Analysis of Factors Related to Shoulder Instability in Young Handball Players

Claúdia Torres, Edgar Leitão[1], Joana Leal[1], Sara Camelo[1], João Paulo Sousa[1,2,3] and Ângela Maria Pereira[1,4,5]

[1]Physiotherapy Department, Escola Superior de Saúde Egas Moniz; [2] Departamento de Desporto e Saúde, Escola de Ciência e Tecnologia, Universidade de Évora; [3]Comprehensive Health Research Center; [4]Centro de investigação interdisciplinar Egas Moniz; [5]Hospital Garcia de Orta, Almada, Portugal

E-mail contact: amcfap@gmail.com

Introduction:

The shoulder of handball players suffers from the ongoing repetition of movement that may lead to the development of joint instability and modification of proprioceptive conditions(1). Articular components of the shoulder joint are considered to have extreme importance on static and dynamic stabilization and quality of proprioceptive information so athlete's performance can be compromised whenever they are affected (2).

Objective:

Therefore, the objective of our study was to verify which factors may contribute to the development of shoulder instability in handball players. The focus was placed on shoulder strength parameters (SSP) and joint position sense (JPS) evaluation of internal and external rotation.

Materials and Methods:

Our study followed a cross-sectional design. The sample was composed by eleven handball players of both genders (4 females and 7 males), with an average age of 22 years, average height of 177 cm, and average weight of 76 kg . Data was collected using a isokinetic dynamometer (Biodex System 3) available at the Gymnastic Pavilion of the University of Évora. Isokinetic dynamometer was used to assess both SSP and JPS.

The evaluation of SSP was implemented prior to JPS at 60º (3 reps) and 180º (20 reps) as described on the protocol for Biodex shoulder assessment of internal and external rotation. Assessment position started with glenohumeral joint at 90º of abduction (Figure 1 and 2).

JPS was evaluated using active positioning and passive determined position at three given external shoulder rotation amplitudes (75º, 35º and 20º). For both active and passive JPS an upper limb inflatable sleeve was used. Participants put a blindfold when determining passive JPS (Figure 3 and 4).

Fig 1. SSP Evaluation: Shoulder at 90º abduction with 90º of external rotation

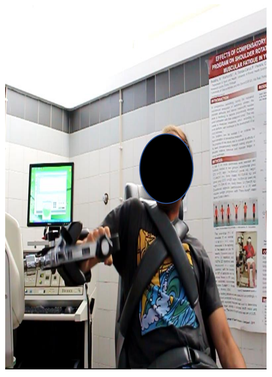

Fig 2. SSP Evaluation: Shoulder at 90º abduction with 0º of external rotation

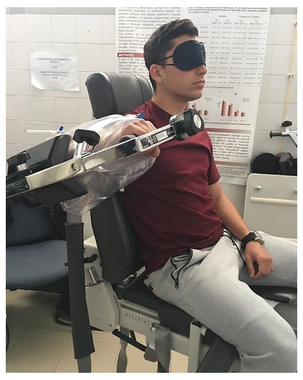

Fig 3. JPS Evaluation: Shoulder at 90º abduction with 35º of external rotation

Fig 3. JPS Evaluation: Shoulder at 90º abduction with 75º of external rotation

Results:

For the right upper limb, on passive movement 6.7±5.8 (75º), 1.7±2.4 (35º) and 0±2.3 (20º). In active movement 1.3±3.1 (75°), 1.0±3.6 (35°) and 1.2±2.7 (20°) were observed. In the left upper limb, we observed the following results, in passive movement: 4.7±3.7 (75°), 1.3±4.1 (35°) and 0.7±3.5 (20°). Finally, in active movement we obtained the following results: 0.5 ± 3.4 (75°), 0.7±2.0 (35°) and 2.7±2.4 (20°). In the SSP the peak torque (PK), at 60º right upper limb, external rotation 41.4±12.2 and internal rotation 40.6±17.5; at 60º left upper limb, external rotation 34,3±10,7 and internal rotation 42.0±12.8. PK at 180º right upper limb, external rotation 37.2±12.2 and internal rotation 37.9±15.0; at 180º left upper limb, external rotation 29.8±10.8 and internal rotation 37.2±11.6. Range of Movement (ROM) at 60º (89.6±3.2) and at 180º (88.8±0.6).

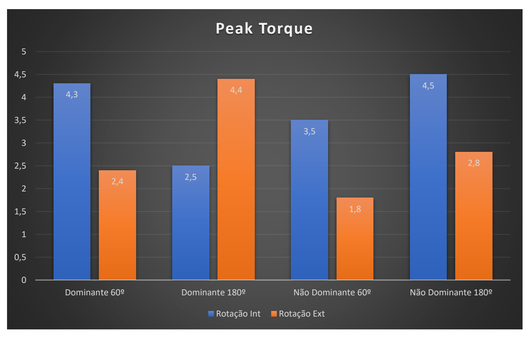

Figure 1. Peak Torque

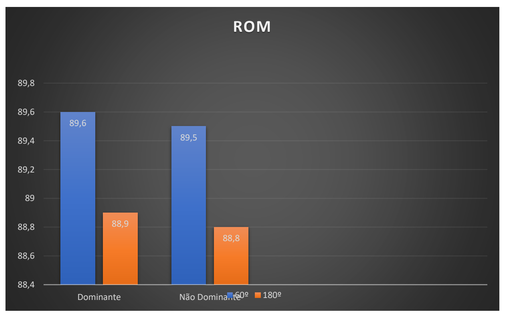

Figure 2. Range of Movement.

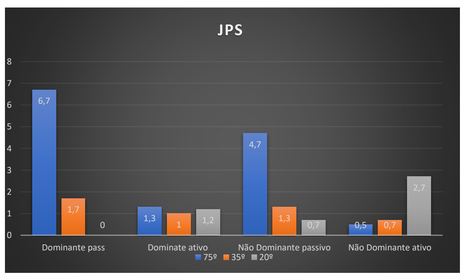

Figure 3. Joint Posision Sense (JPS)

Discussion and Conclusions:

It was possible to conclude after analyzing the collected data, that dominant upper limb (JPS) obtained better results, compared to the non-dominant. So, we can affirm that in active movement athletes had a better perception of joint position, compared to passive movement. Also we can conclude that all athletes that had previous injuries had a decreased JPS (3).

Dominant limb performed greater ROM at 60° as 180° compared to non-dominant limb. as we can see in the figure 2 the accumulation of forces can cause reduction of the internal rotation and increase the movement of external rotation in comparison with uninjured shoulder4.

On average, athletes have a higher peak torque when performing internal than external rotation. It is also verified, based on recent literature, that the dominant member presents a higher peak torque in the internal rotation than external rotation at 60º, but at 180º the opposite occurs. In the non-dominant limb there is a higher peak torque in the internal rotation than external rotation in both range of motion. (60º and 180º) (5).

References

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