A novel approach to quantify the Dynamic Windlass Mechanism

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Hicks in 1954 explained the Windlass Mechanism (WM), following which numerous studies had been performed to confirm the mechanism in static scenarios. Also few studies have categorized static WM based o the onset. However, till date no study has evaluated the WM during running. Hence, the aim of the study is examine WM during running. For this one hundred twenty two samples were collected and out of which fifty eight HFR data were considered for analysis. To record the two-dimensional movement of the first metatarsophalengeal joint and medial longitudinal arch during treadmill running (Aerofit, AF131) a video camera (48 MP, f/1.8 camera, 3840x2160 @ 60fps) was used. The videos were recorded in High Dynamic Range mode. The resultant videos were analysed using KINOVEA (0.9.4) software. The result of this study showed three statistically significant clusters as immediate, early and delayed group. The ROM of MTPJ dorsiflexion is less than 6°, 6°-8° and more than 8° for immediate, early and delayed onset group respectively with an average rise of 3°-4° in MLA. This study results reinforces the findings of the previous literature that WM functions differently in static and dynamic scenarios.