

PURPOSE

Infertile males have higher levels of sperm DNA fragmentation, which impact natural conception and assisted reproductive technology (ART) procedures. The aim of this study was to investigate the role of sperm DNA integrity on reproductive outcomes after Intracytoplasmic Sperm Injection (ICSI) procedures.

BACKGROUND

Since the advent of ICSI, little attention has been given to the evaluation of the male partner with only semen analysis being the routine diagnostic test. Sperm DNA Fragmentation (SDF) testing has prognostic value in selecting the most appropriate mode of ART treatment as poor sperm DNA integrity strongly impacts natural and IUI conceptions¹. SDF has also been associated with reduced fertilization rates, poor embryo quality, lower pregnancy rates and increased miscarriages rates².

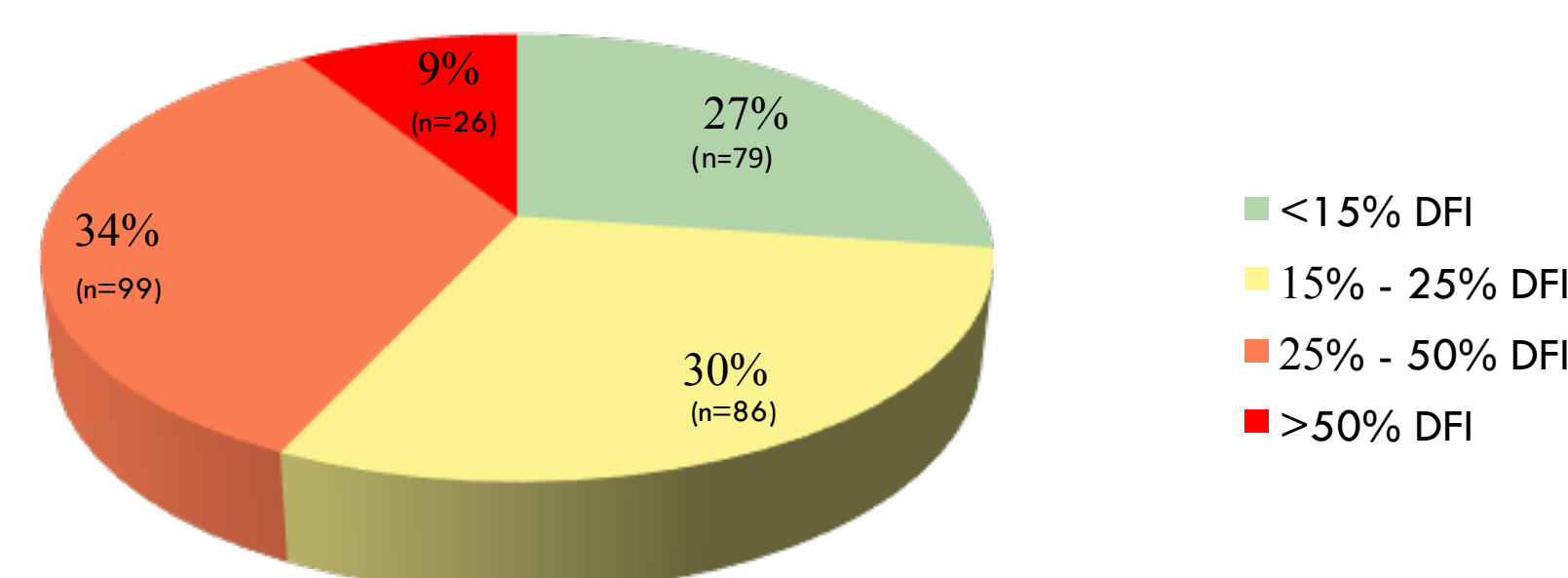
MATERIALS AND METHODS

290 patients reporting to a fertility centre had their Sperm DNA fragmentation levels analysed by the Sperm Chromatin Structure Assay (SCSA)³ prior to ART procedures. Patients then underwent either single cycle ICSI or multiple cycles ICSI. Fertilization rates were monitored and cycle outcomes were classified as clinically positive or negative. Positive cycles were analysed for pregnancy outcomes. All statistical analyses were performed using GraphPad Prism 6.0f.

