Hussien *et. al.,* Babcock Univ. Med. J.2026 9(2):154-160
https://doi.org/10.38029/babcockuniv.med.j..v9i2.1409
eISSN: 2756-4657

RESEARCH ARTICLE OPEN ACCESS

# Comparative ICSI Outcomes in Idiopathic Male Factor and Unexplained Infertility: A Retrospective Cohort Study

Hussein SS[1ID], Al-Dulaimi AIR[2ID], Hassan MF[3ID]

*[1]Department of Anatomy, Histology and Embryology, College of Medicine, University of Thi-Qar, Thi-Qar, Iraq*
*[2]College of Medicine, University of Al-Ameed and Al- Kafeel IVF Centre, Al-Kafeel Super-Speciality Hospital, Karbala, Iraq*
*[3]Department of Anatomy, Histology and Embryology, College of Medicine, University of Kerbala, Karbala, Iraq*

*Submitted: 20th December 2025*
*Accepted: 25th February 2026*
*Published: 30th June 2026*
ID: Orcid ID

**Abstract**
**Objective:** To compare ICSI outcomes in couples with idiopathic male factor sub-fertility versus unexplained sub-fertility.
**Methods:** This retrospective cohort study was conducted at Al-Kafeel IVF Centre, Karbala, Iraq, and included 98 couples who underwent ICSI between February 2023 and January 2024. Of these, 62 had idiopathic male factor sub-fertility and 36 had unexplained sub-fertility. All underwent conventional ICSI. Outcomes assessed were fertilisation rate, cleavage rate, total embryos, good-quality embryos, and biochemical pregnancy confirmed by positive β-hCG.
**Results:** Fertilisation rates were 73.2% ± 25.6 (idiopathic) vs 79.5% ± 22.9 (unexplained), p = 0.39; cleavage rates 95.2% ± 18.1 vs 97.8% ± 5.0, p = 0.56. Total embryos (mean ± SD) were lower in the idiopathic group (3.9 ± 2.6) than in the unexplained group (7.2 ± 4.7), p = 0.003; good-quality embryos 3.5 ± 2.4 vs 6.6 ± 4.1, p = 0.002. Biochemical pregnancy occurred in 32/62 (51.6%) idiopathic versus 14/36 (38.9%) unexplained. Unadjusted odds ratio for pregnancy (idiopathic vs unexplained) = 1.68 (95% CI 0.73–3.86), Fisher's exact p = 0.29. After adjustment for maternal age, BMI, total oocytes and number of embryos transferred (multivariable logistic regression), the group effect was [report aOR here once analysis is run].
**Conclusions:** Idiopathic male factor sub-fertility is associated with lower embryo yield and fewer good-quality embryos after ICSI, but biochemical pregnancy rates did not differ significantly. Future studies should adjust for embryo transfer policy and include live birth outcomes.

**Keywords:** ICSI, Pregnancy rate, Idiopathic infertility, Unexplained sub-fertility, Male sub-fertility

## Plain English Summary

We compared outcomes after ICSI treatment in two groups of couples: [1] men with abnormal sperm tests (idiopathic male factor) and [2] men with normal sperm tests (unexplained infertility). Although men with abnormal sperm produced fewer embryos and fewer good-quality embryos, the chance of detecting a pregnancy after the fresh embryo transfer was not significantly different between the groups. These results suggest that ICSI can achieve similar early pregnancy rates even when sperm parameters are abnormal,

Correspondence:
Hussein Saba S
Department of Anatomy, Histology and Embryology, College of Medicine
University of Thi-qar, Thi-qar
Iraq
saba.sabeeh@utq.edu.iq

© BUMJ. 2026 Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.

but larger studies that include live birth outcomes and genetic tests of embryos are needed to understand long-term outcomes.

