International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Edugbe CO et al. Int J Reprod Contracept Obstet Gynecol. 2025 Jun;14(6):1691-1696
www.ijrcog.org

pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20251552

Original Research Article

Male factor infertility and assisted conception: a 2-year retrospective analysis of pregnancy rates and treatment outcomes

Christropher Orokpo Egbodo[1], Adikpe Emmanuel Edugbe[2]*, Obed Obe Echor[3], Kehinde Paul Agbowuro[4], Grace Benjamin[3], James Bitrus[2]

[1]Department of Obstetrics and Gynaecology University of Jos/Jos University Teaching Hospital, Jos, Nigeria
[2]Department Obstetrics and Gynecology, Bingham University Teaching Hospital, Jos, Plateau State, Nigeria
[3]Fertile Ground Hospital and IVF- ET Centre, Jos, Plateau State, Nigeria
[4]Department of Obstetrics and Gynecology, Jos University Teaching Hospital, Jos, Plateau State, Nigeria

Received: 09 April 2025
Revised: 10 May 2025
Accepted: 12 May 2025

***Correspondence:**
Christropher Orokpo Edugbe,
E-mail: tufingers272@gmail.com

ABSTRACT

Background: Male factor infertility contributes nearly half of the burden of infertility among infertile couples, highlighting the importance of understanding the complex interplay between male reproductive health and fertility outcomes. To investigate the relationship between male factor infertility and pregnancy rates after assisted conception.
Methods: We retrospectively analyzed data of couples attending fertility clinics due to inability to conceive spontaneously. The study focused on the patients seen between October 2022 and September 2024.
Results: Of 298 couples evaluated for infertility during the period under review, 118 had seminal fluid abnormalities of varying degrees, projecting a prevalence of 39.6%. The mean and standard deviation (SD) of 2.26±1.30mL for volume, 15×106±16×106 cells/ml, 32×106±50×106 cells/ejaculate, 14.9±14.3% progressive motility, 15.8±12.5% non-progressive motility and 19.2±15.6% for normal morphology. Nearly 50% had Asthenozoospermia, 33.9% had Oligozoospermia and 13.9% had Azoospermia. Intracytoplasmic sperm injection (ICSI) as the predominantly performed treatment type due poor semen quality. Pregnancy rate and live birth rate were 55.9% and 40.7% respectively. There was no statistically significant correlation between semen parameters and pregnancy rate.
Conclusions: The findings of this study can inform the development of personalized treatment approaches for male infertility and highlight the need for further research to identify the role of individual factor that interferes with semen quality and how it affects fertility outcomes.

Keywords: Assisted conception, IVF, ICSI, Male factor infertility, Pregnancy rate and outcomes

INTRODUCTION

Male factor infertility is an important contributor to infertility among couples. It contributes to nearly half of these cases, highlighting the importance of understanding the complex interplay between male reproductive health and fertility outcomes.[1,2] The prevalence of male factor infertility has been increasing over the past few decades. Recent studies suggest that up to 15% of men of reproductive age may experience infertility.[1,3] Despite advances in assisted reproductive technology (ART), the evaluation and management of male factor infertility remain a significant challenge. Infertility, defined as the inability to conceive after one year of unprotected intercourse. It is a multifactorial reproductive problem. In recent years, there has been a growing recognition of the need for a more comprehensive approach to male infertility diagnosis and treatment. Traditional semen analysis, while providing valuable information on sperm quality and quantity, does not fully capture the complexities of male reproductive function.[4] The development of advanced diagnostic tools, such as sperm DNA fragmentation testing and oxidative stress analysis, has improved our understanding of the molecular mechanisms underlying male infertility.[1] However, the clinical utility of these tests in predicting fertility outcomes remains a topic of ongoing debate. Several studies have investigated the relationship between sperm quality and pregnancy rates after ART, with inconsistent results.[5-7] Furthermore, the impact of male age, lifestyle factors and medical comorbidities on fertility outcomes is not fully understood. This retrospective study aimed to investigate the relationship between male factor infertility and pregnancy rates after assisted conception. We conducted a comprehensive review of 2 years' worth of data from our fertility clinic, examining the outcomes of couples undergoing ART treatments due to seminal fluid parameter abnormalities. Our analysis included a detailed evaluation of semen parameters, medical history and lifestyle factors, as well as pregnancy rates and outcomes.

