

KNEE OSTEOARTHRITIS CHANGES VASTUS LATERALIS MUSCLE ARCHITECTURE AND KNEE EXTENSORS MECHANICAL PROPERTIES IN WOMEN

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INTRODUCTION

Quadriceps weakness associated with knee osteoarthritis (OA) seems to be related to changes in muscle architecture [1]. Patients with knee OA seems to have deficits in strength of quadriceps [2]. Therefore, the purpose of this study was to compare the vastus lateralis (VL) muscle architecture and quadriceps mechanical properties between healthy women and women with knee osteoarthritis.

METHODS

Ten healthy (61.75 ± 5.18 yrs) and fourteen OA (54.71 ± 7.69 yrs) women performed maximal knee extension on an isokinetic dynamometer (Biodex System 3 Pro) at the joint angles of 30°, 45°, 60°, 75° and 90° and at the angular velocities of 60°, 120° and 240°/sec. The VL muscle architecture (pennation angle and fascicle length) was obtained at rest with an ultra-sonography system (ALOKA SSD 4000) at the same knee angles that maximal torque was obtained. A t-test for independent samples was used to check for any differences in the above variables between the two groups. The level of significance was set at $p \leq 0.05$ for all statistical tests.

RESULTS AND DISCUSSION

The increase in the VL pennation angle at 60°, 75° and 90° and the decrease in fascicle length at 30°, 45°, 60°, 75° and 90° in OA compared to healthy women (table 1) are evidence of structural changes produced by OA and might partly explain the lower maximal knee extensor torque at the knee joint angles of 60°, 75° and 90° (figure 1) and at the angular velocities of 60°/s and 120°/s in the OA group (figure 2). Our results agree with the findings that patients with knee OA, even in low grades, had muscle weakness and functional limitation in comparison with healthy subjects [3].

CONCLUSIONS

Knee osteoarthritis changes VL muscle architecture and reduces quadriceps mechanical properties in adult women. Strength training programs at long fascicle length might help to improve muscle function in OA patients.

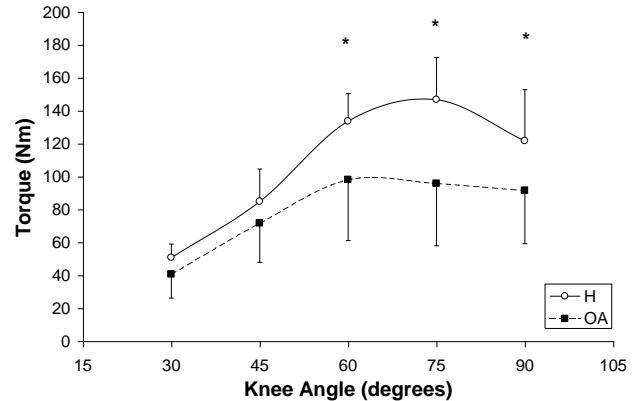


Figure 1: Quadriceps torque-angle relationship of healthy (H) and osteoarthritic (OA) women; (* $p < 0.05$).

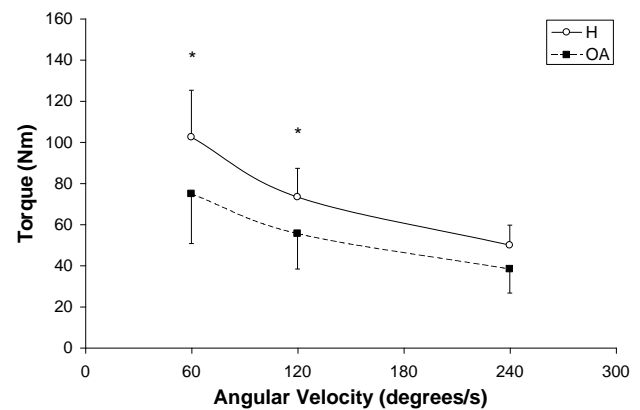


Figure 2: Quadriceps torque-velocity relationship of healthy (H) and osteoarthritic (OA) women; (* $p < 0.05$).

REFERENCES

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Table 1: Vastus Lateralis (VL) muscle architecture of osteoarthritic (OA) and healthy women; (§ $p \leq 0.05$; * $p < 0.05$).

Knee angle (deg)		30	45	60	75	90
VL pennation angle (deg)	Healthy	12.51±4.80	10.78±3.22	8.99±2.51	8.76±2.10	8.04±2.01
	OA	15.34±3.88	12.74±2.77	11.72±2.94*	10.92±2.87*	10.25±2.74*
VL fascicle length (cm)	Healthy	67.14±15.76	78.84±16.05	92.75±18.15	97.96±20.61	108.51±18.43
	OA	52.93±17.47§	62.21±17.65*	67.96±16.00*	75.38±18.72*	82.93±18.83*