**Introduction**

Sub-fertility is considered a significant global health problem with both financial and psychological outcomes. Up to 15% of couples seek medical treatment due to failure to conceive after marriage (1). Male factors are contributed in about 20%–50% of the cases of sub-fertility. Despite the great advances in the diagnostic utility and investigations, a significant percentage of men with sub-fertility are classified as having unexplained infertility with an incidence of 15%–20% (2). They are categorised as having unexplained sub-fertility when they have normal semen parameters (sperm count, progressive motility, and sperm morphology) as evidenced by seminal fluid analysis (SFA) (3), normal personal and sexual history, and normal physical and genital examination with the exclusion of female factor subfertility. For males with impaired semen function in the form of oligozoospermia (<14 million/mL), asthenozoospermia (progressive motility <31%), or teratozoospermia (sperm with normal morphology <4%), according to the World Health Organisation (WHO) 2021 (3), the seminal fluid analysis reference values are classified as indicative of idiopathic male factor sub-fertility (4). There are many factors other than semen quality that might contribute to difficulty in conceiving in normal males, including the presence of anti-sperm antibodies, chromosomal or genetic defects detected by sperm DNA fragmentation (DFI), high concentration of seminal fluid free radicals and reactive oxygen species (ROS), and sperm dysfunction (5). Inappropriate timing of intercourse (fertility window of the female), toxic lubricants, erectile dysfunction, retrograde or anejaculation might also be implicated (6). With the development of intracytoplasmic sperm injection (ICSI) as an assisted reproductive technology in 1992, most couples with male factor sub-fertility are being treated, and their chance of having a child is increased, bypassing most of the problems (7). However, ICSI treatment for couples without a male factor.

Sub-fertility has been a common practice in the last decade, and still, there is insufficient evidence on the benefits of ICSI in couples with or without male factor subfertility (8). Nowadays, most fertility clinics consider male factor sub-fertility to be a strong indication necessitating routine use of ICSI due to the likelihood of bypassing the obstacles caused by poor semen quality, in which only one, progressively motile, morphologically normal sperm is needed to fertilize an ovum, thus overcoming poor quality semen with a possible improvement in fertilization rate and embryo quality (9). However, the pregnancy rate and live birth rate are still not fully determined. Limited data exist from Middle Eastern populations comparing ICSI outcomes between idiopathic male factor and unexplained infertility. This study tried to elucidate the possible factors which might negatively affect the ICSI success rate, primarily embryo quality and secondary fertilisation, cleavage and pregnancy rates, to be fully investigated. We hypothesised that ICSI outcomes would not differ significantly between groups.

**Materials and Methods**

This was a retrospective cohort study in Al-Kafeel IVF Centre in Al-Kafeel Super-Speciality Hospital, Karbala, Iraq, from Feb. 2023 to January 2024. Ninety-eight sub-fertile couples were included, and verbal consent was taken before this study. They sought ICSI following failure to conceive a child for a period of 8.6 ± 3.6 years. The couples were simultaneously evaluated by a fertility specialist. Anthropometric measures (body mass index (BMI)) and investigations such as hormonal and imaging studies were carried out. The couples were divided into two groups: group I: couples with unexplained subfertility, n = 36 (normal semen parameters) and group II: couples with idiopathic subfertility, n = 62 (impaired semen parameters in the form of oligozoospermia, asthenozoospermia, and teratozoospermia according to semen analysis WHO, 2021 (3). Females of both groups are less than 35 years of age, in whom normal ovulation with patent both tubes (normal hormonal assay at cycle day 2; oestradiol, luteinizing hormone (LH), follicular stimulation hormone (FSH), and prolactin and normal ovaries with good ovarian reserve by antral follicle counts and normal uterus with normal baseline endometrial thickness at cycle day two (ET=3-4mm) as evidenced by trans vaginal ultrasound (TVUS) and normal tubes by hystro-salpangio-gram). Females older than 35 years, morbidly obese, with thyroid problems, uterine abnormalities, such as congenital or acquired, polycystic ovary syndrome and tubal infertility, were excluded. Male partners were less than 45 years old, non-smokers or ex-smokers, having normal BMI, hormonal assay indicating normal levels of testosterone and FSH, normal testicular size and presence of vas deferens by scrotal examination, and normal or impaired seminal fluid

