NORMALISED OVULATION TIMING IN POPULATION USING CORE BODY TEMPERATURE MONITORING TO CONCEIVE

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Objective

To determine pattern of confirmed ovulation in users trying to conceive (TTC) with assistance of nocturnal vaginal Core Body Temperature (CBT) recorded during non-menstruation with the OvuSense system (OS).

Materials and Methods

15,332 ovulatory cycles from 6,365 OS users aged 19 to 53 (if age provided), with cycle length 11 to 190 days (90% 22 - 46).

Participants used OS to monitor CBT, having been asked to provide date of birth and length of TTC before OS use. OS produces one representative CBT for each night, assessed with a proprietary moving averaged analysis over the cycle, then confirms date of ovulation.

Ovulation day (OD) in each cycle was divided by total cycle length to provide a percentage – e.g. OD 13 in 32 day cycle would produce 13/32 = 40.6%. ODs for each cycle were then 'normalised' to a representative cycle day for a 28 day cycle, then rounded down to that normalised day (ND), e.g. 40.6% x 28 days = 11.37 = day 11.

Main outcome measures were: proportions of cycles with corresponding ND, then categorised by indicated length of trying to conceive prior to OS use.

To check if bias for OD was introduced by the OS system, a randomised sample of 125 OS cycles were checked with the '3/6' rule [1]. Sample size determined using square root of the total number of cycles + 1 method. Each variance showed earlier OD confirmation by OS than '3/6', with SD 0.68.
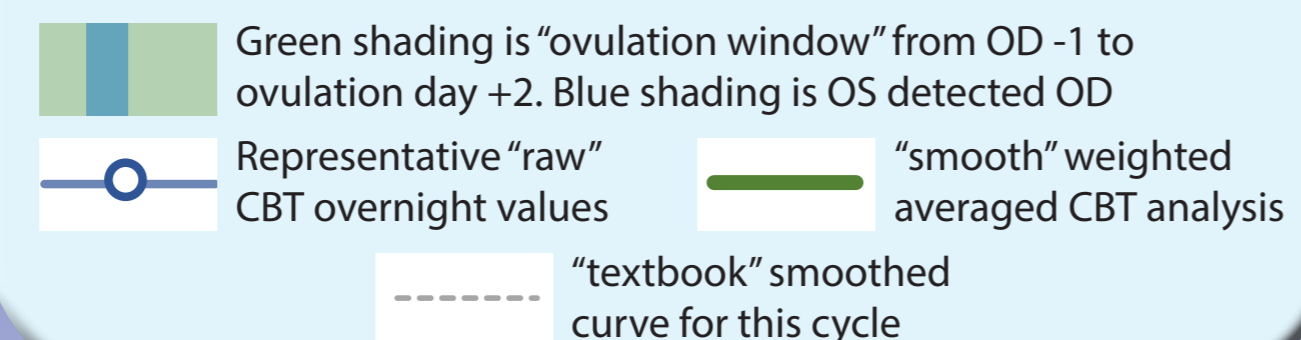
OvuSense Example Chart
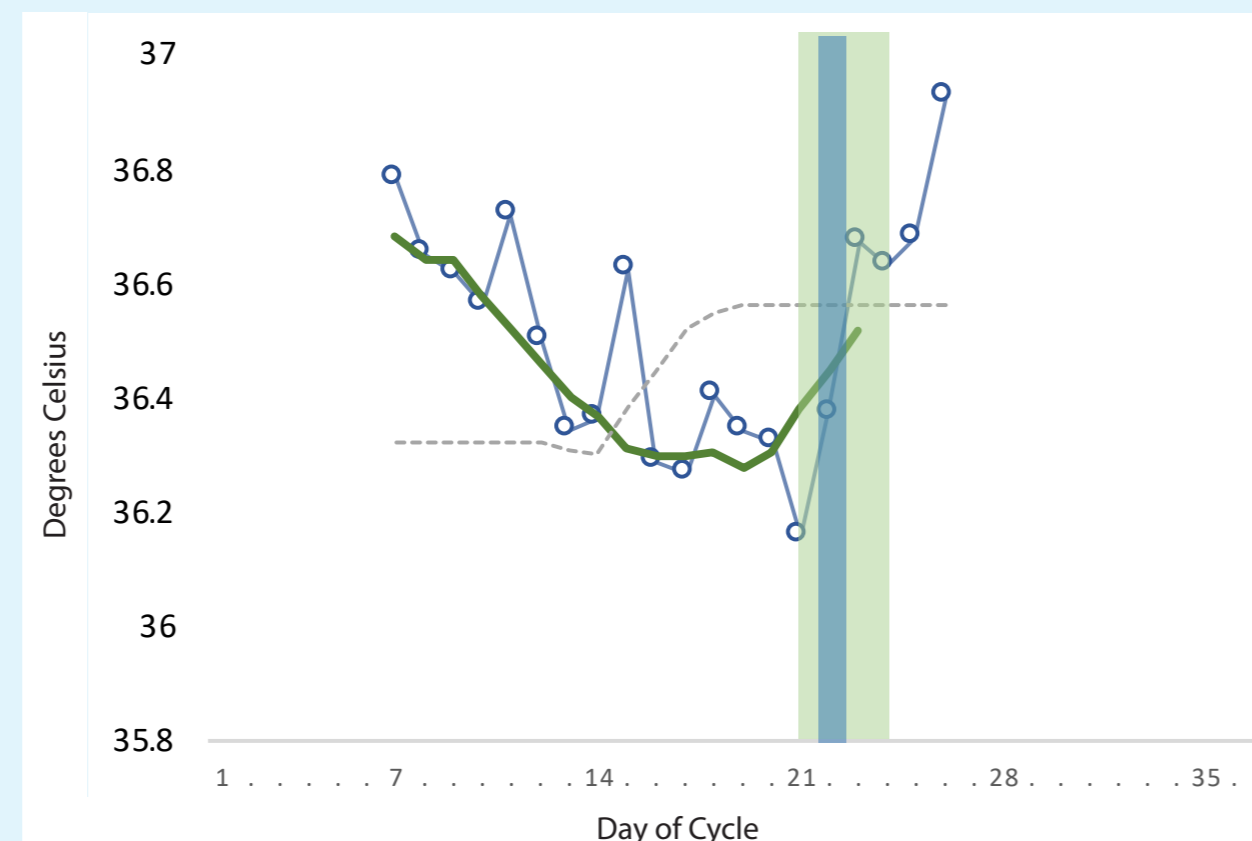
- OS user age: 37
- Trying to conceive: 1-2 years prior to use of OS
- Cycle length for this cycle: 26 days
- OS recordings taken: from day 7 to day 26
- OS confirmed ovulation: day 22

