Detection of fertile window in irregular cycles using a wearable medical device

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Introduction

- The idioptathy of irregular cycles in otherwise healthy women remains poorly studied and little is known about the hormonal patterns within the menstrual cycle of women affected by polycystic ovary syndrome (PCOS).
- Such hormonal fluctuations largely affect the probability of conceiving.
- Using a wrist-worn wearable and a corresponding mobile application (Ava Fertility Tracker), we assessed hormonal patterns and the performance of the underlying algorithm in identifying fertile days in women with irregular cycles with and without diagnosed PCOS.

Design

- This is an ongoing prospective observational cohort of women with irregular cycles and/or PCOS using the Ava Fertility Tracker (Ava AG, Zürich).
- This study started in January 2018 at the University Hospital Zurich and is envisioned to last through early 2020.

Materials and methods

- We included 84 women, 18-40 years old, who are trying to conceive.
- The Ava bracelet, worn during sleep, measures temperature, pulse rate, and heart-rate-variability among other parameters
- Ovulation was detected using a home-based LH urine test. The six-day fertile window is defined as the day of ovulation and the five days preceding ovulation.
- We assessed the performance of the Ava algorithm in identifying the fertile window. Because many causes for irregular cycles, such as PCOS, can cause fluctuating hormonal levels that may be reflected in the physiological patterns, the algorithm screened for multiple fertile windows within a cycle.

Results

- Preliminary results include 161 cycles of women with irregular but undiagnosed or unknown PCOS status and 61 cycles of women with confirmed PCOS.
- The mean cycle length among women with diagnosed PCOS was 34.9 days (95% CI 32.1 to 37.6; range 24 to 98 days) and in women with irregular cycles but undiagnosed or unknown PCOS 28.72 days (95% CI 28.1 to 29.4 days; range 21 to 41 days).
- The accuracy in identifying fertile days in irregular cycles was 82.1% (95% CI 80.0 to 83.8). Almost 30% of these cycles have more than one fertile window with a maximum of four fertile windows per cycle and an average of 1.5 fertile window per cycle. The algorithm successfully identified at least one true fertile day in >98% of the cycles.

Conclusions

- Despite cycle irregularities and physiological patterns suggesting fluctuating hormonal levels, the Ava algorithm has a relatively high accuracy in identifying fertile days using the nightly measurements of physiological parameters.
- Our findings address the unmet medical needs of women with irregular cycles (including PCOS) for targeted intercourse, which has been proven to increase the chances of conception in previously published studies.

References