parameters as evidenced by seminal fluid analysis. Males with abnormal hormones (primary or secondary testicular failure), congenital abnormalities of the ductal system or ductal obstruction (congenital absence of vas deferens, vassal agenesis, and ejaculatory duct obstruction by transrectal ultrasound), and sub-clinical or clinical varicocele were excluded. They underwent ICSI. Females were included in controlled hyperstimulation and downregulation using the long agonist protocol; gonadotropin-releasing hormone (GnRH) agonist, decapeptide 0.1 mg 1 × 1 s.c. and then recombinant FSH (r-FSH); Gonal-F 75 × 2 iu s.c. for 10–14 days, which was followed up by serial TVUS and hormonal assay. Ovulation induction was done by human chorionic gonadotropin (hCG); pregnyl 5000 iu × 2 i.m injection when the number and size of the growing follicles are adequate; at least 7–14 follicles were of more than 17 mm in size. Oocyte retrieval was done under general anaesthesia. Vaginal progesterone suppositories were started to support the luteal phase, a day after oocyte retrieval. Oocyte maturity was assessed microscopically under an inverted microscope (immature oocyte may be retrieved depending on the time of trigger, with the onset of oocyte maturity). ICSI was commenced for only mature MII oocytes (those which exhibit the presence of the first polar body in the perivitelline space and the absence of germinal vesicles). At the same time, a fresh semen ejaculate was obtained from the male partners, following microscopic assessment of sperm count, progressive motility and morphology, sperm preparation by centrifugation, and assessment of direct swim up from the bottom. Fertilisation assessment was done 16–18 h after injection (presence of two pronuclei and two polar bodies). Subsequently, the quality of the resulting embryos was assessed. Four-cell stage embryos at 84 hrs. or six-to eight-cell stage 72 hrs. post-injection, even size and blastomeres, and least or absence of fragmentations were considered as good quality (grades I and II). Anything else was considered bad quality (grades III and IV) (10). The number 2PN zygotes divided by the number of injected mature MII oocytes was used for calculating fertilisation rate, while the cleavage rate was calculated by dividing the total number of resulting embryos by the total number of zygotes. In the idiopathic male-factor group, the median (IQR) number of embryos transferred was 3 (2–3) (range 1–3), while in the unexplained infertility group, it was 3 (3–3) (range 2–3). The embryo transfer policy allowed up to three embryos per cycle. The biochemical pregnancy rate was calculated by dividing the number of females who had positive beta-hCG by the number of females who underwent fresh embryo transfer.

*Statistical Analysis*

Data were analysed using SPSS version 24.0 (IBM Corp., Chicago, IL, USA). Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages.

Normality of continuous variables was assessed using the Shapiro–Wilk test (given the sample size <200) and visual inspection of histograms and Q–Q plots. For variables demonstrating normal distribution and homogeneity of variance (assessed using Levene's test), comparisons between groups were performed using the independent-samples Student's t-test. When equality of variances was not assumed, Welch's t-test was applied.

Categorical variables were compared using the Chi-square test. When expected cell counts were less than five, Fisher's exact test was used. For the primary outcome (biochemical pregnancy rate), odds ratios (ORs) with 95% confidence intervals (CIs) were calculated to estimate the strength of association between study groups.

A two-tailed p-value ≤ 0.05 was considered statistically significant.

A post-hoc power analysis was performed for the primary outcome (biochemical pregnancy rate). Based on the observed proportions (51.6% vs 38.9%), total sample size of 98 couples, and alpha level of 0.05, the study had approximately 35–45% statistical power to detect the observed difference between groups. Therefore, the study may be underpowered to detect moderate differences in pregnancy rate.

**Results**

Table 1 illustrates demographic characteristics of the studied groups. No significant statistical variation has been observed.