RESULTS

Patients were classified into 4 groups based on their %DNA Fragmentation Index (%DFI):

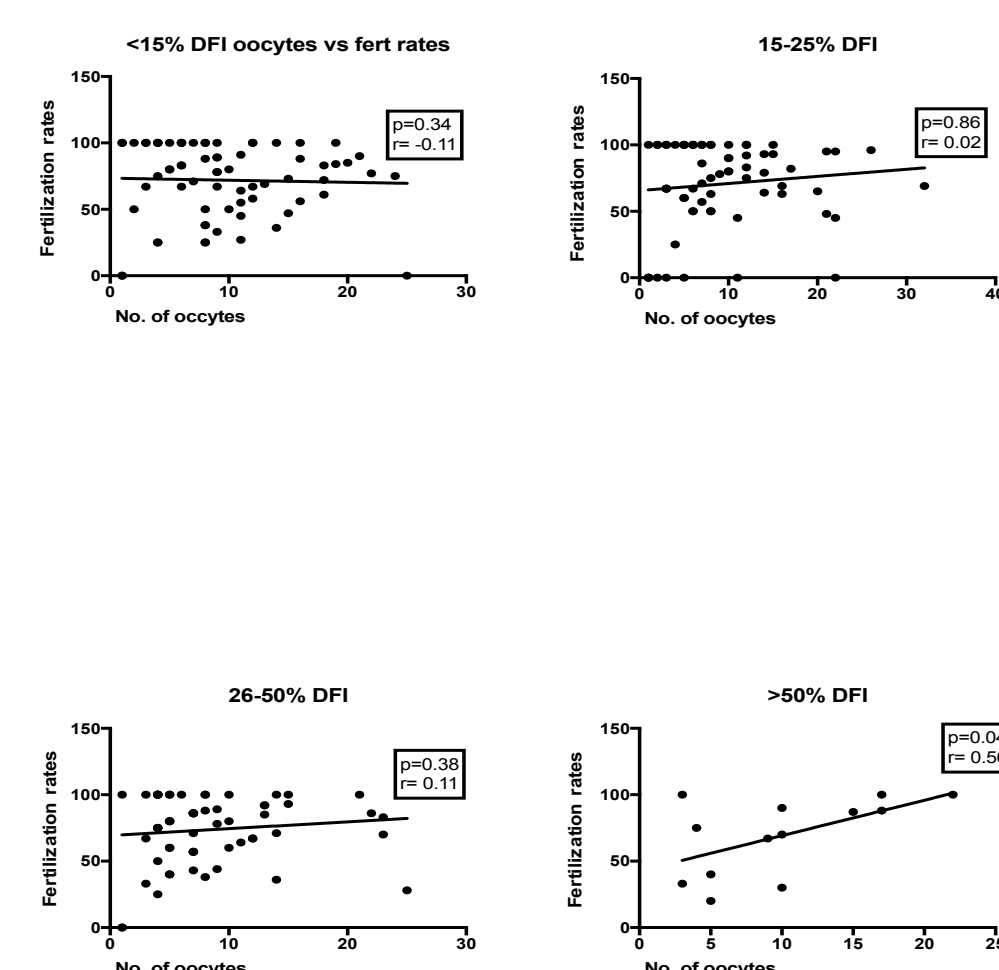
- Group 1: Patients with <15% DFI
- Group 2: Patients with 15% - 25% DFI
- Group 3: Patients with 25% - 50% DFI
- Group 4: Patients with >50% DFI



DFI Range	<15%	15% - 25%	25% - 50%	>50%
Single ICSI	64	67	75	22
Multiple ICSI	15	19	24	4

