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Investigation of biomechanical and viscoelastic musculoskeletal properties of females over a one-month cycle using the MyotonPRO.

Intro

Women of reproductive age experience cyclical variation in endogenous ('natural') sex steroid hormones during the menstrual cycle to regulate and / or support the production, release and fertilisation of ova (Messinis, Messini & Dafopoulos, 2014).

Hormonal contraceptives are commonly used by female athletes and servicewomen to delay or prevent menstrual bleeding (Martin et al., 2018; Witkop et al., 2017), but there is growing concern that non-reproductive effects of oestrogen on bone, muscle, and metabolism may influence injury risk and physical performance (Chidi-Ogbolu & Barr, 2019).

As with circadian rhythm, hormonal cycles can effect changes to the musculoskeletal resting properties, it is important to understand how these changes affect the body, and if the MyotonPRO can measure these and differentiate by day, to better understand the mechanisms why they are more at risk of injury when taking part in high intensity physical activity or occupations.

Method

Ten to twelve females will be recruited to take part in the study, who are not on any form of contraceptive, and also free of any muscular injuries or conditions that will affect muscular properties. MyotonPRO measurements will be taken from the Patella Tendon, Achillies Tendon, Soleus muscle, Gastrocnemius muscle, and Rectus femoris.

Measurement points will be found in the initial session and the locations noted, to increase reliability and speed up later collection sessions. Sessions will be conducted every other weekday (Monday, Wednesday, Friday) for a month (28-32 days), with the exception of the first, each session will last 5-10 minutes. Participants will be seen around the same time of day each day with similar travel and activities each day (i.e cycling in or walking, consistent). Participants will also be asked to take their temperature each morning with a sensitive thermometer (to two decimal places), to assist in tracking their menstrual cycle. normalise

Data analysis

Data will be normalised with day 1 being the day after menstrual cycle and the final day being the start of the next one. The raw data will then be plotted for visual analysis with descriptive statistics ran. Changes will be assessed using a two-way repeated measures ANOVA with Post hoc tests between key point in the cycle where largest hormonal differences occur.