**Table 1: Demographic characteristics of the studied groups**

| Parameters | Idiopathic n=62 Mean ± SD | Unexplained n=36 Mean ± SD | P-value |
|---|---|---|---|
| Age | 33.38±6.67 | 33.23±5.21 | 0.93 |
| BMI | 27.92±4.53 | 27.63±5.66 | 0.84 |
| Duration | 7.03±4.15 | 8.61±3.648 | 0.18 |
| **Type of sub-fertility, total no.** | | | |
| Primary | 44 | 22 | P-value |
| Secondary | 18 | 14 | 0.47 |
| Total | 62 | 36 | |

Table 2 discusses the comparison between the studied groups regarding female hormonal profile, baseline endometrial thickness (ET) by TVUS, and gonadotropin total dose. Again, no significant statistical variation had been shown.

**Table 2: Female partner hormonal profile and cycle characteristics in the studied groups**

| Parameter | Idiopathic n=62 Mean ± SD | Unexplained n=36 Mean ± SD | P-value |
|---|---|---|---|
| E2 (pg/ml) | 37.08±15.05 | 31.31±16.83 | 0.22 |
| LH (IU/L) | 4.93±9.93 | 2.93±1.63 | 0.40 |
| FSH (IU/L) | 6.38±6.32 | 4.64±1.63 | 0.26 |
| Prolactin (ng/l) | 19.63±14.5 | 18.54±11.73 | 0.78 |
| Baseline cycle day 2 ET (mm) | 3.45±0.88 | 3.55±0.86 | 0.69 |
| Total dose of Gn | 1692.25±602.9 | 1550.0±472.9 | 0.39 |

E2 = oestradiol, FSH = follicular stimulation hormone, LH = luteinizing hormone, Gn = Gonadotropins

Table 3 demonstrates the response of the female partners to ovarian stimulation in the form of the number of retrieved oocytes and oocyte quality. No significant differences had been reported.

**Table 3: Female partner ovarian response to controlled ovarian stimulation in both groups**

| Parameters | Idiopathic n=62 Mean ± SD | Unexplained n=36 Mean ± SD | P-value |
|---|---|---|---|
| Total number of oocytes | 8.03±6.11 | 10.11±4.57 | 0.21 |
| Total number of mature oocytes | 6.53±4.93 | 9.05±4.83 | 0.09 |
| Total number of immature oocytes | 1.43±2.4 | 1.00±1.23 | 0.48 |

ICSI outcomes represented by rates of fertilisation and cleavage, the quality of resulting embryos (good or bad), and pregnancy rate are illustrated in Tables 4 and 5. Both CR and FR exhibited no statistically significant differences in both groups, despite being lower in the idiopathic sub-fertility group. During ICSI, the embryologist choose best quality sperm to be injected inside oocyte, which improves fertilisation rate.

**Table 4: ICSI outcome in the studied groups**

| Parameter | Idiopathic n=62 Mean ± SD | Unexplained n=36 Mean ± SD | P-value |
|---|---|---|---|
| Total number of embryos | 3.90±2.67 | 7.27±4.77 | 0.003 |
| Total number of good-quality embryos | 3.53±2.43 | 6.61±4.11 | 0.002 |
| Total number of bad-quality embryos | 0.37±0.80 | 0.67±1.30 | 0.33 |
| Fertilization rate | 73.18±25.58 | 79.5±22.87 | 0.39 |
| Cleavage rate | 95.24±18.18 | 97.81±5.03 | 0.56 |

**Table 5: Pregnancy rate in the studied groups**

| Parameter | Idiopathic (Total no.%) | Unexplained (Total no.%) | Total cases | P-value |
|---|---|---|---|---|
| Pregnant | 32 (51.6%) | 14 (38.9%) | 46 (46.9%) | 0.39 |
| Not pregnant | 30 (48.4%) | 22 (61.1%) | 52 (53.1%) | |
| Total | 62 (63.3%) | 36 (36.7%) | 98 (100%) | |

Together, only the best quality embryos will be transferred; thus, the cleavage rate is improved. The number and the quality of resulting embryos tended to be significantly higher in the group with unexplained subfertility in comparison with those in the idiopathic group, P value = 0.003 and 0.002, respectively. While the pregnancy rate (PR) between both groups was lower in the unexplained group in comparison with the idiopathic (male factor) group, 38.9% versus 51.6%, with an insignificant P value = 0.39, which could be related to other factors like induction protocol, ovulation trigger, oocyte quality and endometrial state.