NUMBER OF OOCYTES AFFECTS FERTILIZATION RATES

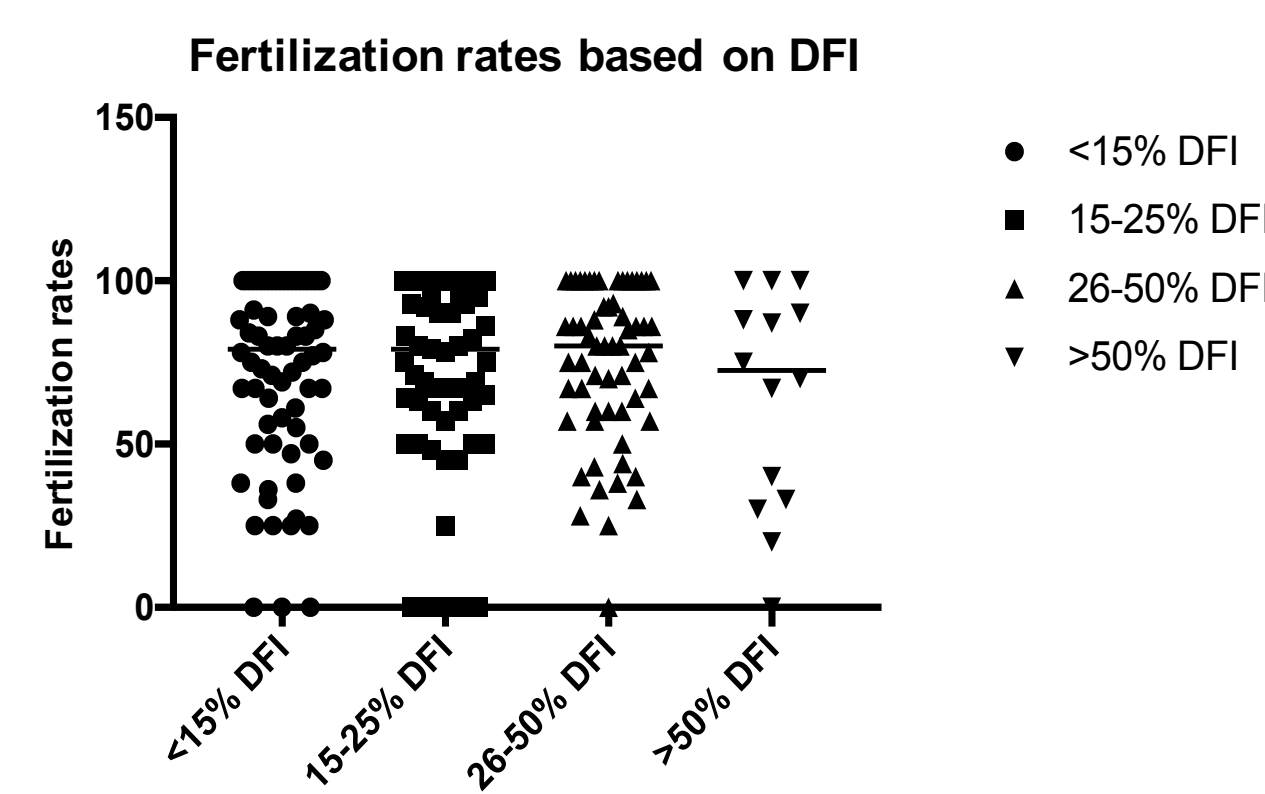
DFI



Number of oocytes influences fertilization rates as DFI increases. In group 4, number of oocytes significantly affected the fertilization rates ($p=0.04^*$).