Explanation of Charts

OS plots standard charts on a daily basis. The blue line shows the best representative "raw" CBT value produced by the OS algorithm for each set of overnight measurements taken every 5 minutes. The green "smooth" weighted average CBT curve is used by the OS algorithm to predict ovulation up to 24 hours in advance using this current cycle's data, and then confirm ovulation. A grey "textbook" smoothed curve has been added to these charts for the purpose of this paper to show the typical pattern which might have been expected for this cycle, taking into account an expected "textbook" middle of the cycle ovulation.

Green shading is "ovulation window" from OD -1 to ovulation day +2. Blue shading is OS detected OD

Representative "raw" CBT overnight values

"smooth" weighted averaged CBT analysis

"textbook" smoothed curve for this cycle

Results

Ovulation timing for the OS population shows a broad spread within the 'normalised' 28-day spectrum.

Inter-cycle ovulation timing with the OvuSense System as measured by % day of cycle on which ovulation was detected in relation to total cycle days 'normalised' to represent the equivalent day in a 28 day cycle
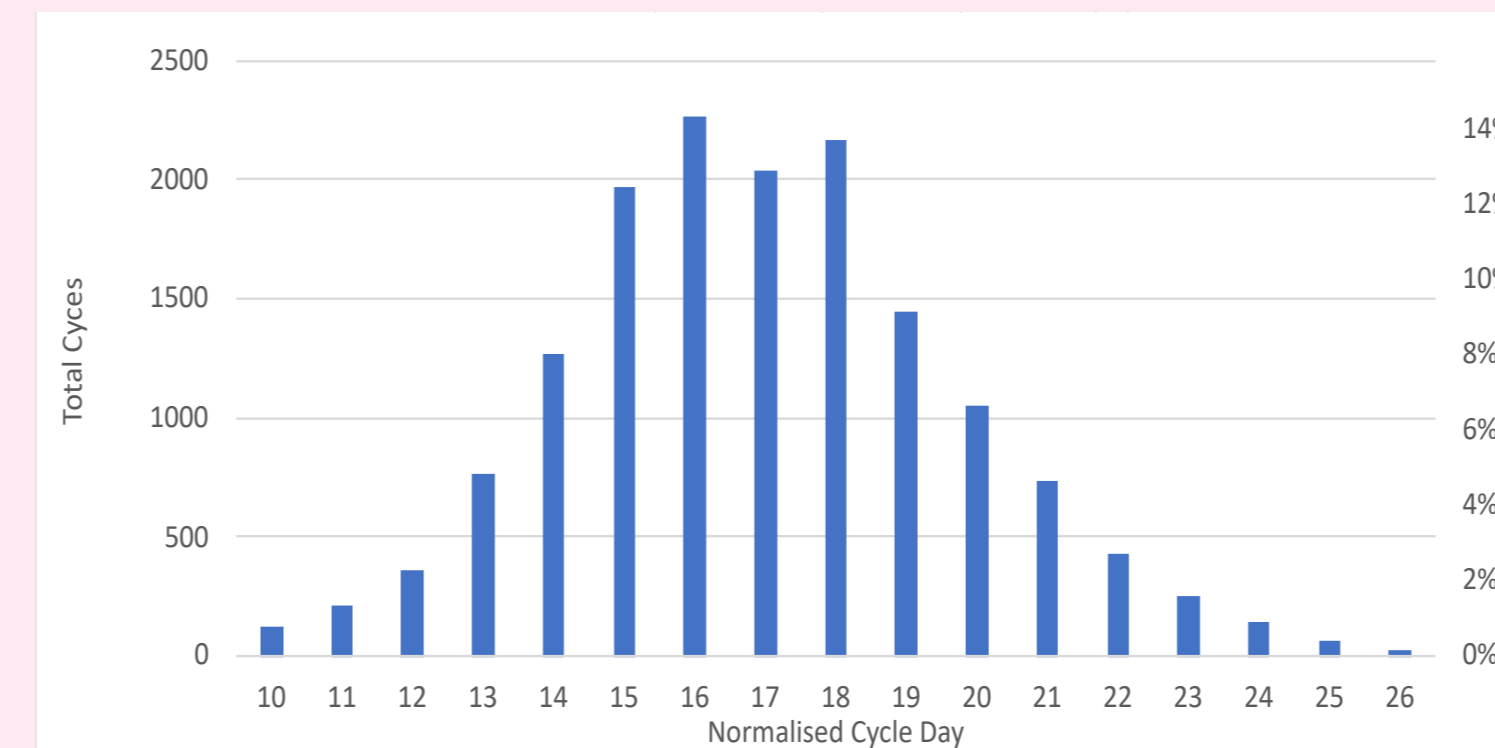