*Primary Outcome (Biochemical Pregnancy Rate)*
Biochemical pregnancy occurred in 32 of 62 women (51.6%) in the idiopathic male factor group and 14 of 36 women (38.9%) in the unexplained infertility group. The unadjusted odds ratio (OR) for pregnancy in the idiopathic group compared with the unexplained group was 1.68 (95% confidence interval [CI]: 0.73–3.86). Fisher's exact test demonstrated that this difference was not statistically significant (p = 0.29).

## Discussion

The incidence of male factor sub-fertility has witnessed a steady increase with a systematic decline in semen quality (11). Unfortunately, in contrast to female sub-fertility, in which fertility treatment is carried out to enhance oocyte production, abnormalities in spermatogenesis and poor sperm quality are much more difficult to treat adequately. Unsuccessful treatment makes assisted reproductive technologies with ICSI an important option to be discussed with the affected couples to achieve a successful pregnancy (12). This study examined the outcomes of patients who underwent ICSI due to idiopathic male subfertility, with impaired semen quality. It has been shown that impaired semen quality tends to have no significant negative effect on the oocyte fertilisation rate and embryo cleavage rate, and both of them are equivalent and slightly lower in males with completely normal semen parameters (unexplained subfertility). Similar results were obtained by some studies that stated that semen parameters had a great impact on the rate of oocyte fertilisation and resulted in the embryos' cleavage rate (9, 13, 14). This could be explained by the ICSI process itself, which could overcome the problem of decreased semen quality by allowing the embryologist to choose best quality, high progressively motile, morphologically normal sperms to be injected into the oocytes, which improves the fertilization rate, embryo development, and quality (15); in addition, a continuously developing specialized culture media was used in preparation and separation of sperms for ICSI, which may have a privilege to choose sperms with better outcomes in ICSI (16). The current study showed that the total number of good-quality embryos was significantly lower in patients with impaired semen quality when compared with those with normal semen parameters. There is some agreement with these results, which suggest that some molecular mechanisms and genetic defects of the sperm are exhibited in the form of impaired semen quality: count, motility, and morphology (1, 9, 17). This possibility is evidenced in Table 4, which showed no significant differences in oocyte quality between both groups and females of the idiopathic sub-fertility group, where semen parameters in males are below normal and produced a sufficient number of good quality oocytes, and as most of the produced embryos were of bad quality, this suggests that poor quality sperms are responsible for bad quality embryos. A morphologically normal cell is not necessarily chromosomally normal (18), and even a good-quality embryo could have a variable degree of chromosomal defects (9). Regarding pregnancy rate, however, the couples with unexplained sub-fertility demonstrated a lower pregnancy rate than those in the idiopathic sub-fertility group. Although the result is insignificant, there were a higher number of good quality embryos in the unexplained group, which are most likely have a lower implantation potential. Similar results were recorded and exhibited in several studies that demonstrated that impaired pregnancy rate in such couples might be related to endometrial receptivity (9, 19).

## Conclusion

Males with unexplained sub-fertility yield more embryos and good quality embryos following ICSI, thus several degrees of impaired semen

parameters in idiopathic sub-fertility could negatively affect embryo quality, while fertilisation and cleavage rates were improved during the ICSI procedure. Despite this, the pregnancy rate was insignificantly less, which could be related to factors other than embryo quality (endometrial state).

*Study Limitations*
Retrospective design, Single centre, small sample size, the evaluation of semen, sperm parameters and embryo quality are objectives depends on the microscopic evaluation, while the genetic, molecular and chromosomal assessment of sperm and embryos was not assessed. No control for the number of embryos transferred, potential grading subjectivity, and lack of power analysis. No live birth rate, no multivariate analysis, no sperm DNA fragmentation data and no long-term neonatal outcomes.

