Embryos and Ethnicity: A Study of Ploidy Results in IVF

Authors: Emily Wentworth (1), Dinura Gunatilake (2), Mariana Jimenez (2), Heidi Hausermann (1) , Amber R. Cooper (1,2), Angie Beltsos (1), Manuel Viotti (2)
Affiliations: (1) Kindbody, Chicago, IL; and (2) Kindlabs, Secaucus NJ

kindbody

Introduction

- Ploidy status plays a crucial role in **IVF outcomes**, with **euploid embryos** more likely to result in successful pregnancies compared to **aneuploid or mosaic embryos.**
- **Preimplantation genetic testing for aneuploidy (PGT-A)** is widely used, but little research has examined whether **ethnicity affects euploidy, aneuploidy, or mosaicism rates.**
- Aneuploidy and mosaicism arise from **meiotic and mitotic errors**, which have been associated with **gene variants in the general population.**
- Ethnic differences in genetic backgrounds may potentially influence **ploidy outcomes** in IVF patients.
- **Assessing the impact of genetic ancestry on ploidy outcomes** may provide insights into reproductive health disparities and inform clinical approaches in assisted reproductive technology (ART).

Objective

- To investigate whether **ethnicity** affects **embryo ploidy outcomes**, including rates of **euploidy, aneuploidy, and mosaicism**, in **IVF patients** across **four ethnic groups.**

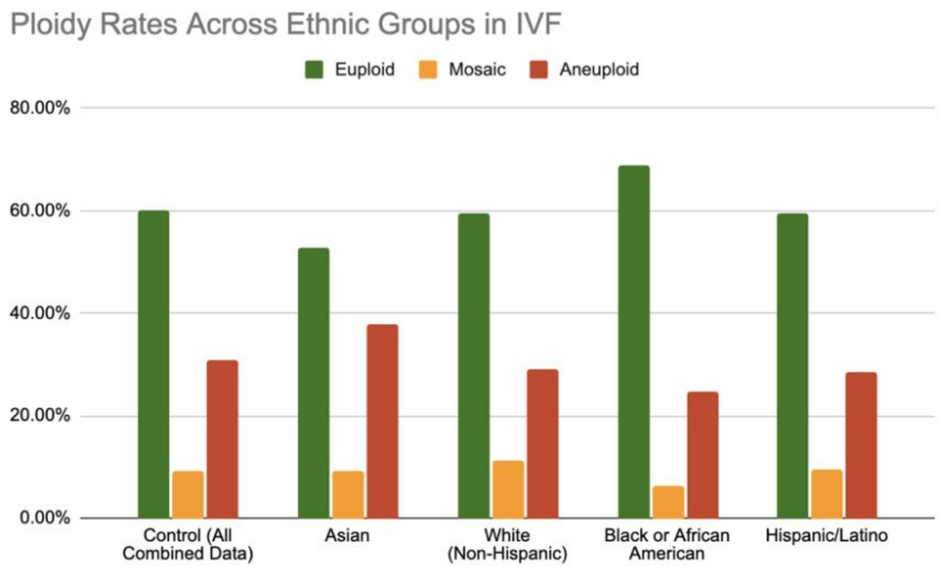
Design

- A retrospective chart review was conducted at a private multi-center fertility center, focusing on patients who underwent preimplantation genetic testing for aneuploidy (PGT-A).

Materials & Methods

- **Patient Selection**: From a pool of **~3,000 patients** who underwent **PGT-A testing**, patients were categorized based on **maternal, self-reported ethnicity.**
- **Sample Size**: A **random sample of 250 autologous embryos per ethnic group** was selected (**Total = 1,000 embryos**).
- **Ploidy Classification**: Embryos were categorized as **euploid, aneuploid, or mosaic**; **triploid, inconclusive, and no-result embryos** were excluded from analysis.
- **Comparative Analysis**: Each **ethnic group was compared against a combined control group** (all ethnicities pooled) to assess disparities in ploidy outcomes.

Results



Results

- A **chi-square test** was conducted to compare **ploidy outcomes (euploid, mosaic, and aneuploid)** across different ethnic groups.
- The analysis included the **control group, Asian, White (non-Hispanic), Black or African American, and Hispanic or Latino** groups.
- Findings: No **statistically significant differences** were observed in ploidy rates between groups (**$\chi^2 = 6.49$, $p = 0.59$**).
- Since the **p-value > 0.05**, ethnicity **did not have a significant impact** on ploidy outcomes in this sample.

Discussion

- The lack of statistical significance suggests that **ethnic background alone may not be a determining factor** in ploidy abnormalities observed in IVF patients. Additionally, self-reported ethnicity may not fully reflect genetic ancestry, potentially masking underlying genetic influences on ploidy status. These findings reinforce the importance of assessing **embryo viability based on clinical and genetic factors rather than broad ethnic classifications.**
- Understanding the factors that influence ploidy outcomes is essential for **improving clinical decision-making in assisted reproductive technology (ART)**. These findings suggest that **embryo selection and IVF treatment approaches should not be adjusted based on ethnicity alone** but rather on established clinical and genetic factors
- Further studies should incorporate **paternal ethnicity, age, and BMI**, in addition to maternal factors, to evaluate **how both parental contributions influence ploidy outcomes**. Expanding sample sizes and including **multicenter cohort analyses** could provide a more comprehensive understanding of embryo ploidy determinants.

References

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