SONIFICATION ANALYSIS OF MIDFOOT PLANTAR PRESSURE IN PRONATED AND NOT PRONATED RUNNERS

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Introduction

Runners are often concerned with how they step. Prone running is believed to cause the most overload (Mei et al, 2019). Therefore, ways of assessing foot posture, such as the Foot Posture Index (FPI), are used to obtain clinical information on the posture of an individual's foot. In addition to this information, it is necessary to understand how the foot behaves according to how the first contact occurs. In addition, how the load is transferred from the hindfoot to the forefoot as it passes through the midfoot. That said, it is necessary to observe how the overload in the midfoot region behaves in runners according to the type of step, as well as the relationship of this overload between the medial and lateral regions of the foot. This information is important so that it can be used for a running retraining process and visual and auditory forms of feedback can be used based on this information. Thus, this study aimed to identify sound markers for movement changes in runners with pronation or not pronation foot posture.

Methods

Data on peak plantar pressure from 40 recreational runners were collected using Flexinfit resistive insoles. Participants were categorized into two groups: pronate foot and not pronate foot with Foot Posture Index (FPI) (Redmond et al, 2006). All of them wore running shoes Run Falcon 1.0 (Adidas). Sonification data were collected using Twotone software. We used the C note in the first octave to transform numerical data into sounds according to the pressure magnitude. The sound file was decomposed using Audacity software into a spectrogram illustrating the main frequency components and their amplitudes.

Discussion

As there was no significant difference in the midfoot medial and lateral plantar pressure values, it was impossible to raise any sound marker that could identify these differences. These data corroborated the study by Chuckpaiwong (2008) when he compared the plantar pressure between normal feet and feet with low arch, being classified by the Navicular Drop. Perhaps because the foot pronation movement has a relatively small range of motion compared to other joints, this promotes few variations in plantar pressures in this region. Therefore, when the Sonification process occurred for each group, the sound produced did not provide differentiated harmonics or fundamental frequencies so that it could identify some sound marker.

Results

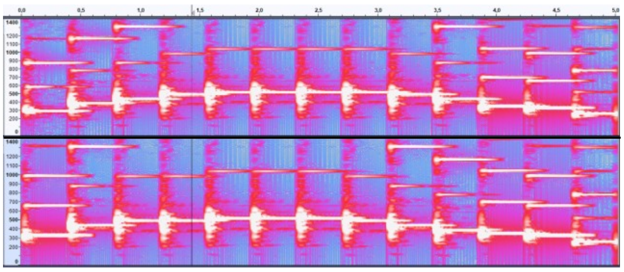

Figure 1: Spectrogram of the medial region of the right midfoot with the pronators in the FPI (above the black line) and the non-pronators (below the black line).

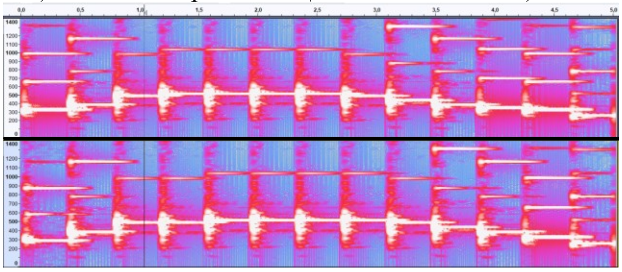

Figure 2: Spectrogram of the lateral region of the right midfoot with the pronators in the FPI (above the black line) and the non-pronators (below the black line).

FPI		7.7%	15.4%	23.1%	30.8%
Not Pronated	M right	41,5	79.11	90.51	98.82
Pronated	M right	34,3	66.03	84.77	94.72
Not Pronated	L right	32.47	67.29	84.8	93.55
Pronated	L right	35.49	59.33	73.88	80.74

Table 1: Plantar pressure (kPa) of the first 31% midfoot contact time. (M-medial; L-lateral).

References

1. Mei et al, Frontiers in Physiology, 10: 573, 2019. doi: 10.3389/fphys.2019.00573
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3. Chuckpaiwong et al, Gait & Posture, 28:405-411, 2008.

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