**List of Abbreviations**

ICSI: Intracytoplasmic sperm injection
BMI: Body mass index
CR: Cleavage rate
DFI: DNA fragmentation test
ET: endometrial thickness
FR: Fertilisation rate
FSH: Follicle-stimulating hormone
GnRH: Gonadotropin-releasing hormone
hCG: Human chorionic gonadotropin
LH: Luteinizing hormone
MI: Metaphase I
MII: Metaphase II
PR: Pregnancy rate
ROS: Reactive oxygen species
SD: Standard deviation
SFA: Seminal fluid analysis
TVUS: Trans vaginal ultrasound
WHO: World Health Organisation

**Declarations**

*Ethics Approval and Consent to Participate*
This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the Local Ethics Committee, College of Medicine, University of Thi-Qar, Iraq (Approval No.: [INSERT IRB NUMBER], approved on [INSERT DATE]). Written informed consent for participation and use of clinical data for research purposes was obtained from all participants before inclusion in the study.

*Consent for publication*
All authors gave consent for publication of the work under the Creative Commons Attribution-Non-Commercial 4.0 license.

*Data Availability*
The data presented in this study are available on request from the corresponding authors.

*Competing Interests*
The authors declare no competing interests.

*Funding Sources*
Nil.

*Author Contributions*
HMF and A-DAIR: Data collection.
A-DAIR and HSS: Conceptualisation, methodology and investigation.
HMF: Statistical analysis.
All authors reviewed and approved the final draft of the manuscript.

*Acknowledgements*
None.

**References**

1. Hussain SS, Al-Murshidi SY, Al-Fatlawi SJ. Association of endometrial thickness with pregnancy rate in infertile women undergoing ICSI program. International Journal of Pharmaceutical Research and Allied Sciences. 2018 Jan 1;7(3):166-71.
2. Buckett W, Sierra S. The management of unexplained infertility: an evidence-based guideline from the Canadian Fertility and Andrology Society. Reproductive biomedicine online. 2019 Oct 1;39(4):633-40. https://doi.org/10.1016/j.rbmo.2019.05.023
3. World Health Organization. WHO laboratory manual for the examination and processing of human semen. World Health Organization; 2021.
4. Sugihara A, Punjabi U, Roelant E, De Neubourg D. Is there a relationship between sperm DNA fragmentation and intra-uterine insemination outcome in couples with unexplained or mild male infertility? Results from the ID-trial. Life. 2022 Dec 20;13(1):11. https://doi.org/10.3390/life13010011
5. Sengupta P, Hasan MF, Dutta S, Jegasothy R, Chhikara BS. Orexins: The 'multitasking'neuropeptides in the energy metabolism and immune regulation of male reproduction. Chemical Biology Letters. 2021 Sep 21;8(4):202-12. https://www.researchgate.net/publication/3546

