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COMPARATIVE STUDY OF THE BIOMECHANICAL PROFILE AMONG ATHLETES FROM DIFFERENT SPORTS

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SUMMARY

Objective: The aim of this study was to compare the biomechanical profile among from different sports. **Methods:** We analyzed 86 subjects that were divided into Control Group, Capoeira Group, Soccer Group, Rugby Group and Athletics Group. The athletes were evaluated with a sit and reach test and an isokinetic dynamometer (*Byodex*®), using a CON/CON knee protocol at 60º/s with five repetitions. This research was approved by Committee of Ethics at Federal University of Ceara. **Results:** It was observed different results according to the test and sport.. **Conclusion:** It was suggested that athletes from different sports and features can be compared using the same tests and can present similar results when compared with each other.

INTRODUCTION

Training and sports practice result in the development of a specific musculature according to the modality practiced [1]. It is important to compare different sports, because it is easier to evaluate the performance of an athlete using similar parameters such as age, gender, competitive level and in comparison with itself [2]. The aim of this study was to compare the biomechanical profile among athletes from different sports.

METHODS

It was conducted a study in Movement Analysis Laboratory at Federal University of Ceara, Brazil. We analyzed 86 athletes, in 2012, from different sports (soccer, rugby, capoeira and athletics), and a control group (sedentary subjects). Athletes were evaluated with a sit and reach test and an isokinetic dynamometer (Biodex®) with a protocol of concentric contractions for joint knee at 60º/s. This study was approved by the Committee of Ethic at Federal University of Ceara.

The test protocol was initiated by the sit and reach test, to evaluate flexibility of the posterior chain muscles. This test consists of sat on the floor with their legs fully extended, then slowly bent forward and reaches along the top of the ruler, holding the stretch for three seconds, each subject repeated the test three times.

The last test was conducted in an isokinetic dynamometer (Biodex®) and aimed to evaluate the muscle strength. After five minutes of warming up, subjects were positioned in the chair, seated with a 90º hip flexion on the knee module, aligning the knee movement axis with the dynamometer axis and secured with snug straps across the shoulder, chest and hip. We used the test protocol with concentric contractions for extension and flexion knee at 60°/s. Peak Torque (PT) and Hamstring/Quadriceps strength ratio (H:Q ratio) of the dominant limb (DL) and non-dominant limb (NDL) were used as variables.

Data were analyzed with SPSS 17.0 and all statistical analysis was performed adopting a significance level of 5% ($p < 0.05$). We used an ANOVA to compare the groups, and a Bonferroni post hoc test when possible.

RESULTS AND DISCUSSION

Characteristics of sample are presented in Table 1. We found that only capoeira group obtained satisfactory results for flexibility, therefore 70.4% of subjects had good or very good flexibility. However, other groups failed to achieve acceptable values of flexibility.

PT of dominant quadriceps muscle in soccer group (266.8±38.5 N.m) and rugby group (275.6±57.5 N.m) were statistically greater than the other groups – control (198.8±27.3 N.m), capoeira (218.9±33.7 N.m) and athletics (220.8±42.5 N.m) - Figure 1A.Similar results were observed for PT of non-dominant quadriceps muscle in soccer group (270.1±28.8 N.m), rugby group (273.5±47.9 N.m), capoeira group (220.7±38.6 N.m), control group (179.4±40.7 N.m) and athletic group (216.5±50.7 N.m) - Figure 1B.

PT for dominant hamstring muscle in soccer group (160.7±28.5 N.m), rugby group (142.7±43.8 N.m) and athletics group (139.8±73.5 N.m) were statistically greater than the other groups - control group (98.0±18.5 N.m) and capoeira group (98.5±17.9 N.m) - Figure 1A. Similar results were observed for PT of non-dominant hamstring muscle in soccer group (148.1±18.8 N.m), rugby group (129.8±60.8 N.m) - Figure 1B.

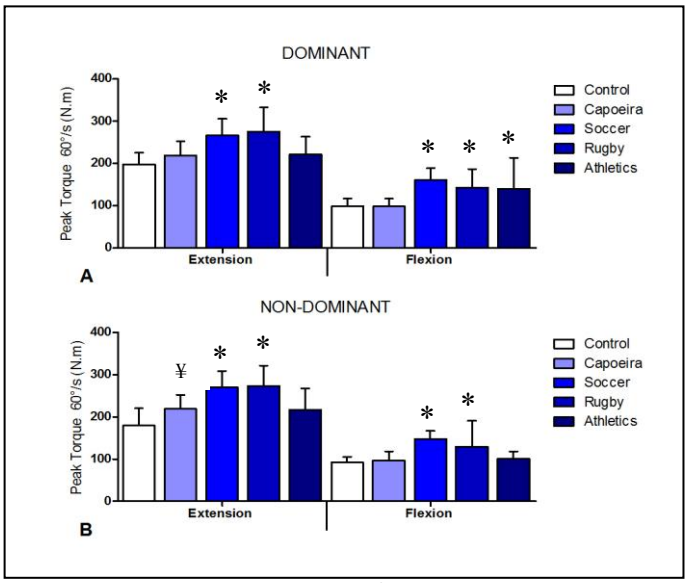

Figure 1 - The knee extensors and flexors muscles peak torque at speed 60°/s of the dominant limb **(A)** and Non-dominant limb (B)**.** * Significant difference between the groups no signaled. ¥ Significant difference between the control an athletic groups

It was found a good H:Q ratio for dominant limb in soccer group (61.2±13.4%) and athletics group (61.3±21.8%); however the other groups showed an index below the recommended value: capoeira (45.5±6.3%), control (49.4±7.2%) and rugby (52.9±18.5%). These data shows that soccer and athletics groups have a better balance of strength between the agonist and antagonist muscles than the other sports. All groups showed values below of expected for H:Q ratio of the non-dominant limb; soccer (54.4±7.0%), control (54.3±16.4%), capoeira (43.5±6.69%), athletics (47.3±5.15%) and rugby (46.7±16.3%).

CONCLUSION

Capoeira practitioners were more flexible than the other groups. Soccer and Rugby players have higher levels of muscle strength for flexors and extensors knee. Only soccer and athletics groups showed a good H:Q ratio.

REFERENCES

1. SCRANTON Jr PE, et al. *Foot Ankle*. **6**:85-89, 1985.
2. SILVA LRR, et al. *Bras. Ciên. e Mov.* **11**: 69-76, 2003.

Table 1. Characteristics of sample.

	Control	Capoeira	Soccer	Rugby	Athletics
N	23	28	19	9	7
Age (Year)	24.4±5.8	26.6±5.5	25.4±4.5	25.1±3.1	20.4±4.9
Weight (kg)	75.4±10.0	78.2±8.5	77.8±8.4	90.5±16.0	64.2±5.7
Height (m)	1.74±0.1	1.73±0.1	1.80±0.1	1.75±0.1	1.70±0.1
BMI	23.7±5.7	26.0±2.8	23.8±1.0	29.4±4.9	22.1±1.7