DECREASED FERTILIZATION RATES

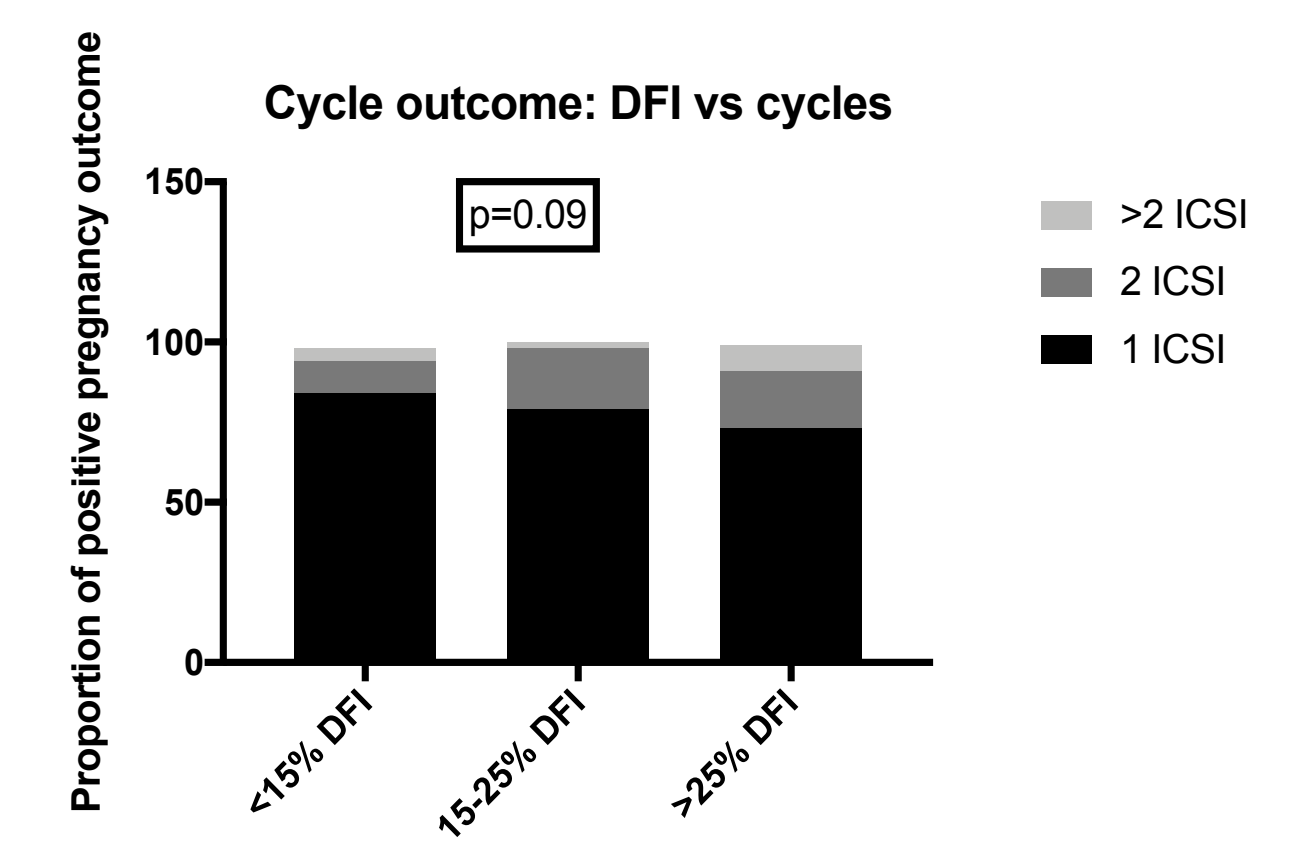
DFI



Increasing DFI negatively impacts fertilization rates. Fertilization rates dropped to 64% in Group 4 patients compared with the other 3 groups.

