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TOTAL MOTILE SPERM COUNT HAS A SUPERIOR PREDICTIVE VALUE OVER THE WHO 2010 CUT-OFF VALUES FOR THE OUTCOMES OF INTRACYTOPLASMIC SPERM INJECTION CYCLES

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INTRODUCTION

Semen analysis is recommended for the investigation of sperm quality and relies on cut-off values that were defined by the WHO in 2010 to distinguish between normal and abnormal samples. However, several reports suggest that the correlation between the WHO classification system and the probability of natural or assisted conception is minimal, if any. Individual semen parameters like volume, concentration, and motility can be combined, resulting in an alternative way to express sperm quality (TMSC), which is obtained by multiplying the volume of the ejaculate by the sperm concentration and the proportion of progressive motile sperm divided by 100%.

MATERIALS AND METHODS

518 patients with male infertility undergoing 1st ICSI attempt Dec/2012 – Apr/2014

- Group-I, TMSC <1×10^6 million
- Group-II, 1–5 × 10^6 million
- Group-III, 5–10 × 10^6 million
- Group-IV, 10–20 × 10^6 million
- Group-V, >20 × 10^6 million (normal TMSC)

1st analysis - Groups I-IV were compared regarding ICSI outcomes

2nd analysis - Groups I-IV were combined to form the abnormal TMSC group, and compared to the normal TMSC group regarding ICSI outcomes

3rd analysis - The influence of the WHO cut-off value and TMSC on ICSI outcomes was investigated

RESULTS

All men were diagnosed with male factor infertility according to the WHO classification system

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36.7% had abnormal TMSC and 63.3% had normal TMSC

Variables	TMSC groups				
	I (n=26)	II (n=50)	III (n=38)	IV (n=76)	V (n=328)
Paternal age (y-old)	39.1 ± 8.2^{ab}	38.6 ± 6.3^{ab}	40.0 ± 5.7^{a}	36.5 ± 5.1^{b}	37.4 ± 4.8^{b}
Maternal age (y-old)	34.1 ± 4.1^{ab}	32.9 ± 4.1^{a}	33.7 ± 4.1^{a}	33.6 ± 3.9^{a}	35.3 ± 3.9^{bc}
Injected oocytes	12.9 ± 5.0^{a}	9.6 ± 5.1^{b}	9.0 ± 3.8^{b}	10.3 ± 4.9^{b}	9.4 ± 4.3^{b}
Fertilization rate (%)	72.5 ± 17.6^{a}	82.5 ± 14.9^{ab}	81.5 ± 20.1^{ab}	82.4 ± 13.0^{ab}	84.9 ± 14.4^{b}

Table 1. Comparison of ICSI outcomes amongst TMSC groups I-V (only significant comparisons are shown).
Note: Different letters (uppercase) on the same line represent a significant statistical difference.

Variables	Normal TMSC group (n=328)	Abnormal TMSC group (n=190)	p-value
Paternal age (y-old)	37.4 ± 4.8	38.1 ± 6.1	0.187
Maternal age (y-old)	35.4 ± 3.9	33.5 ± 4.0	<0.001
Number of aspirated follicles	17.8 ± 9.7	20.8 ± 11.2	0.002
Number of obtained oocytes	12.7 ± 7.2	15.1 ± 8.1	0.001
Number of mature oocytes	9.7 ± 5.5	11.2 ± 6.2	0.003
Number of injected oocytes	9.4 ± 4.3	10.2 ± 4.9	0.067
Fertilization rate (%)	84.9 ± 14.4	81.1 ± 15.8	0.016
Number of obtained embryos	8.2 ± 3.8	8.7 ± 4.4	0.204
Number of transferred embryos	2.2 ± 0.6	2.2 ± 0.5	0.469
Implantation rate (%)	25.1 ± 36.0	25.8 ± 35.2	0.832
Pregnancy rate (%)	134/328 (40.9)	94/190 (49.5)	0.060
Miscarriage rate (%)	29/162 (17.9)	23/78 (29.5)	0.041

Table 2. Comparison of ICSI outcomes between normal and abnormal TMSC groups
Note: SD, standard deviation; TMSC: total motile sperm count.

Variables	Method	OR or RC	CI or R^2	P-value
Fertilization rate	Concentration	3.994	1.4%	0.015
	Morphology	8.735	0.9%	0.047
	TMSC	3.784	1.5%	0.013
Formation of high-quality zygotes on D1	Concentration	1.64	1.09-2.46	0.018
	TMSC	1.13	1.01-1.28	0.049
Formation of high-quality embryos on D2	TMSC	1.18	1.03-1.35	0.013
Formation of high-quality embryos on D3	TMSC	1.12	1.07-1.29	0.037
Formation of blastocyst on D5	TMSC	1.16	1.04-1.26	0.011
Blastocyst expansion grade on D5	TMSC	1.27	1.01-1.60	0.042
Miscarriage	TMSC	0.52	0.28-0.90	0.045

Table 3. Linear and binary regression analysis results for the influences of TMSC and WHO cut-off values on ICSI outcome (only significant associations are shown).
Note: CI, confidence interval; OR, odds ratio; RC, regression coefficient; TMSC: total motile sperm count; WHO, World Health Organization.

CONCLUSION

In couples with male infertility, the TMSC has a superior predictive value over the WHO 2010 cut-off values for laboratory and pregnancy outcomes after ICSI. As these are novel findings for infertile patients undergoing ICSI treatment, prospective randomized studies should be performed to investigate whether the TMSC grading is superior to the WHO classification system for classifying male infertility.