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TITLE

PULSE RATE MEASUREMENT DURING SLEEP USING WEARABLE SENSORS, AND ITS CORRELATION WITH THE MENSTRUAL CYCLE PHASES, A PROSPECTIVE OBSERVATIONAL STUDY

AUTHOR/S

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ABSTRACT

Context

An affordable, user-friendly fertility monitoring tool remains an unmet need. While calendar based methods offer an appealing solution their accuracy is questionable, especially given the variability of the menstrual cycle length. Hence, methods that rely on physiological parameters reflecting the fertile window represent a more consistent predictor.

Objective

We examine in this study the correlation between pulse rate (PR) and the menstrual phases using wrist-worn PR sensors, and whether PR could be used to identify the fertility window

Patient(s)

41 healthy, non-pregnant women, between 22-42 years old

Methods

A 1-year prospective-observational study.

Intervention(s)

Pulse rate was recorded using wrist worn photoplethysmographic sensors during sleep under normal living conditions.

Main Outcome Measure(s)

The primary outcome is ovulation based on self-administered urine test (Clearblue digital ovulation test).

Results

155 ovulatory cycles were recorded from 33 eligible women, with a mean length of 29 days (± 9). We observed a significant increase in the median PR during the fertile window compared to the menstrual phase (1.7 beats per minute, p -value $< .01$). Moreover, the median PR during the mid-luteal phase was also significantly elevated compared to the fertile window (1.7 beats per minute, $p < .01$), and the menstrual phase (3.4 beats per minute, $p < .01$). The associations were robust to adjusting for the collected behavioral and nutritional covariates.

Conclusions

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There is a significant increase in nocturnal pulse rate correlating with the fertile window, which is robust to the inter- and intra-person variability of menstrual cycle length, behavioral, and nutritional profiles. Hence, PR monitoring using wearable sensors could be used as one parameter within a multi-parameter fertility awareness method.