NUMBER OF ICSI ATTEMPTS vs POSITIVE OUTCOMES

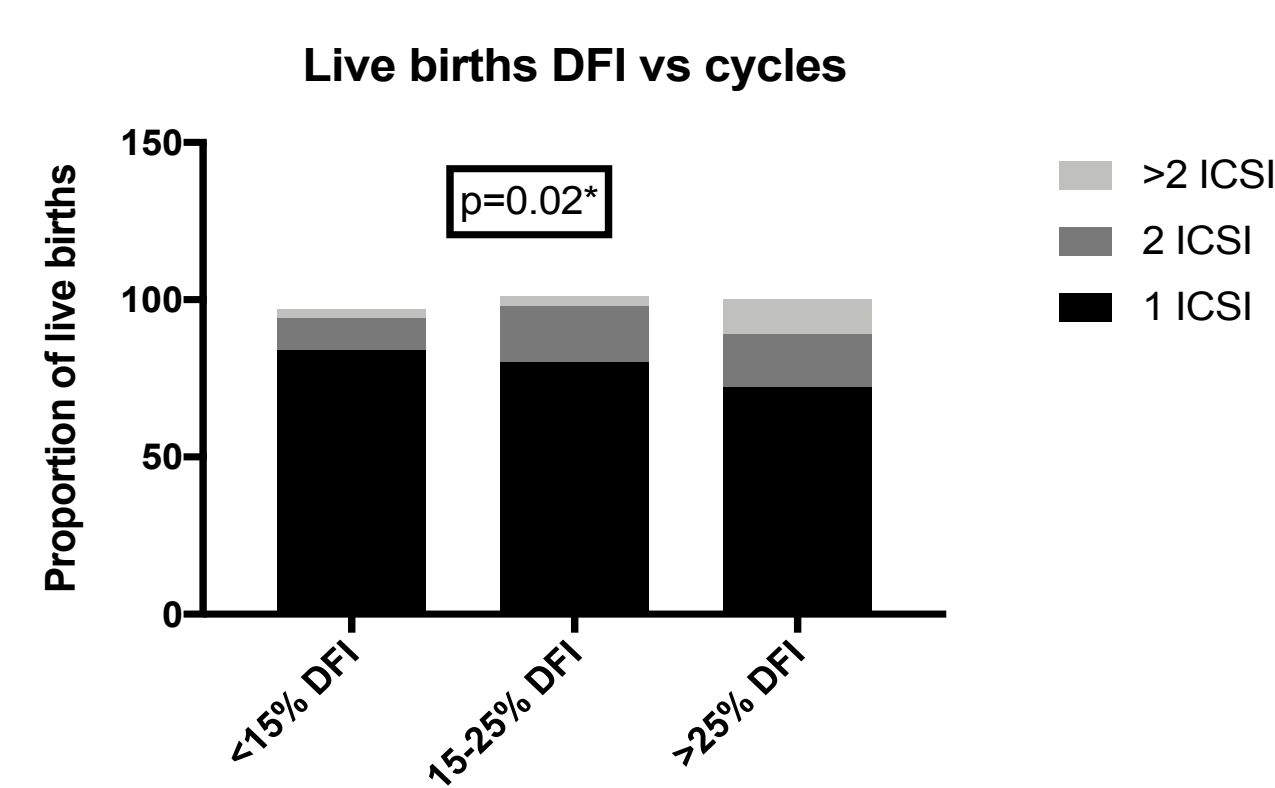
DFI



As DFI increases, the number of ICSI cycles becomes crucial for a positive outcome. For group 3 and 4 patients, multiple ICSI cycles were required for a positive outcome ($p=0.09$).

NUMBER OF ICSI ATTEMPTS vs LIVE BIRTH RATES

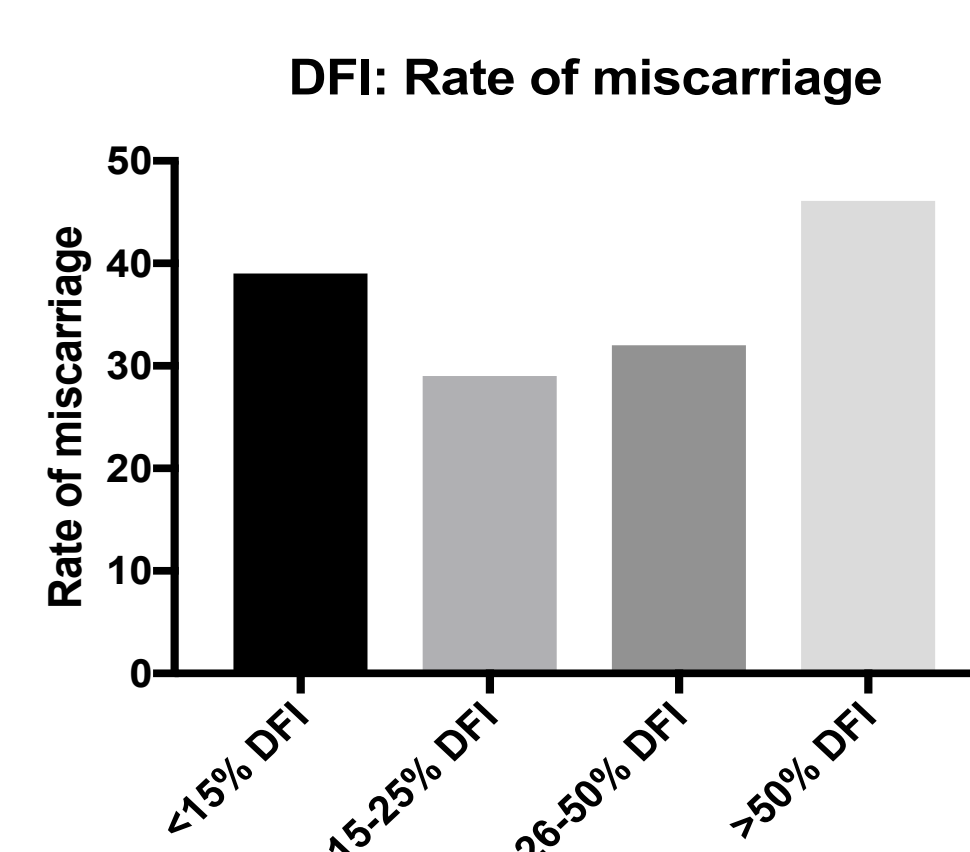
DFI



Comparison of number of ICSI cycles required for a live birth between the 4 groups was done. In groups 3 and 4, number of ICSI cycles significantly impacted the live birth rate ($p=0.02^*$).

