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Can likelihood of natural pregnancy be predicted from demographics and LH surge characteristics?

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Background

- There are many factors known to influence the probability of conceiving naturally, such as age, body mass index (BMI), smoking and previous obstetric history[1]
- Age is a particularly significant factor: a fertile 30-year-old has a 20% chance of conceiving each month, which declines to <5% for a 40-year-old woman[2]
- Fertility declines during the perimenopause, but onset of the perimenopause is not currently predictable and often not recognisable; in addition, conditions such as polycystic ovary syndrome (PCOS) may influence fertility; these can manifest in disturbances in the luteinising hormone (LH) surge profile[3]
- Therefore, it is possible that characterisation of the LH surge, along with basic demographic information, could provide important information on the chances of natural conception

Study objective

- Predicting the likelihood of conceiving naturally could help women who are planning pregnancy
- This study examined whether demographic information, together with LH surge characteristics, can predict the likelihood of women conceiving naturally

Methods

- This was a home-based, observational study
- Trial registration number: NCT01577147

Study population

- Volunteers from the UK seeking to conceive naturally (>18 years old)
- Analysis population; Women who became pregnant (n=185) and an approximately equal number of randomly selected non-pregnant women (n=200)

Data collection

- Demographic data was self-reported
- Volunteers collected daily urine samples for one entire menstrual cycle; urinary LH was measured using AutoDELFIA across the whole cycle

Analysis

- LH surges were characterised to examine baseline levels, surge day, peak day, peak concentration and magnitude of surge
- The most accurate description of baseline levels was found to be square root of (LH concentration on cycle day 6–15)^2, and description of magnitude was (LH on peak day - LH on surge day)/LH on surge day

Results

Study population

- Of the 185 pregnancies, 26 miscarried and 149 had ongoing pregnancies (10 pregnancies were lost to other causes)
- Of the 200 non-pregnant volunteers, 26 had no LH surge day (due to varying reasons, including: missing LH samples, anovulatory cycles or atypical LH curves)

Association between demographic information and chance of conceiving

- Table 1 provides summary statistics of the impact of demographic variables on the likelihood of conceiving
- Those who failed to conceive had a higher BMI (non-statistically significant difference) and were more likely to be current smokers
- The number of months trying to conceive was an extremely significant predictor of pregnancy and the number of previous livebirths also differed significantly between those who did and did not conceive
- Both self-reported endometriosis and PCOS were more prevalent in the group that failed to conceive; endometriosis, 1% versus 4% and PCOS, 11% versus 18% for the pregnant and non-pregnant groups, respectively

Table 1. Impact of demographic variables on likelihood of conceiving

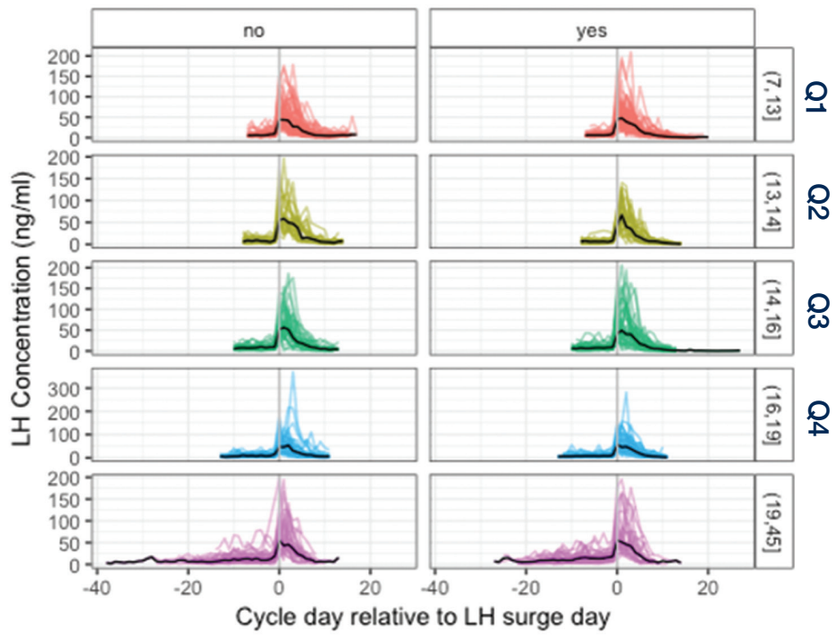
Variable	Pregnant volunteers	Non-pregnant volunteers	P Value*
Mean age, years (SD)	30.55 (5.05)	30.57 (5.14)	0.7
Mean BMI (SD)	26.90 (5.94)	27.91 (6.70)	0.12
Self-reported average cycle length, days (SD)	29.28 (3.06)	29.84 (3.91)	0.12
Current smokers	5.4%	10.5%	
Months trying to conceive (SD)	7.72 (9.13)	17.75 (24.19)	<0.001
Previous livebirths, n (SD)	0.92 (1.04)	0.66 (0.86)	0.01
Previous miscarriages, n (SD)	0.68 (1.04)	0.70 (1.18)	0.87

BMI, body mass index; SD, standard deviation.

Association between cycle characteristics and chance of conceiving

- Volunteers who conceived had slightly shorter, but non-significant, self-reported menstrual cycle characteristics (Table 1)
- Volunteers' cycles were grouped into quartiles according to day of LH surge. Figure 1 shows the LH surge profiles for each quartile of surge days in cycles where volunteers did and did not conceive

Figure 1. Comparison of volunteers' LH surge profiles in women who Conceived vs those who Did not conceive



Quartiles were: Q1, day 7–13; Q2, day 13–14; Q3, day 14–16; Q4, day 16–19; LH, luteinising hormone

- Surge profiles were comparable between the groups for each quartile of surge day, showing that the quality of LH surge does not depend upon when in the cycle a woman ovulates
- LH surge day or LH concentration did not differ significantly between groups; however, volunteers who did not conceive had either higher or lower basal LH; significantly different on day 6 (p=0.02)
- The surge profile was also steeper in the group that became pregnant, indicating that LH cycle profiles may assist in predicting pregnancy success

Conclusions

- Base demographics can predict the likelihood of achieving pregnancy: particularly length of time trying to conceive, previous number of pregnancies, BMI and self-reported PCOS/endometriosis
- LH surges were broadly observed to be similar between both groups, but a steeper LH surge is associated with a higher pregnancy likelihood
- LH baseline on day 6 is important, with very low or very high levels associated with a lower probability of conception
- Providing robust information to women on their chances of natural conception can provide them with realistic expectations on their likelihood of success. This may be especially valuable to women of an older age who still wish to try for a natural conception, enabling them to make more objective decisions on their path to pregnancy

References

1. Sharma R., *et al*. Reprod Biol Endocrinol. (2013) 11: 66; 2. American Society of Reproductive Medicine 2012. Age and Fertility. A guide for patients. Available at: http://www.reproductivefacts.org/news-and-publications/patient-fact-sheets-and-booklets/fact-sheets-and-info-booklets/age-and-fertility/ (accessed May 2017); 3. Burger HG., *et al.* Menopause. (2008) 15: 603–612; 4. Shahrami SH., *et al*. Acta Med Iran. (2016) 54: 134–139.

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