2007). These consist of the such as single point peak moment (Thorstensson et al., 1976), visual inspection of the moment-joint angle curve (Grace et al., 1984), moment at a specified knee joint angle (Perrine and Edgerton, 1978; Thorstensson et al., 1976), and the fleksor extansor peak moment ratio (Nosse, 1982; Kannus and Jarvinnen, 1990).

The muscular torque and ratio of the quadriceps and hamstrings has been evaluating by using isokinetic tests (H/Q) (Grace et.al, 1984). ‘The H/Q ratio is used both clinically and in the laboratory as an indicator of the strength balance between the knee joint muscles and rate of risk of injury (Aagaard et.al, 1995). ‘The H/Q ratio is conventionally calculated by dividing the maximum values of the flexion by the maximum values of the extension of the knee joint in angled speed and determined contraction modes (Aagaard et.al, 1998)’ (Portes et al, 2007)

The question is ,whether the hamstring weakness or the quadriceps weakness, are related to the knee injuries, or their ratio is more important for injury,

trying to find by sport scientist for many years (Devan et al, 2004; Portes et al, 2007).

Objective: The purpose of this study was to examine the maximal voluntary peak torques of the quadriceps and hamstring muscles, and the torque ratio between these muscle groups in second division basketball players.

Material and Methods

Subjects: Twent-three second division basketball players (age: 22,7±4,14 years, height: 195,9±6,59 cm, weight: 94,3±13,4 kg, BFP: %11,98±3,6) involved in this study.

Procedur: To measure the H:Q ratio, we used the Isomed 2000 isokinetic dynamometer to perform knee concentric flexion and extension movements. We assessed MPT between right and left limbs. Measurements were taken at 60 and 1800 s⁻¹.

Before the isokinetic test, subjects performed a 5-minute warm-up on the bicycle ergometer. Measurements were taken using an Isomed 2000 (Ferstl, Germany) isokinetic dynamometer. The test was performed a seated position; stabilization straps were secured across the trunk, waist, and distal femur



of the tested leg. The leg extensor and leg flexor muscle of each leg were concentrically measured at 60°.s-1 (10 repetitions) and 180°.s-1 (10 repetitions). Verbal encouragement was given to the subjects during the measurement. Before starting the test, subjects were allowed 5 trials.

Results: Table 1 shows the maximal voluntary peak torques of the quadriceps (Q) and hamstring (H)

	Mean	Std. Deviation
Q60 Right	250,43	46,65
Q180 Right	181,52	40,02
Q60 Left	250,00	43,56
Q180 Left	187,86	34,33
H60 Right	178,26	36,89
H60 Left	173,69	31,22
H180 Right	160,17	35,71
H180 Left	153,34	32,47
H/Q60 Right	71,60	10,29
H/Q60 Left	70,03	9,21
H/Q180 Right	88,89	11,26
H/Q180 Left	82,15	11,97

muscles and the torque ratio between these muscle groups

Table 1 Peak isokinetic knee torques and H/Q Values at 60 and 180°.s-1(Concentric /Concentric) (Con/Con)

The average right and left H:Q ratios at 60°.s-1 were above the "normal" isokinetic range of 60%–69%. However, at 180°.s-1, the mean right and left H: Q ratios were within the "normal" range.

Conclusion: The normal Hcon/Qcon ratio is 0.60. This ratio has been used to assess thigh muscle imbalance, but the functional Hcon/Qcon ratio is related with velocity of the test it increased above 1.00 with increasing velocity and more extended knee joint positions, it means the more velocity the more ratio (Burkett, 1970; Coombs and Garbutt, 2002). The present study may be useful as comparison basis for future studies aiming evaluate the isokinetic muscle function in basketball players.

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