INCREASED MISCARRIAGE RATES

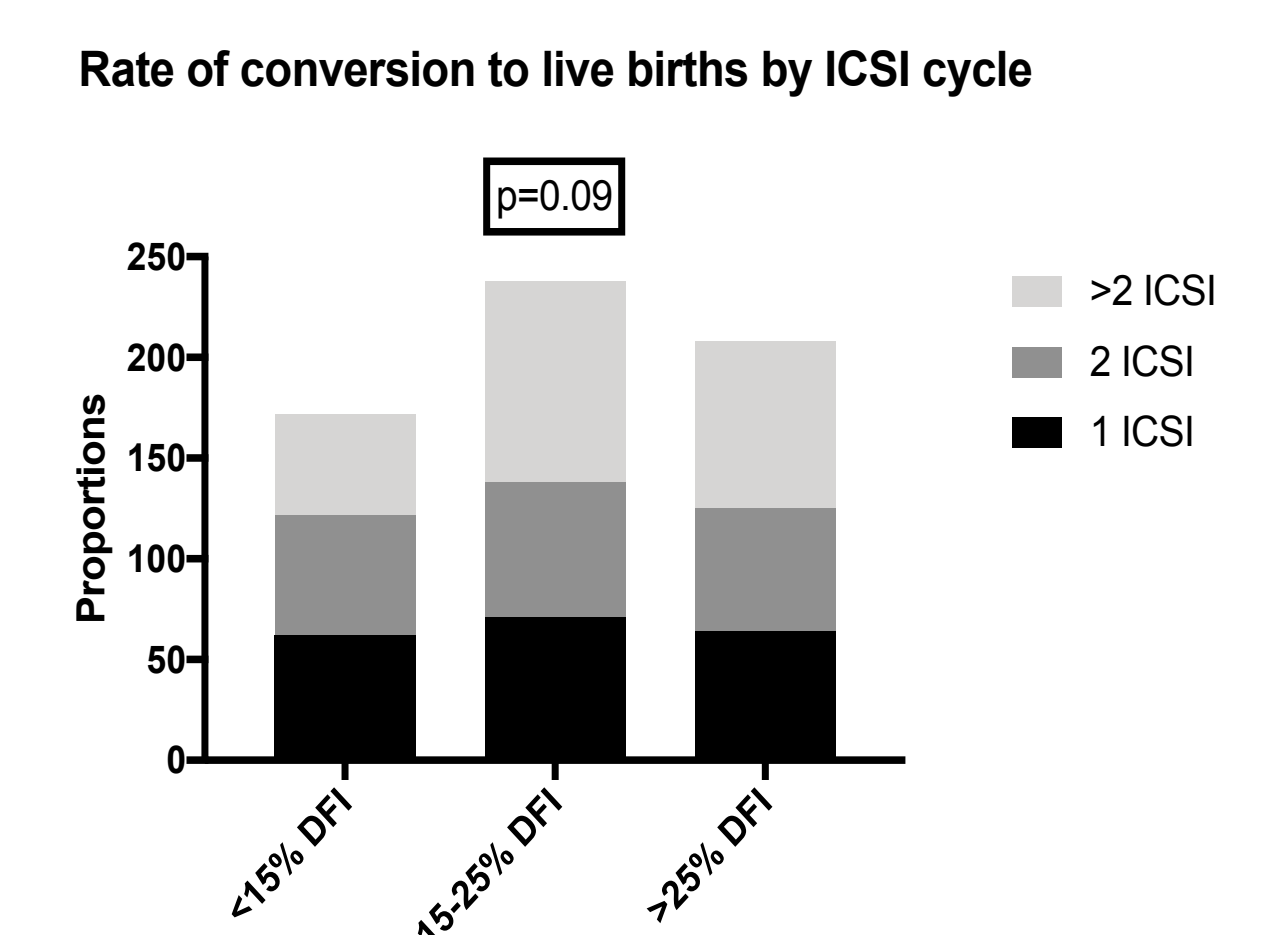
DFI



Miscarriage rates are higher in patients with high DFI. Miscarriage rates in Group 4 patients increased to 47%.

POSITIVE OUTCOMES INTO LIVE BIRTHS

DFI



The number of positive cycle outcomes changing into live births increases with the number of ICSI cycles performed as the DFI increases ($p=0.09$).

DISCUSSION

Our study in Indian couples confirms the adverse impact of poor sperm DNA integrity on reproductive outcomes after ART procedures. Larger number of oocytes are required to improve fertilization rates in patients with high DFI. For patients with higher DFI, more number of ICSI cycles are required to achieve a positive clinical pregnancy and live birth rate. Our results confirm that men with poor sperm DNA integrity are associated with increased risk of miscarriages. These findings further strengthen and emphasize the importance of SDF testing in male infertility evaluation especially in cases of idiopathic infertility, previous ART failures and recurrent pregnancy loss. Sperm DNA integrity serves as a reliable indicator for reproductive outcomes in natural conceptions and ART procedures.

REFERENCES

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