Cycles aggregated in four normalised day of ovulation groups: <13, 13-16, 17-20, > 20 produces 4.55%, 40.89%, 43.80% and 10.77% cycles in each category, respectively. **Analysis of these groups split by time trying to conceive prior to OS use showed no identifiable pattern.**
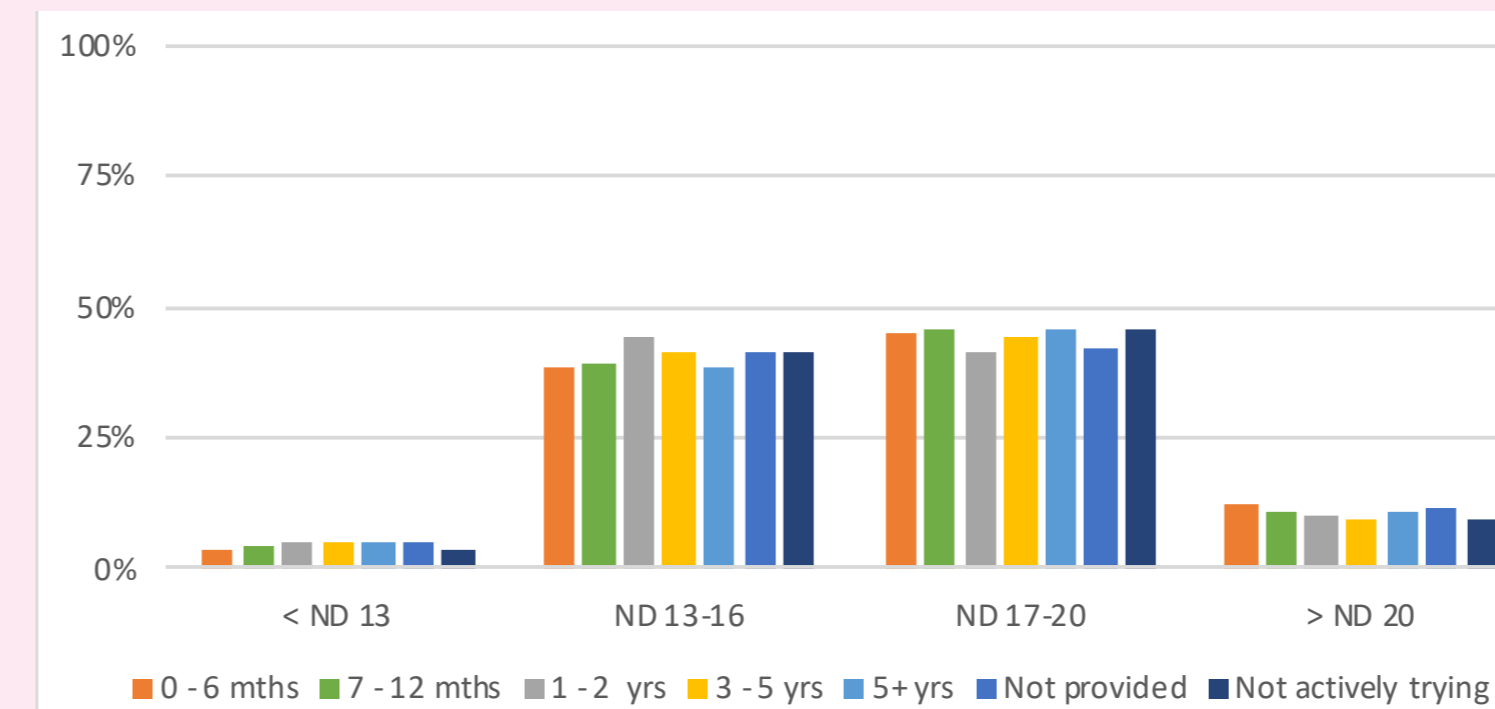
Study Design

Retrospective, longitudinal, comparative, observational study.

Conclusions

Over 52% OS users ovulate more than 60% through their cycle. Over 10% ovulate more than 75% through their cycle. The consistent variance in sampling vs. the '3/6' rule shows the OS method to provide consistent results. Traditional thinking holds that a majority of women ovulate mid-cycle, whereas only 42% of OS users show this pattern.

There appears to be no increased chance of early or late ovulation in OS users based on how long they had been trying to conceive prior to OS use.

References

1. Marshall J. (1968) A field trial of the basal-body-temperature method of regulating births. Lancet 2, 8–10 10.1016/S0140-6736(68)92886-9

2. Papaioannou S, Delkos D (2014) Vaginal core body temperature assessment identifies pre-ovulatory body temperature rise and detects ovulation in advance of ultrasound folliculometry. ESHRE 30th Conference.

3. Hurst BS, Pirrie A (2019). P-345 Atypical vaginal temperature patterns may identify subtle, not yet recognised, causes of infertility. ASRM 75th Conference.

Support