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Letter to editor

Somatosensory Nerve Function, Measured by Vibration Thresholds in Asymptomatic Tennis Players: A Pilot Study

Dear Editor-in-chief,

Tennis players are vulnerable to injury in their upper limbs due to the repetitive exposure to racket vibrations and torsional forces during play, leading to musculoskeletal adaptations in the dominant arm including some evidence of changes in nerve function (Colak et al., 2004). Vibration is a sensitive technique for diagnosing mild pathology in clinically asymptomatic participant groups. It has been used in participants with various musculoskeletal disorders (Laursen et al., 2006) (Tucker et al., 2007) showing widespread and bilateral increases in vibration threshold. Tests of somatosensory function by vibration will be abnormal prior to changes in nerve conduction velocity. Thus vibration testing in a sub-clinical group of participants may a more sensitive measure of nerve function compared to nerve conduction by electrodiagnostic testing.

The aim of this pilot study was to conduct an exploratory investigation to establish whether tennis players have a reduction in their somatosensory nerve function compared to non- tennis playing controls. It also set out to compare the somatosensory nerve function of the dominant compared to the non-dominant upper limb in tennis players.

Healthy tennis players (males, n = 8, females, n = 2, mean age 22 years) and control non- tennis playing volunteers (males, n = 6, females, n = 4, mean age 22 years) were recruited on an opportunistic basis from a tennis centre in London UK. Participants were excluded if they had any history of neurological impairment, serious injury or fracture or any arthritic condition affecting the upper limbs, cervical or thoracic spine. Control participants were excluded if it was deemed that they played a sport where there was exposure to repetitive use of the upper body.

Ethical approval was obtained from the University College London Ethics Committee and all participants gave written informed consent. A preliminary clinical examination was carried out on all participants followed by vibration threshold testing. Vibration testing was carried out using a Vibrameter (Somedic AB, Stockholm, Sweden). The tissue displacement range was 0.1-400μm and had a frequency of 100Hz. The vibration threshold was determined by the method of limits as standardised by Goldberg and Lindblom (1979). The tester was not blinded to whether tennis players or controls were being tested, but was familiarised with the equipment and testing procedure. The coefficient of variation for the tester was 4.7% - 22.6%, this was comparable to previous studies (Goldberg and Lindblom, 1979).

Readings were taken at three sites:

1. Palmar surface of the head of the second metacarpal (median nerve).
2. Dorsal surface of the shaft of the fifth metacarpal (ulnar nerve).
3. Dorsal surface over the shaft of the second metacarpal (radial nerve).

The data was subjected to descriptive analysis. Where appropriate the observed differences were tested for statistical significance using t-tests. Comparisons of vibration perception values were recorded as follows:

1. Between the dominant and non-dominant arm.
2. Between controls and tennis players.
3. To compare the differences between the median, ulnar and radial nerves.

All of the participants in this group were found to have changes in the range of movement of the dominant upper limb and half were found to have changes in the range of movement of the cervical spine. Neurological examination proved normal bilaterally for isometric muscle power, reflexes, and cutaneous sensation to light touch. No changes were found in the control group.

There was no difference of the mean of vibration threshold between dominant and non- dominant arms in tennis players ($p > 0.5$), and in control participants ($p > 0.2$). There was a significant difference between tennis players and controls ($p < 0.03$). There was no difference in the vibration threshold of the areas of the skin innervated by the median, ulnar and radial nerves in tennis players (Figure 1). This was also the case for the control participants.

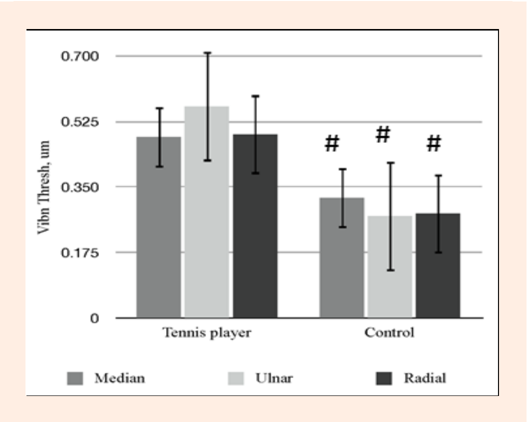

Figure 1. Average vibration thresholds (+/- standard error) for areas of the hand innervated by the median, ulnar and radial nerves for tennis players and controls; showing the dominant and non-dominant arms combined for both groups. The figure shows a difference between tennis players and controls (# $p < 0.001$) and no difference between areas of the skin innervated by the individual nerves ($p > 0.8$).

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Clinical examination of the tennis players used in this study showed they had similar anatomical changes as described in previous studies (Kibler 2002), in the dominant arm only. Comparing young healthy tennis players and healthy non-tennis playing controls, bilateral increased vibration threshold was evident in the tennis players, suggesting sub- clinical central changes in somatosensory processing and, or bilateral, minor neuropathic changes.

As a feasibility study, the author is mindful of the effects of both a small sample size and the lack of blinding on the potential effect on any assumed difference in somatosensory function that is demonstrated by vibration threshold testing. The author believes the results are sufficiently interesting enough to warrant further investigation.

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