Randomised controlled trial of connected ovulation test system demonstrates double the chances of pregnancy in first cycle and reveals other factors affecting pregnancy likelihood.

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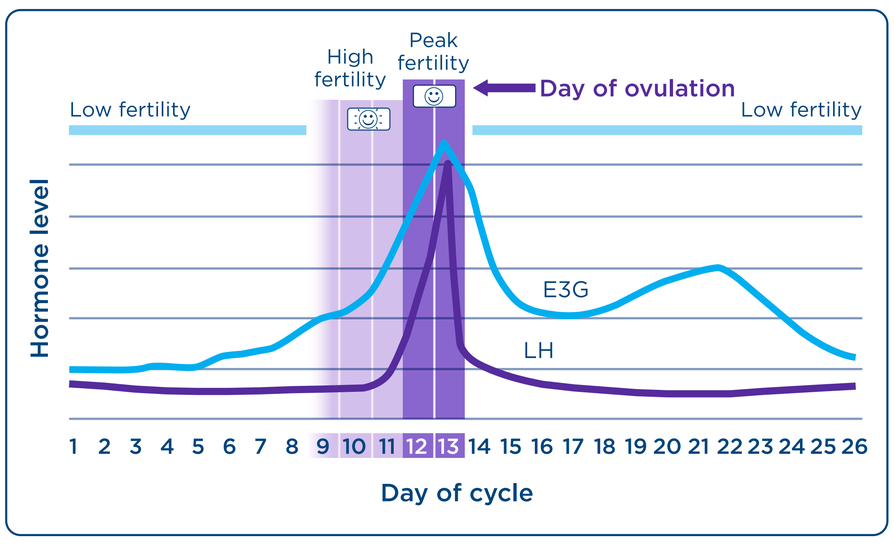
Background

- There are only a limited number of days in a woman's cycle where unprotected intercourse can lead to pregnancy, known as the fertile window
- Timing of intercourse to the fertile window maximises chances of natural conception, and has been shown to reduce the time to pregnancy[1]
- Home ovulation tests, especially those that measure estrogen (the estrogen metabolite estrone-3-glucuronide; E3G) as well as luteinising hormone (LH) to identify the full fertile window, provide an accurate tool for timing intercourse[2]
- Free apps are now very popular but can lack accuracy[3,4,5]
- A new connected ovulation test aims to combine the accuracy of hormone measurements with the convenience of an app (Figure 1)

Objective

To determine whether the Clearblue® Connected Ovulation Test System increases chances of pregnancy, and investigate what other factors are related to likelihood of natural conception.

Figure 1: Clearblue® Connected Ovulation Test System enables monitoring of hormone levels to identify the fertile period. This test determines three phases of fertility: Low (LH and E3G at baseline), High (E3G rise from baseline), and Peak (LH surge detected). Bluetooth® connectivity enables test results to be synced to an app. Users can add intercourse, menses and cycle data to the app, and the app also indicates testing days.



Methods

- Home based, randomised, controlled study of 844 women aged 18-40 who were seeking to conceive.
- Volunteers were randomized 1:1 into the test or control arm.
  - Test group used the Clearblue® Connected Ovulation Test System.
  - The control group were instructed not to use ovulation tests.
- Randomization was stratified by the age of the volunteers, with two cohorts (<35 and ≥35 years of age).
- Volunteers participated for two full cycles if pregnancy was not achieved.
- Admission questionnaires collected demographics, and post study questionnaires examined behaviour during the study.
- Volunteers conducted digital pregnancy tests (Clearblue), collected urine samples (hCG measurement, AutoDELFIA™, Perking Elmer), and a diary of menses to determine pregnancy status.
- Both groups were able to use other methods to time intercourse.
- Trial registration number: NCT03424590