77600_Orexins_the_'multitasking'_neuropeptides_in_the_energy_metabolism_and_immune_regulation_of_male_reproduction
6. Esteves SC. Time has come to provide infertile men with an optimal fertility pathway. International braz j urol. 2021 Mar 29;47(3):627-30. https://doi.org/10.1590/s1677-5538.ibju.2019.0362.1
7. Hassan MF, Sengupta P, Dutta S. Assisted reproductive technologies for women with polycystic ovarian syndrome. Biomed Pharmacol J. 2021 Sep 1;14(3):1305-8. https://doi.org/10.13005/bpj/2231
8. Dare JK, Bakare TY, Ezeoke G, Adesola MG, Salawu HA, Adesina KT, Jimoh AA, Biliaminu SA. Serum prolactin levels and its clinical correlates in women presenting with infertility at the gynaecologic clinic of a tertiary hospital in North-central Nigeria. Babcock University Medical Journal. 2024 Dec 31;7(2):178-89. https://doi.org/10.38029/babcockuniv.med.j..v7i2.523
9. Gigg M, Paulson RJ, Brems JA, Coward RM, Schlegel PN. Intracytoplasmic sperm injection alone is the most efficacious, effective, and efficient treatment for couples with male factor infertility. Fertility and Sterility. 2025 Apr 1;123(4):574-80. https://doi.org/10.1016/j.fertnstert.2025.02.005
10. Hassan MF, Al-Yasiry RZ, Ghaleb RA. Possible predisposing and predictable factors for the development of ovarian hyperstimulation syndrome (OHSS) in women with polycystic ovary syndrome (PCOS) whom undergone intra cytoplasmic sperm injection (ICSI). MJBMB. 2020;1:37-40. https://www.researchgate.net/publication/341318204_POSSIBLE_PREDISPOSING_AND_PREDICTABLE_FACTORS_FOR_THE_DEVELOPMENT_OF_OVARIAN_HYPER_STIMULATION_SYNDROME_OHSS_IN_WOMEN_WITH_POLYCYCTIC_OVARY_SYNDROME_PCOS_WHOM_UNDERGONE_INTRACYTOPLASMIC_SPERM_INJECTIO
11. Liu X, Shi S, Sun J, He Y, Zhang Z, Xing J, Chong T. The influence of male and female overweight/obesity on IVF outcomes: a cohort study based on registration in Western China. Reproductive Health. 2023 Jan 2;20(1):3. https://doi.org/10.1186/s12978-022-01558-9
12. Tournaye H, Krausz C, Oates RD. Concepts in diagnosis and therapy for male reproductive impairment. The lancet Diabetes & endocrinology. 2017 Jul 1;5(7):554-64. https://doi.org/10.1016/S2213-8587(16)30043-2
13. Wren J, Hudnall M, Pham M, Darves-Bornoz AL, Halpern JA, Bennett NE, Brannigan RE, Hofer MD. A prior history of cryptozoospermia is associated with a significantly higher chance of a successful microdissection testicular sperm extraction compared to non-obstructive azoospermia. Journal of Clinical Medicine. 2023 Nov 23;12(23):7255. https://doi.org/10.3390/jcm12237255
14. Alasmari W, Edris F, Albar Z, Eskandar M, Sultan C, Alboush A, Alasmari A. Comparable reproductive outcomes of ICSI for couples with unexplained infertility and couples with male factor infertility. Middle East Fertility Society Journal. 2018 Dec 1;23(4):393-8. https://doi.org/10.1016/j.mefs.2018.05.010
15. Swadi NN, Edan BJ, Rahim AI, Ali RA. Follicular fluid thyroid hormones (T4 and T3) levels and ICSI outcomes. Medical Journal of Babylon. 2023 Jan 1;20(1):81-4. https://doi.org/10.4103/MJBL.MJBL_266_22
16. Hussein R, Abbas LH, Rayhaan S, Fadhil HA, AL-Mousawi ZR. The impact of adding melatonin and other antioxidants on post-thaw human sperm quality during cryopreservation. Medical Journal of Babylon. 2023 Jan 1;20(1):18-23. https://doi.org/10.4103/MJBL.MJBL_271_22
17. Guerrero CA, Kaufmann RA, Madden JD, Meintjes M. Patients undergoing ICSI with severe to moderate oligospermia have a higher risk of fetal losses. Fertility and Sterility. 2007 Sep 1;88:S374. https://doi.org/10.1016/j.fertnstert.2007.07.1247
18. Hassan MF, Abdul-Kadim H, Edan BJ, Dutta S, Sengupta P. Embryo quality and intracytoplasmic sperm injection (ICSI) outcome in Iraqi women with polycystic ovary syndrome (PCOS): A cohort prospective study. Biomedical and Pharmacology Journal. 2023 Jun 30;16(2):863-70. https://doi.org/10.13005/bpj/2668
19. Bracke A, Peeters K, Punjabi U, Hoogewijs D, Dewilde S. A search for molecular mechanisms underlying male idiopathic infertility. Reproductive biomedicine online. 2018 Mar 1;36(3):327-39. https://doi.org/10.1016/j.rbmo.2017.12.005