By examining the complex interplay between male reproductive health and fertility outcomes, this study aims to contribute to our understanding of the factors influencing success rates after ART. Our findings have important implications for the development of personalized treatment approaches and the optimization of fertility outcomes for couples affected by male factor infertility.

METHODS

Study design

This was a retrospective descriptive study.

Study place

This study was conducted at Fertile Ground Hospital (FGH) and In vitro Fertilization (IVF) Centre. FGH is a multidisciplinary private hospital in Jos, Plateau State, North-Central Nigeria. It boasts over 50-bed capacity and cutting-edge IVF, embryo transfer (ET) and intracytoplasmic sperm injection (ICSI) facilities, providing top-notch reproductive healthcare services.

Study period

This study was conducted between October 2022 and September 2024.

Population

Couples who had fertility workup due to inability to conceive spontaneously and had been recruited for IVF/ICSI-ET due to suboptimal seminal fluid parameters.

Selection criteria

Couples with male factor infertility, who had assisted conception (IVF, ICSI) within the specified period and had complete medical records and treatment outcomes. Couples with female factor infertility as the primary cause were excluded. Couples with both male and female factors were also excluded.

Procedure (Semen analysis)

All patients were asked to provide semen sample after 3-5 days of ejaculatory abstinence. Semen specimens were produced by masturbation directly into a sterile plastic container, in a room specially provided for this purpose within the hospital and received in the laboratory within 30 min of production. After liquefaction, semen processing and analysis was performed according to the World Health Organization recommendations.[8,9] Seminal volume was determined in a graduated tube. During the entire period of study, sperm concentration was assessed by conventional method using Makler counting chamber (Sefi Medical Instruments, Israel) and expressed in million spermatozoa/ml. Sperm motility was assessed in 100 random spermatozoa by characterizing them as (i) rapidly forward progressive motility, (ii) slow progressive motility, (iii) nonprogressive motility and (iv) immotile/no movement and the motility was expressed as percentage.[8] A total of 200 sperm cells were characterized as morphologically normal or abnormal and the final morphology was expressed as percentage.

Ethical approval

Relevant approval was obtained from the institution’s review board.

Data collection

The records of couples with cases of infertility who had evaluations including seminal fluid analyses (SFA) within the study period were retrieved, from the patient’s case notes and the WHO 2010 reference values for seminal fluid analysis were used.

Statistical analysis

All statistical analyses were performed using SPSS software version 26.0 (IBM, Armonk, NY, USA). Frequencies and percentages were computed for demographic characteristics, seminal fluid parameters, morphological abnormalities, medical and surgical co-morbidities, treatment types and pregnancy and live birth rates. Pearson correlation coefficient (r) was used to measure a linear correlation between semen parameters and pregnancy rate. A p value of $<0.05\%$ was considered as statistically significant at a confidence interval (CI) of 95%.

RESULTS

During the period under review, a total of 298 couples were evaluated for infertility. Among these couples, 118 had seminal fluid parameter abnormalities of varying degrees, projecting a prevalence rate of male factor infertility in this Centre to be 39.6%. Mean age of the fertility challenged men was 43.74±7.07 years, most of them had tertiary education and approximately 35.0% were office workers as shown in Table 1. The mean and standard deviation (SD) of semen parameters recorded among the 118 men were: 2.26±1.30 mL for volume, 15×106±16×106 sperm/mL for concentration, 32×106±50×106 sperm for total sperm count, 14.9±14.3% for sperm with progressive motility, 15.8±12.5% for sperm with non-progressive motility, 3.5±5.7% for immotile sperm and 19.2±15.6% for sperm with normal morphology. A descriptive analysis of semen parameters (mean, standard deviation, median and interquartile range) is depicted in Table 2.

