

Gaming Controller Use and its Effects on Morphological Characteristics of the Median Nerve

マリアノ リズベス アンブロシオ

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Name: MARIANO, LIZBETH AMBROCIO

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Abstract of Dissertation

The rising popularity of esports as a profession and a recreational activity has increased the number of players and enthusiasts annually. However, similar to other sports, there are health concerns for players such as musculoskeletal injuries and discomfort. Carpal tunnel syndrome (CTS) is one of the most common injuries experienced by the players. Thus, this dissertation mainly aimed to determine the effects of gaming on the musculoskeletal health of players and investigate its impact on the median nerve. Furthermore, the first study aimed to determine the prevalence and severity of musculoskeletal pain, player characteristics, and gaming conditions in Filipino and Japanese esports players. It was found that Filipino and Japanese players experienced musculoskeletal pain in the upper body, specifically in the back, neck, wrists, hands, and shoulders. Positive correlations were found between the number of playing years and presence of neck, shoulder, and wrist pain among Japanese participants. Increased number of playing hours was also positively correlated with hand pain.

The second study aimed to investigate the dynamic changes in the median nerve at the proximal carpal tunnel, specifically the cross-sectional area, circularity, and longitudinal and transverse diameters, using different buttons and gaming controllers during simulated and actual gaming. A smaller gamepad size resulted to a smaller median nerve cross-sectional area (MNCSA), indicating compression. Moreover, longer travel distances of the buttons showed greater deformation of the median nerve, as evidenced by a smaller MNCSA. Analog stick design was also found to compress the carpal tunnel when fully pushed by the thumb. Analysis of the dynamic changes in the median nerve revealed a significant increase in the longitudinal diameter compared to the simulated use. These findings indicate that the median nerve undergoes compression and strain during an actual game.

Lastly, the third study aimed to determine the acute changes in the median nerve and hand functions after playing esports for different durations. Playing esports continuously resulted in an increased MNCSA for both hands after 90 and 120 minutes. The increase in the MNCSA after some time highlights the importance of taking regular breaks. Thus, players should incorporate breaks into their regular gaming schedules to allow for recovery and prevent the development of CTS symptoms.

In summary, this dissertation presents the impact of gaming on the musculoskeletal health of players and on the morphological changes in the median nerve. A thorough analysis of the results provided the insights into the relevant factors affecting median nerve deformation. This study highlights the importance of controller design, specifically gamepad size and button design, and regular breaks to minimize the stress exerted on the median nerve to prevent CTS.