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6.10. Vibration Load in Sport
6.10.2. Application of Vibration in Exercise

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The effect on coefficient of restitution and vibratory conduction of tennis racket arranged in one-piece molded and pu-foam handles

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Tennis racket material composition and structure might affect the racket feature when impact. This study aimed at analyzing the characters of tennis racket which were varied with one-piece molded and pu-foam handles. This study was also to investigate how the vibratory conduction on racket handles and coefficient of restitution of the ball from each racket were affected by the vibration of the racket. There were ten different kinds of tennis racket, composed by mixing carbon fiber and glass fiber in the ratio of 1 to 0, 3 to 1, 1 to 1, 1 to 3 and 0 to 1. The structure of the racket handles were arranged in one-piece molded handle and pu-foam handle. The rackets had the same weight, string tension and balance. In this study, one experiment was to monitor the vibration in the grip of every tennis rackets. Three accelerometers (500 G) and BioPAC system were attached to each racket to acquire the vibratory signals, and the sample rate was 2000 Hz. The other experiment was to distinguish the coefficient of restitution between the ball and everyone of ten different rackets. The impact of the tennis ball was set in the velocity of 28 m/s or so. SIMI Analysis System with one high-speed video camera (1000 Hz) was used to record the kinematics data and to calculate the coefficient of restitution between the ball and racket. The results of this study indicated that the racket arranged in pu-foam handles had high value of vibratory damping ratio. On the other hand, however, the racket arranged in one-piece molded had high value of coefficient of restitution.