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ELEVATED SPERM DNA FRAGMENTATION IS NOT CORRELATED WITH EMBRIONICMOSAICISM IN PATIENTS UNDERGOING IVF WITH PGT-A

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OBJECTIVE:

Elevated sperm DNA fragmentation (SDF) has been postulated to impair in-vitro fertilization (IVF)outcomes. High index of sperm DNA fragmentation could be a surrogate marker for aneuploidy in the sperm, potentially influencing embryo development. However, the contribution of sperm to embryonic mosaicism has been underrecognized, as it is commonly understood that the paternal effect on the embryonic genome is restricted to the post-zygoteic stage. The objective of this study is to examine the correlation between indices measuring sperm DNA fragmentation and embryonic mosaicism rate in a diverse population of infertile couples undergoing IVF with preimplantation genetic testing for aneuploidy (PGT-A).

MATERIALS AND METHODS:

This retrospective study included all couples undergoing IVF/PGT-A in which Sperm DNA fragmentation Index (DFI) was analyzed from 2019 to 2023. Patients were divided into 2 groups (Group A: elevated DFI (≥30%); Group B: normal DFI (30%)). Patients who had surgical sperm extraction, frozen/thawed semen samples, and patients harboring chromosomal rearrangements were excluded from the analysis. Primary outcome was embryo mosaicism status; secondary outcome included the level of mosaicism. Embryos were classified as low-level mosaic if the trophectoderm (TE) biopsy result contained 20-40% mosaicism and high-level mosaic with 41-80%. Demographic characteristics, cycle characteristics and embryologic data were collected. Student's t-test, chi-square test, and multivariate logistic regression with a GEE model were used for data analysis.

RESULTS:

A total of 521 blastocysts derived from 119 IVF/PGT-A cycles were analyzed. Group A consisted of 56 cases (n= 212 embryos); Group B of 63 cases (n= 309 embryos). Significant differences were found among male patient ages (Group A 40.1 ±2, Group B 38.3±5, p=0.02) and normal

male semen analysis (Group A 35.2%, Group B 57%, p= 0.005). Other stimulation and demographic parameters were comparable between cohorts. While no differences were found in fertilization and blastulation rates between study groups, patients with elevated DFI had fewer blastocysts for biopsy than their counterparts (3.7±2, 4.9±1, p=0.004). Embryonic mosaicism rates were comparable between the two populations (1.4 %(n=31/212), 1.2 %(n=38/309), p=0.34). However, patients in Group A had on average more high-level mosaic embryos than patients in Group B (65.5%,55.7%, p= 0.04). After adjusting for male patient's age, normal semen analysis and number of biopsied embryos, there was no association with elevated DFI and higher odds of embryonic mosaicism (OR 1.09, CI95% 0.9-2.).

CONCLUSIONS:

The rate of mosaicism in high DFI was comparable to controls. These results suggest that the occurrence of mitotic errors involved in mosaicism are not influenced by sperm DNA fragmentation.

IMPACT STATEMENT:

Sperm DNA damage does not appear to influence embryonic mitotic origin aneuploidies.

REFERENCES:

1. Riggs R, Mayer J, Dowling-Lacey D, Chi TF, Jones E, Oehninger S. Does storage time influencepostthaw survival and pregnancy outcome? An analysis of 11,768 cryopreserved human embryos. FertilSteril. 2010 Jan;93(1):109-15. doi: 10.1016/j.fertnstert.2008.09.084. Epub 2008 Nov 21. PMID:19027110.