Table 3 shows the morphological abnormalities among the infertile men; nearly 50% had reduced motility (Asthenozoospermia), 33.9% had low sperm count (Oligozoospermia) and a sizable 13.9% had no sperm cells in the ejaculate (Azoospermia). Medical and surgical co-morbidities found among the participants are presented in Table 4. Table 5 revealed ICSI as the predominantly performed treatment type due poor semen quality. Pregnancy rate and live birth rate were 55.9% and 40.7% respectively. Table 6 shows no significant correlation between semen parameters and pregnancy rate.

Table 1: Sociodemographic profile of the study participants.

Variables	Frequency (N)	(%)
Age (in years)		
30–34	13	11.0
35–39	23	19.5
40–44	27	22.9
45–50	30	25.4
51–54	15	12.7
55–59	6	5.1
60–64	4	3.4
Educational level		
Informal	12	10.2
Primary	23	19.5
Secondary	35	29.7
Tertiary	48	40.6
Occupation		
Industrial workers	19	16.1
Agricultural workers	30	25.4
Healthcare workers	12	10.2
Military workers	7	5.9
Transportation workers	5	4.2
Office workers	41	34.7
Others	4	3.4
Alcohol use		
Yes	29	24.6
No	89	75.4
Cigarette use		
Yes	15	12.7
No	103	87.3

Table 2: Seminal fluid parameters.

Variable	Mean±SD	Median (IQR)
Volume (ml)	2.26±1.30	2 (1)
Sperm concentration/ml (x 10^6)	15.17±16.88	10 (15)
Sperm concentration/ejaculate (x 10^6)	32.84±50.19	17 (31)
Total Motility (%)	34.12±21.07	40 (32.5)

Continued.

Variable	Mean±SD	Median (IQR)
Rapid forward Progression	9.55±9.63	8 (15)
Slow forward progression	5.32±4.71	3 (8)
Non-progressive	15.80±12.46	14 (19)
Immotile	3.53±5.69	3 (5)
Normal morphology (%)	19.16±15.64	15 (25)

Table 3: Pattern of morphological abnormalities.

Morphology (%)	Frequency (N)	(%)
Oligozoospermia	40	33.9
Asthenozoospermia	55	46.6
Teratozoospermia	7	5.7
Azoospermia	16	13.6
OAT syndrome	4	3.4

Table 4: Medical and surgical conditions among study participants.

Variable	Frequency (N)	(%)
Medical conditions		
Yes	44	37.3
No	74	62.7
Specific medical conditions		
Hypertension	20	16.9
Diabetes mellitus	13	11.1
HIV	11	9.3
Previous Surgeries		
Yes	18	15.3
No	100	84.7
Specific type of surgery		
Hydrocelectomy	3	2.5
Varicocelectomy	10	8.5
Herniorrhaphy	5	4.3

Table 5: Type of ART treatment, pregnancy and live birth rates.

Variable	Frequency (N)	(%)
Treatment modality		
Conventional IVF-ET	46	39.0
ICSI-ET	72	61.0
Pregnancy		
Pregnancy rate	66	55.9
Live birth rate	48	40.7

Table 6: Correlation Analysis between Semen Parameters and Pregnancy Rate.

Semen parameters	Pearson correlation coefficient (r)	P value	Pregnancy rate Pearson correlation coefficient (r)	P value
Morphology	-0.029	0.775*	-0.029	0.775*
Concentration	-0.110	0.284*	-0.110	0.284*
Motility	0.037	0.716*	0.037	0.716*

*No significant correlation.

DISCUSSION

The contribution of male factor as a critical contributor to the overall burden of infertility is becoming widely investigated. Fertility treatment centers continue to record a declining quality in semen parameters among infertile couples treated for infertility. Sperm quality is essential to oocyte fertilization and to give rise to healthy embryos, successful pregnancy and live birth.[10,11] This 2-years retrospective analysis of 298 infertile couples revealed a significant prevalence of male factor infertility, accounting for 39.6% of cases. The mean age of the men was 43.74 years, with a high proportion having tertiary education and working as officers. These demographic characteristics are consistent with previous studies, which have shown that male infertility is more common among older, educated and professional men.[1,2] While there is no direct link between educational level or office work and seminal fluid abnormalities, certain factors such as sedentary behavior, stress and exposure to environmental toxins could contribute to such findings.[12,13] The semen analysis results showed that the men had significant abnormalities in total sperm count, total motility and progressive motility. These parameters were generally reduced in these men despite normal volume of ejaculate and sperm morphology. These findings are similar to those reported in previous studies, which have reported similar semen parameter abnormalities in infertile men.[3,4] The exact course of this decline in seminal fluid parameters is not known, but it’s being attributed to a number of environmental toxins in addition to individual characteristics owing to the global nature of the decline.[1,12,13]

