Monitoring cycle trends in patients of advanced maternal age

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Advanced maternal age (AMA) is associated with a decline in both ovarian reserve and oocyte competence. Yet, the proportion of individuals delaying childbearing until the 3rd-early 4th decade of life has greatly increased. In AMA patients, an infertility workup is recommended after 6 months of regular unprotected intercourse. We looked to compare quantitative hormone data and cycle trends using the Oova platform among AMA and non-AMA patients to inform patient management. Results demonstrate that more cycles and more measurements per cycle were tracked with increasing age. Based on these results, it can be inferred that AMA patients would be more likely to adhere to protocols for fertility treatment and monitoring more effectively than non-AMA patients. We show that by proactively monitoring fertility hormone levels in AMA patients, patients can receive increased personalized care and expedite access to fertility treatment.

Introduction

According to the Society for Maternal-Fetal Medicine, advanced maternal age (AMA) is defined as women of age 35 years or above at delivery[1]. It is well established that the fecundity of women decreases gradually but significantly beginning approximately at age 32 and decreasing more rapidly after age 37[2]. However, in the US, 44.4% of births from 2018-2020 were to women in their thirties and 3.5% of births occurred in women over the age of 40[3]. In a recent study, the most common reasons for delaying pregnancies in women 35 years or older were: not having a partner (50%), wanting financial security (32%), and a stable career (19%)[4].

Many assumptions are made about women with AMA when it comes to fertility, however many of these are based on outdated information. We evaluated hormone patterns, cycle trends, and general demographic information to see if AMA patients were more likely to have trouble conceiving than patients in a younger age group.

The technology utilized in this study was an at-home fertility testing kit, Oova. Oova accurately monitors luteinizing hormone (LH) and progesterone through daily urine and measures quantitative values in real-time. The platform learns every woman's unique hormone baseline levels and detects fluctuations in her daily levels compared to that. The hormone levels were used to determine a woman's most fertile days and confirm ovulation.

References

[1] Publications & Guidelines | SMFM.org - The Society for Maternal-Fetal Medicine. https://www.smfm.org/publications/81-advanced-maternal-age-and-the risk-of-antepartum-stillbirth. Accessed April 12, 2022. [2] Female Age-Related Fertility Decline | ACOG. https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2014/03/female-age-related-fertility-decline. Accessed April 12, 2022. [3] Birth rates by maternal age: United States, 2018-2020 Average | PeriStats | March of Dimes. https://www.marchofdimes.org/peristats/data?reg=99&top=2&stop=2&lev=1&slev=1&obj=1. Accessed April 12, 2022. [4] Hammarberg K, Clarke VE. Reasons for delaying childbearing--a survey of women aged over 35 years seeking assisted reproductive technology - PubMed. Australian Family Physician. https://pubmed.ncbi.nlm.nih.gov/15799672/. Published 2005. Accessed April 12, 2022.

Results

DEMOGRAPHICS

Data were available for 1,782 women with 46.5% above 34 years. Overall demographic information on the cohort can be seen in **Table 1**.

Age Range	N	Average Age (years)	BMI
18-24	165	21.98 ± 1.8	32.14 ± 10.85
25-29	280	27.19 ± 1.39	32.49 ± 12.52
30-34	510	32.07 ± 1.37	31.26 ± 10.81
35-39	463	36.69 ± 1.39	29.91 ± 9.95
40-44	256	41.68 ± 1.39	30.41 ± 9.77
45-60	108	46.43 ± 1.4	27.65 ± 9.24

Table 1. Demographic information for patients observed in the study.

Patients were allowed to report whether they were diagnosed with any reproductive disorder within the app. **Figure 1** displays a segmentation of self-reported disorders across AMA and non-AMA patients.

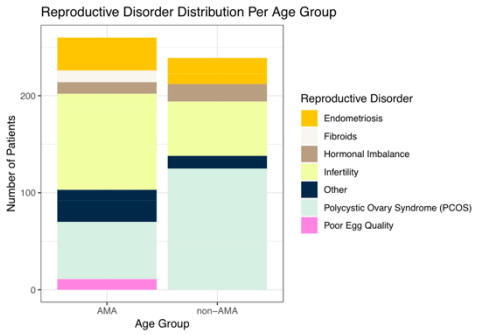

Figure 1. Self-reported reproductive disorders across each age group.

Methods

Data Set

- The data set used in this study includes all patients using the Oova platform between April 20, 2020 and February 14, 2022.
- AMA patients were defined as women above the age of 34

Oova Technology

- Data was solely collected through Oova's platform
- Demographic information was self-reported by patients
- Hormone data was captured using Oova cartridges and phone
- Patients provided a urine sample on the sample pad and scanned the cartridge using a smartphone
- Both LH and progesterone were quantitatively detected
- Patients were instructed to test at approximately the same time for all 15 days

Hormone Measurements

- LH Range: 0-125 mIU/L
- Progesterone Range: 0-22.5 ng/mL

AMA PATIENTS MONITORED THEIR HORMONES FOR MORE CYCLES

The Oova kit is designed to be used for 15 consecutive days with the goal of capturing a user's hormone baseline levels, their LH surge, and post-surge to confirm ovulation. Many women begin using less cartridges in subsequent cycles as they get more familiar with their hormone patterns. **Table 2** highlights that AMA women used Oova for more cycles and more consistently in each cycle than those in the younger age group.

Age Range	N	Average Number of Cycles	Average Number of Scans per Cycle
18-24	165	1.7 ± 1.25	5.94 ± 4.82
25-29	280	2.53 ± 1.99	6.36 ± 7.58
30-34	510	2.92 ± 2.39	7.95 ± 9.98
35-39	463	3.42 ± 3.28	8.86 ± 13.12
40-44	256	3.84 ± 3.81	7.69 ± 8.99
45-60	108	4.47 ± 3.94	12.51 ± 14.57

Table 2. Usage of Oova test strips across various age groups.

Discussion

To the best of our knowledge, this study was the first to evaluate AMA patients using solely hormone patterns measured in the patient's home. Our results indicate that women above the age of 34 were more diligent about monitoring their menstrual cycles and understanding their hormone patterns than those in the younger age group. We also observed that AMA patients were not more likely to be diagnosed with a reproductive disorder than the non-AMA group. This will be evaluated in more detail in a follow up study to understand the diagnoses of these patients and if these factors influenced the attentiveness of product utility.

By increasing the ease of monitoring hormones at home, Oova's technology opens many opportunities for clinicians and patients. These results highlight that by proactively monitoring fertility hormone levels in AMA patients, patients can receive personalized care and expedite access to fertility treatment.