Results

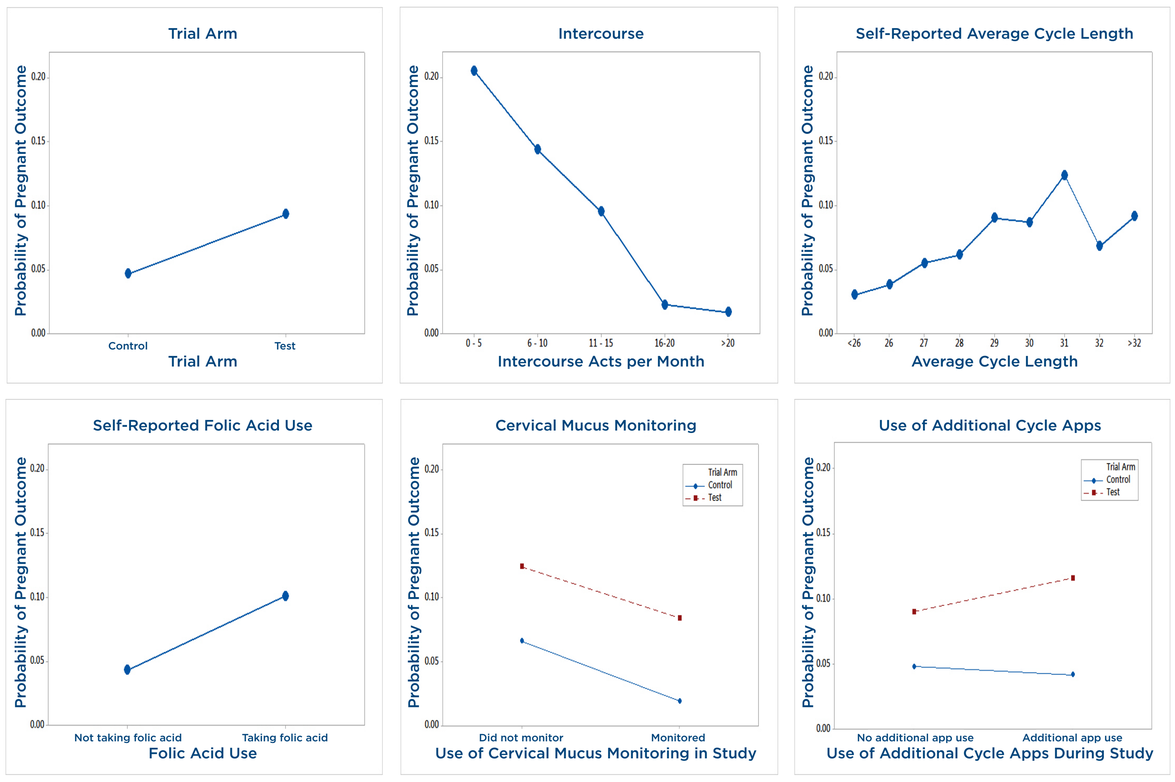
- More women became pregnant after one cycle using the test system (25.4%) compared to the control group (14.7%; P<0.001), with an odds ratio of 2.0. After two cycles pregnancy rate was still higher in the test group (36.2% vs 28.6%; P=0.026), with an odds ratio of 1.4. Table 1.

Table 1: Pregnancy rates

	Pregnancy rate (95% confidence interval)		Odds ratio (95% confidence interval)	Fischer's exact test p-value
	Test group	Control group		
Cycle 1 total pregnancies	25.4% (21.1-30.1%)	14.7% (11.4-18.5%)	2.0 (1.4-2.8)	<0.001
Cycle 1 & 2 total pregnancies	36.2% (31.3-41.3%)	28.6% (24.2-33.4%)	1.4 (1.0-1.9)	0.026

- The test group reported less frequent intercourse per cycle compared to controls (9 vs 10; P=0.027), however, the test group did report greater targeting of intercourse (88.5% vs 57.8%; P<0.001).
- The control group indicated they had used methods, most commonly apps (40.0%) and cervical mucus (35.2%).
- Neither use of a non-study app nor cervical mucus monitoring was associated with a higher pregnancy rate (figure 2).
- Other factors related to likelihood of pregnancy were folic acid use (p=0.004), average cycle length (p=0.021) and intercourse/month (p=<0.0001). The odds ratio for pregnancy was 2.0 for folic acid users vs non-users (figure 2).
- Shorter (≤25 days) cycles had lower conception probability (figure 2).
- Interestingly, the higher number of intercourse acts, the lower the likelihood of conception; odds ratio for pregnancy 6.0 for ≤5 acts, 4.0 for 6-10, 2.6 for 11-15 and 1.0 for 16-20 vs >20 acts (figure 2).

Figure 2: Factors related to likelihood of pregnancy during the study. (total pregnancies in cycle 1)



Discussion

- With women delaying pregnancy and desiring control over their future, tools demonstrated to help conception, such as the Clearblue® Connected Ovulation Test System, are of great relevance today[6].
- This system identifies a woman's personal fertile window based on direct measurement of E3G and LH, so provides accurate information to the user. Studies have found calendar-based apps to be inaccurate for fertile phase prediction[3,4,5] and this is mirrored in this study where use of cycle apps was not associated with increased likelihood of conception.
- High levels of intercourse without conception probably indicates infertility, so could be used to guide couples for infertility investigation.
- An exclusion criteria was trying to conceive for >6months, because a considerably higher sample size would have been required due to low conception rates in this group. Therefore, findings may not extrapolate to those who have been trying for a long period of time.
- Folic acid use is probably a surrogate marker for women adopting a healthier lifestyle and having greater awareness of factors relating to healthy conception.

Conclusion

The test arm (connected ovulation test system) had double the odds of conception compared to the control arm (no ovulation test) in first cycle.

Declaration of interest

Authors are employees of SPD Development Company Ltd, a wholly owned subsidiary of SPD Swiss Precision Diagnostics GmbH, the manufacturer of Clearblue® pregnancy and fertility tests. The study was funded by SPD Development Company Ltd. Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Clearblue® is under license. Other trademarks and trade names are those of their respective owners.

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