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Postural Control Changes Due to Pain in the Knee and Leg Muscles

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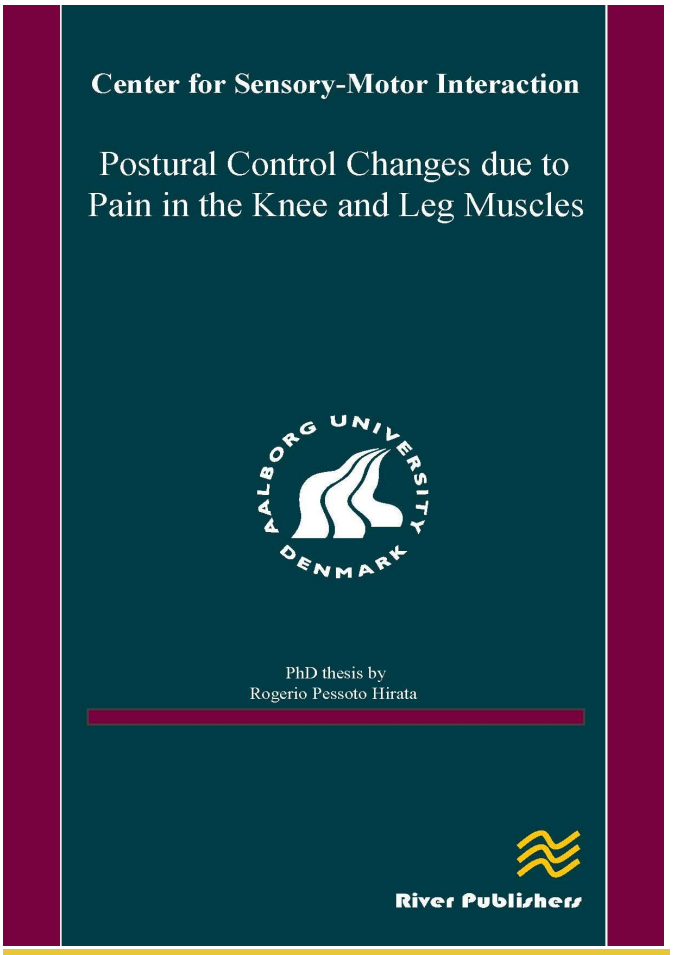
Pain around the knee joint is one of the most common pain conditions in the elderly. This po-tentially causes impaired knee proprioception and postural stability which consequently leads to an increased risk of falls. Injection of hypertonic saline was applied to the calf muscles (Study 1), leg muscles (close to the knee joint, Study 2) and infrapatellar fat pad (Study 3) of healthy subjects. The subjects were asked to recover their upright posture as fast as possible after receiving the perturbation and could take a step if required. A movable force platform was used to measure the center of pressure excursions (COP) and to provide random forward or backward perturbations. Bipolar surface EMG electrodes were used bilaterally and plantar pressure insoles were used to estimate the plantar pressure beneath the feet (Study 1 and 2) and kinematic data from the lower limb segments was acquired to quantify the angular posi-tion, displacement and velocity (Study 2 and 3). The results suggest that pain in the lower limb decreases postural stability during quiet standing and after perturbations. Such instability may increase the likelihood of falling by the deleterious effect of nociception on the movements responsible to maintain stability. Increased speed and displacement of the COP suggest that the body sway is larger and faster when compared to non-painful conditions both during quiet standing and after perturbations. The closer the pain to the knee joint, the greater the influence the pain had on the postural stability, suggesting that the knee joint may play an important role in controlling posture. Larger variability in muscle activation patterns was identified, indicating that the subjects used different strategies during pain. Such non-optimal strategies used in the presence of pain, probably increase the likelihood of destabilization of the body, which may lead to further damage/injuries and subsequent pain. Hence, clinical approaches to reduce pain may lead to improvements in balance especially for people with knee pathologies such as OA.



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