

Effect of Vibration Dampers on Tennis Athletes' Perception and Playing Feel: A Preliminary Study

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Summary

This study presents preliminary insight on the impact of tennis vibration dampeners (VD) on athletes' playing feel and perception. The subjects hit forehand shots in two conditions: with a VD and without VD. In both conditions the presence of the VD was visually masked. The results of one subject are shown. The subject recognized his usual racquet condition by the playing feel. No significant differences were found in accuracy and ball speed, albeit the latter was slightly higher with the subject's familiar configuration (his racquet with VD).

Introduction

Traditional vibration dampeners are small devices placed between the strings of a tennis racquet and serve to reduce vibrations [1], with the purpose of providing a more comfortable playing experience. Indeed, some tennis players claim they cannot play without. However, previous studies revealed that VDs affect vibration content above 200 Hz [2], i.e. above the content transmitted to the players' hand [3,4]. Following these considerations, we assume that VD are mostly relevant for players' acoustical preferences, and, to a lesser extent, for proprioceptive comfort. Therefore, this study aims to investigate whether the presence of VDs influences perception and playing feel.

Methods

Thirty experienced tennis players (> 4 years of playing experience with a French ranking of "3e série") wore during the test earmuffs (3M Peltor X5A, 30dB protection for $f \leq 500$ Hz) and used a Dunlop FX500 racquet where the presence of the VD was visually masked. The racquet was strung with Head monofilament at 22 kg the day before the measurements. Unaware of the situation, they participated crosswise in two conditions: Vibration Damper (VD) and Control Group (CG). The subjects performed two sets of ten long line forehand shots for each situation on the same day, receiving the ball from a ball-launching machine, aiming to play into a 2 m x 2 m area on the other side of the court. A speed radar (Stalker Pro II, Stalker Sport, Richardson, Texas) measured the ball speed. An evaluator checked whether the ball reached the target area using a binary variable (1: in, 0: out). A questionnaire regarding the presence or absence of VD, vibrations transmitted, impact sound and playing comfort was filled. MANOVA test was used to detect changes in ball speed, accuracy of the shots and players comfort between the conditions. Statistical analysis was carried out with Jasp software (Version 0.18.3).

Results and Discussion

Preliminary results for one subject are shown. The subject perceived no difference in the sound of impact and vibration between the two racquet conditions. However, being used to playing with the same model of the experiment with VD, he recognized his usual situation as a playing feel and correctly guessed when the racquet had the VD. In terms of performance, there was no significant difference in accuracy between the two situations (VD: 56 %; CG: 50 %) and a difference of almost 3km/h (Figure 1), still not significant in ball speed with VD compared to the other situation: (VD: 127.3; CG: 124.5 km/h).

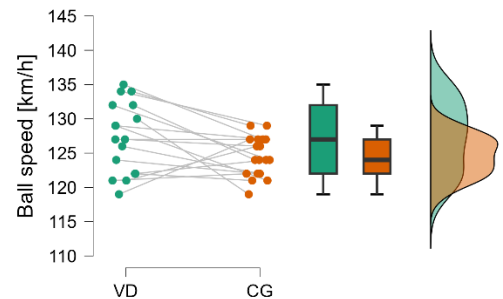


Figure 1: Raincloud plot relative to the ball speed (km/h) in the two conditions: Traditional Damper (VD) and Control Group (CG) .

These findings suggest that the presence of the VD, the most usual situation to the subject, might have subtly influenced his stroke, potentially leading to a slight increase in swing speed. In this view, the player's subjective perception could have a crucial role. Indeed, despite the use of earmuffs to minimize auditory cues, the subject could accurately distinguish his usual racquet condition based on the familiar playing feel.

Conclusions

This preliminary study provides initial insights into the potential effects of VDs on tennis players. Furthermore, the study highlights the role of player familiarity in influencing performance and comfort feel. The analysis of the full sample size, as well as the use of inertial sensors, handle pressure sensors, and video cameras, may contribute in future studies to understanding the impact of VD on tennis performance.

References

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