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OBJECTIVE: To determine the susceptibility of the oocytes, embryos, granulosa and cumulus cells to SARS-CoV-2 infection.

MATERIALS AND METHODS: To address this question, we retrospectively examined the gene expression profiles of SARS-CoV-2-associated receptors and proteases in human granulosa cells (GCs), cumulus cells (CCs), mature oocytes, day 3 embryos, blastocysts and trophectoderm cells obtained from previously described Affymetrix microarray data from assisted reproduction patients. Human GCs and CCs (n = 17), mature oocytes (n = 6), and preimplantation embryos (n = 20) were analyzed and gene expression levels of receptors and proteases closely related to SARS-CoV-2 infection were reported. For each gene, the number of samples with the probe set present, based on the detection call was studied. Each probe set was classified according to the signal intensity value median, as low (< 100), medium (100-200) or high expression level (> 200).

RESULTS: ACE2, BSG, CTSL, CTSA were detectable at high expression level in all mature oocyte samples, while only CTSL was strongly expressed in all day 3 embryos. The most representative dual co-expression of SARS-CoV-2-associated proteases and receptors was present in all CCs against BSG, CTSL, CTSA were detectable in the entire cohort at high expression level, and the prevalence of the different dual co-expression of SARS-CoV-2-associated proteases and receptors was optimal (100% of samples). Interestingly, only CTSL was detectable in all trophectoderm samples and a prevalence of 60% was found for the BSG-CTSL co-expression. ACE2, BSG, CTSL and CTSA were present at high expression level in CCs samples. In contrast, ACE2 and BSG expression was very low while CTSL and CTSA showed a high expression level in GCs. A prevalence of 100% was reported for ACE2-CTSL, ACE2-CTSA co-expression for both cell types. In addition, BSG-CTSL and BSG-CTSA co-expression were also present in all CCs against ~70% in GCs samples. This data suggests a potential risk of SARS-CoV-2 infection either GC or early embryo development.

CONCLUSIONS: Transcriptomic analyses of SARS-CoV-2-associated receptors and proteases strongly suggest that blastocysts are most permissive to SARS-CoV-2 compared with mature oocytes and day 3 embryos.

IMPACT STATEMENT: Specimens from female genital tract may be considered as potential targets for SARS-CoV-2.

SUPPORT: None.

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ASSISTED REPRODUCTIVE TECHNOLOGY PROCEDURES IN THE US PRIOR TO AND DURING THE COVID-19 PANDEMIC. Jennifer Chae-Kim, MD, Yongil T. Kim, PhD, Larisa Gavrilova-Jordan, MD, Gordon Wright Bates, MD1 1Texas A&M College of Medicine, Baylor Scott & White Health, Temple, TX; 2University of Texas at Dallas, Naveen Jindal School of Management, Richardson, TX; 3Medical College of Georgia at Augusta University, Augusta, GA.

OBJECTIVE: The COVID-19 pandemic has created many uncertainties for those pursuing fertility care and assisted reproductive technology (ART) procedures, due to ever-changing healthcare restrictions. There is a lack of research on large-scale data for ART procedures during the pandemic. The objective of our study is to evaluate ART procedures, specifically oocyte retrieval and in vitro fertilization (IVF) cycles, prior to and during the pandemic.

MATERIALS AND METHODS: Claims data from Symphony Health, one of the largest databases of patient-level data on more than 280 million patients in the US, was examined from May 1, 2019 to February 28, 2021. Reproductive-aged women were included in the analysis. March - April 2020 was used as a threshold for when healthcare restrictions became widespread. We compared 10 months prior to the pandemic (May 2019 - Feb 2020) and the same time period after the start of the pandemic (May 2020 - Feb 2021). ART procedures were identified using CPT codes (58970 for oocyte retrieval, and S4011, S4015, and S4016 for IVF) under ICD-10. Data analysis was conducted in Stata, version 16.1, using 2-sided t-tests with significance set at P < 0.05.

RESULTS: Our search yielded 39,087 oocyte retrievals and 14,365 IVF cycles. The average age of patients who started an IVF cycle (36.4 ± 4.4 years) prior to and during the pandemic was statistically different. Time series plots show that, after a substantial drop in focal vaginal procedures in March - April 2020, ART procedures quickly recovered to pre-pandemic baseline by June 2020. Afterwards, oocyte retrievals increased from 1,703 per month pre-pandemic to 2,010 per month during the pandemic, and this difference approached significance (P=0.06). There was not a significant difference in IVF cycles (677 per month pre-pandemic vs 686 per month during the pandemic, P=0.88).

CONCLUSIONS: Despite concerns regarding suspension of ART and delivery of infertility care during the pandemic, our study shows no significant difference in oocyte retrievals and IVF cycles prior to and during the COVID-19 pandemic.

IMPACT STATEMENT: These results suggest reassuring outcomes despite a health crisis in the US. There was no significant delay or interruption of fertility care and ART procedures in the US. Further research should examine how other social determinants such as ethnicity, income and geographic location affected access to and utilization of infertility care.

SUPPORT: None.