The morphological abnormalities observed in this study, including asthenozoospermia (reduced motility), oligozoospermia (low sperm count) and azoospermia (no sperm cells), are consistent with previous reports.[1,6,7] This observation may be due to a common factor to which most men are exposed to. The most likely culprit may environmental toxins.[11] These abnormalities can significantly impact fertility outcomes and may require specialized treatment approaches as observed in this study. The prevalence of azoospermia in the study is about 14% among the infertile couples. This is similar to the prevalence reported by Sharma and his colleague. In the general population the prevalence is said to be 1% while among infertile couples it is between 10–15%.[14]

The high prevalence of medical and surgical co-morbidities observed in this study highlights the importance of comprehensive medical evaluation and management of infertile men. Co-morbidities such as hypertension, diabetes and varicocele can impact fertility outcomes and may require treatment before assisted reproductive technology (ART) can be successful.[15,16] The finding that ICSI (intracytoplasmic sperm injection) was the predominantly performed treatment type due to poor semen quality. Significant reduction in total sperm concentration and progressive motility may have led to this preferred treatment type. This observation corroborates the previous reports by Esteve et al, Intracytoplasmic sperm injection is a specialized ART technique that involves injecting a single sperm into an egg to facilitate fertilization.[17,18]

The pregnancy rate and live birth rate observed in this study were 55.9% and 40.7%, respectively. While poor semen quality affects fertilization and cleavage rates, embryo quality and blastocyst development rates, there has been documented statistically significant differences in clinical pregnancy and implantation rates. This may the observation in this study because in spite of poor semen quality among the participant the outcome competes favourably with treatment with normal semen. These rates are also consistent with previous reports and highlight the effectiveness of ART in treating male factor infertility.[19-21]

Interestingly, this study found no significant correlation between semen parameters and pregnancy rate. This finding is consistent with previous reports, which have shown that semen parameters are not always predictive of fertility outcomes.[22,23] Other factors, such as egg quality, embryo quality and uterine receptivity, may play a more significant role in determining fertility outcomes.

The subjects included here were infertile patients and do not represent the general population. This study did not look into association between possible factors affecting semen quality such as occupation of the subjects, smoking, alcohol ingestion, food habits, co-morbid health conditions and level of stress etc. The duration of study is only 2 years which may be too short to come to any conclusion. However, longer study period may be influenced by factors like change in laboratory staff, equipment, methodology over the period of time and modification of WHO reference ranges.

CONCLUSION

In conclusion, this study highlights the importance of comprehensive medical evaluation and management of infertile men. The findings of this study can inform the development of personalized treatment approaches for male factor infertility and highlight the need for further research to identify the role of individual factor that interferes with semen quality and how it affects fertility outcomes.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Agarwal A, Mulgund A, Hamada A, Chyatte MR. A unique view on male infertility around the globe. Reproductive Biology and Endocrinol. 2015;13(37):1-9.
2. Esteves SC, Zini A, Aziz N, Alvarez JG, Sabanegh, ES, Agarwal A. Critical appraisal of World Health Organization's new reference values for human semen characteristics and effect on diagnosis and treatment of sub-fertile men. Urol. 2012;79(1):16-22.
3. Gül M, Russo GI, Kandil H, Boitrelle F, Saleh R, Chung E, et al. Male Infertility: New Developments, Current Challenges and Future Directions. World J Mens Health. 2024;42(3):502-17.

