The Effect of Wrist Flexion and Extension on Median Nerve at Carpal Tunnel among Older Japanese Men

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1. Introduction
The population of aging workforce is increasing and aging process affect the workers' strength, motor skills, easy to fatigue and speed of movement (Cote et al., 2014). Workplace related musculoskeletal disorder such as carpal tunnel syndrome causes by the median nerve compression within the carpal tunnel. Wrist angle changes leads to median nerve deformation and causes the median nerve cross-sectional area (MNCSA) became smaller among young adults (Loh and Muraki, 2014; Loh and Muraki, 2015). The objectives are to investigate the changes of MNCSA among older adults and to determine the MNCSA deformation percentages as the wrist angle changes from neutral (WN 0°) to 30° flexion (WF) and extension (WE).

2. Method
Twelve healthy right-handed male adults (age = 75.2 ± 3.2 years old; height = 162.4 ± 5.5 cm; weight = 62.5 ± 11.1 kg; BMI = 23.6 ± 3.1 kg/m²) were recruited. Ultrasound examination for median nerve was performed using GE Healthcare Ultrasound System (LOGIQ e). The median nerve of dominant wrist was examined at the proximal carpal tunnel level in the transverse plane. Three wrist positions were examined, namely, WN 0°, WF 30°, and WE 30°. MNCSA was measured by a tracing method with ImageJ. The independent variable is the wrist angles and the dependent variable is the MNCSA at different wrist positions. One-way repeated ANOVA and post hoc pairwise Bonferroni-corrected comparison were conducted with flexion-extension positions as factors to examine the changes of MNCSA.

3. Results
The mean values of MNCSA for WN, WF 30°, and WE 30° were 11.20 ± 2.14 mm², 9.59 ± 2.01 mm², and 9.31 ± 1.65 mm², respectively. The main effect of wrist extension-flexion on MNCSA changes was significant (p < 0.001). Post hoc pairwise Bonferroni corrected comparisons showed significant reduction in MNCSA as WN changed to WF 30° and WE 30° (p < 0.001). The deformation ratio of the MNCSA at WE 30° and WF 30° were -14.5% and -16.5%.

4. Conclusion
In this study, significant reduction of MNCSA was observed among older men as the wrist changed from neutral (0°) to both 30° flexion and extension. Wrist flexion-extension shows significant effect on the MNCSA reduction in both young adults (Loh and Muraki, 2014; Loh and Muraki, 2015) and older adults.

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References
