Estimation of Foot Center of Pressure Information Using Smartphone Sensors

There are a growing number of reports on the effectiveness of postural control training in restoring motor function. One of the most commonly used pieces of information in such training is the Center of Pressure (CoP) of the foot. Many studies have demonstrated the effectiveness of postural control training based on CoP information. Force plates are often used to measure CoP. However, force plates are not widely available and are expensive. Therefore, we aim to estimate CoP displacement using only the sensors of smartphones, which are commonly used in everyday life, for more accessible postural control training.

We used one-link and two-link inverted pendulum models to compare CoP estimates from smartphones with actual force plate measurements. The results confirmed that these models could estimate CoP displacement, and in particular showed that the two-link inverted pendulum model had superior performance. In the future, we plan to develop a smartphone app that can perform such postural control training in practice and verify its effectiveness.

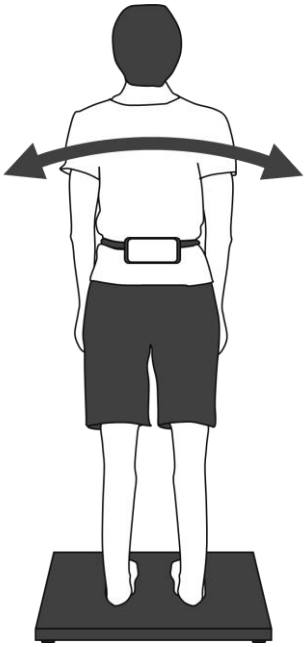

Fig 1. CoP estimation in standing posture with a smartphone worn at the waist.

Keywords: Postural Control, Smartphone, Center of Pressure

References

[1] Huang,Rui, Kaminishi,Kohei, Hasegawa,Tetsuya, Yozu,Arito, Chiba,Ryosuke, & Ota,Jun. (2023). Estimation of center of pressure information by smartphone sensors for postural control training. Proc. 2023 45th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Sydney, Australia, July 24-27, 2023.