4. Bjordahl L, Brown JK. The sixth edition of the WHO laboratory manual for the examination and processing of human semen: ensuring quality and standardization in basic examination of human ejaculates. Fertility and Sterility. 2022;117(2):246-51.
5. Del Giudice F, Belladelli F, Chen T, Glover F, Mulloy EA, Kasman AM, et al. The association of impaired semen quality and pregnancy rates in assisted reproduction technology cycles: Systematic review and meta-analysis. Andrologia. 2022;54(6):14409.
6. Dolores JL, Jessica AM. Can semen parameters predict pregnancy outcomes. Fertility and Sterility. 2023;120(4):709–14.
7. Zhao J, Zhang Q, Wang Y, Li Y. Whether sperm deoxyribonucleic acid fragmentation has an effect on pregnancy and miscarriage after in vitro fertilization/intracytoplasmic sperm injection: a systematic review and meta-analysis. Fertility and Sterility. 2014;102(4):998-1005.
8. World Health Organization WHO laboratory manual for the examination of human semen and sperm-cervical mucus interaction. 4th ed. Cambridge University Press: Cambridge, UK. 1992.
9. World Health Organization WHO laboratory manual for the examination of human semen and sperm-cervical mucus interaction. 4th ed. Cambridge University Press: Cambridge, UK. 1999.
10. Tarozzi N, Nadalini M, Coticchio G, Zaca C, Lagalla C, Borini A. The Paternal Toolbox for Embryo Development and Health. Mol Hum Reprod. 2021;27:42-3.
11. Vollenhoven, B., Hunt, S. Ovarian Ageing and the Impact on Female Fertility. Res. 2018;7:1835.
12. Wadhwa L, Fauzdar A, Wadhwa SN, Singh L, Chakravarti S, Kaur O. Association of occupational exposure on semen density in male industrial workers undergoing infertility treatment at tertiary care hospital. Int J Reprod Contracept Obstet Gynecol. 2019;8:2453-8.
13. Rodprasert W, Toppari J,Virtanen HE. Environmental toxicants and male fertility. Best Prac Res Clin Obst Gynaecol. 2023;86:1–13.
14. Sharm M, Leslie SW. Azoospermia. In: StatPearls. Treasure Island: StatPearls Publishing. 2025. Available at: https://www.ncbi.nlh.nih. Accessed on 21 December 2024.
15. Shiraishi K, Matsuyama H. Effects of medical comorbidity on male infertility and comorbidity treatment on spermatogenesis. Fertile Steril. 2018;110(6):1006-11.
16. Lewis SE. Revisiting the impact of varicocele and its treatments on male fertility. Reproductive BioMed. 2022;45(6):1061-3.
17. Esteves SC, Roque M, Bedoschi G, Haahr T, Humaidan P. Intracytoplasmic sperm injection for male infertility and consequences for offspring. Nat. Rev Urol. 2018; 15(9):535-62.
18. Chaichian S, Tamannaie Z, Rohani H, Ahmadi M, Nasr MH, Pazouki A, et al. Relationship between sperm parameters and intracytoplasmic sperm injection outcome. Middle East Fert Soc J. 2015;20:251-4.
19. Calvert JK, Fendereski K, Ghaed M, Bearelly P, Patel DP, Hotaling JM. The male infertility evaluation still matters in the era of high efficacy assisted reproductive technology. Fertility and Sterility. 2022;118(1):34-46.
20. Ping P, Zheng Z, Ma Y, Zou S, Chen X. Comparison of intracytoplasmic sperm injection (ICSI) outcomes in infertile men with spermatogenic impairment of differing severity. Asian J Androl. 2022;24:299–304.
21. Intracytoplasmic sperm injection (ICSI) for non–male factor indications: a committee opinion. Practice committees of the american society for reproductive medicine and the society for assisted reproductive technology. Fert Ster. 2020;114(2):239-45.
22. Lamb DJ, Marinaro JA. Can semen parameters predict pregnancy outcomes. Fertil Steril. 2023;120(4):709-14.
23. Wang C, Swerdloff RS. Limitations of semen analysis as a test of male fertility and anticipated needs from newer tests. Fert Ster. 2014;102(6): 1502-7.

Cite this article as: Egbodo CO, Edugbe AE, Echor OO, Agbowuro KP, Benjamin G, Bitrus J. Male factor infertility and assisted conception: a 2-year retrospective analysis of pregnancy rates and treatment outcomes. Int J Reprod Contracept Obstet Gynecol 2025;14:1691-6.