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The Effect of Immune System on the Sperm Quality in Iraqi Patients

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Abstract

Diseases of the immune system have a negative impact on patients. This leads to reduced sperm quality and infertility. This article aimed to assess clinical findings related to the immune system and its effect on sperm quality in Iraqi patients. This article were collected patients' data from laboratories and hospitals located in Baghdad, Iraq, between April 2023 and January 2024, where it focused on 89 patients with immune infertility and employed a control group for comparison in terms of sperm concentration, motility characteristics, sex hormones, and ovulation were evaluated for both groups. In terms of the study findings, semen volume was 2.80 ± 0.14 ml, normal morphology was 2.90 ± 0.13, FSH (U/L) was 34.21 ± 6.28, and LH (mU/ml) was 3.18 ± 1.10, E2 (ng/L) was 22.56 ± 7.14, AMH (ng/ml) was 1.10 ± 0.19, AFC was 3.88 ± 0.18, and the abnormal sperm index was 3.40 ± 0.10. Infertile couples exhibited a semen volume of 3.41 ± 0.18, while normal couples demonstrated a volume of 6.10 ± 0.24. The abnormal sperm index was 1.14 ± 0.06 in normal couples. The FSH (U/L) was 8.16 ± 0.43, while LH (mU/ml) was 6.15 ± 0.67, E2 (ng/L) was 73.19 ± 6.08, AMH (ng/ml) was 3.97 ± 0.53, and AFC was 7.50 ± 0.71 in normal couples. In summary, the article noticed which the immune system can be as an adverse effect on the quality of sperm, resulting in poor motility and subsequent fertility issues, which may ultimately lead to complete infertility.

Keywords: Immune system, Sperm concentration, and Infertility.

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1. Introduction

Sperm quality is define as one of the most significant determinants of male fertility and reproductive health [1,2]. Over the last decade, it has been as an increased interest in studies relating to the effect of the immune system on sperm quality in patients from different geographical locations, including Iraq. [3,4,5]

The immune system acted tin protecting of the body from pathogens and foreign substances, but it can also be involved in the control of inflammation in the male reproductive organs [6]. In Iraqi populations, external factors like control of immunity due to genetic or environmental factors such as lifestyle habits had an impact on sperm quality. [7,8,9]

Therefore, it becomes crucial to know how the immune system interacts with sperm quality in Iraqi patients in order to include these men in future interventions and treatments aimed at enhancing male fertility and its outcomes. [10]

2. Patients and methods

We conducted a cross-sectional study of 89 participants aged 20-35 years whose data were collected from all laboratories in Baghdad hospitals - Iraq. The data of the participants were recorded, and they were divided into two groups: where group A represented couples with immune infertility due to immune problems, where 50 infertile couples were selected, while Group B recorded the data of the participants who represented normal couples who did not have immune problems.

Semen samples were taken from all participants, controlled by a computer-aided semen analysis system in which various parameters such as semen volume, sperm count, sperm motility and others were checked. Females, meanwhile, had a fasting venous blood sample of 5 ml taken on the third day of their menstrual cycle, which was done early in the morning, followed by centrifugation at 3000 r/min for 10 minutes, after which measurements of observed changes of follicle-stimulating hormone (FSH), luteinising hormone (LH), estradiol (E2) and anti-mullerian hormone (AMH) levels were performed using an automatic immune analyzer and a vaginal color Doppler ultrasound was conducted.

The analysis of all data of the participants contained in this article was done by using SPSS 20.0, where the level of statistical significance was set at $P < 0.05$.

3. Results

Table 1. Baseline characteristics of patients.

Characteristics	No. of Participants [n = 89]	Percentage [%]
Age, years		
20 – 25	30	33.71%
26 – 30	38	42.70%
31 – 35	21	23.60%
Sex		
Males	39	43.82%
Females	50	56.18%
BMI, kg/m2		
Underweight	24	26.97%
Normal weight	20	22.47%
Overweight	30	33.71%
Obese	15	16.85%
No. of Comorbidities		
Yes	32	35.96%

No	57	64.04%
Hypertension	30	33.71%
Diabetes	25	28.09%
Asthma	14	15.73%
Anemia	24	26.97%
Smoking status		
Yes	43	48.31%
No	46	51.69%
Malnutrition		
Yes	50	56.18%
No	39	43.82%
Education status		
Primary	14	15.73%
Secondary	30	33.71%
Under or post graduated from a unversity	45	50.56%
Income status, $		
300 – 600	39	43.82%
601 - 900	30	33.71%
> 900	20	22.47%

Table 2. Determine sperm quality of in both groups.

Variables	Group A, 50 cases	Group B, 39 cases
Semen volume (ml)	2.80 ± 0.14	3.41 ± 0.18
Rate of normal morphology (%)	2.90 ± 0.13	6.10 ± 0.24
Concentration (×106/ml)	70.18 ± 1.25	83.15 ± 2.13
Survival rate (%)	68%	87%
Abnormal sperm index	3.40 ± 0.10	1.14 ± 0.06

Table 3. Distribution examination data on both groups in terms of hormone and ovulation.

Variables	Group A, 50 cases	Group B, 39 cases
FSH (U/L)	34.21 ± 6.28	8.16 ± 0.43
LH (mU/ml)	3.18 ± 1.10	6.15 ± 0.67
E2 (ng/L)	22.56 ± 7.14	73.19 ± 6.08
AMH (ng/ml)	1.10 ± 0.19	3.97 ± 0.53
AFC	3.88 ± 0.18	7.50 ± 0.71

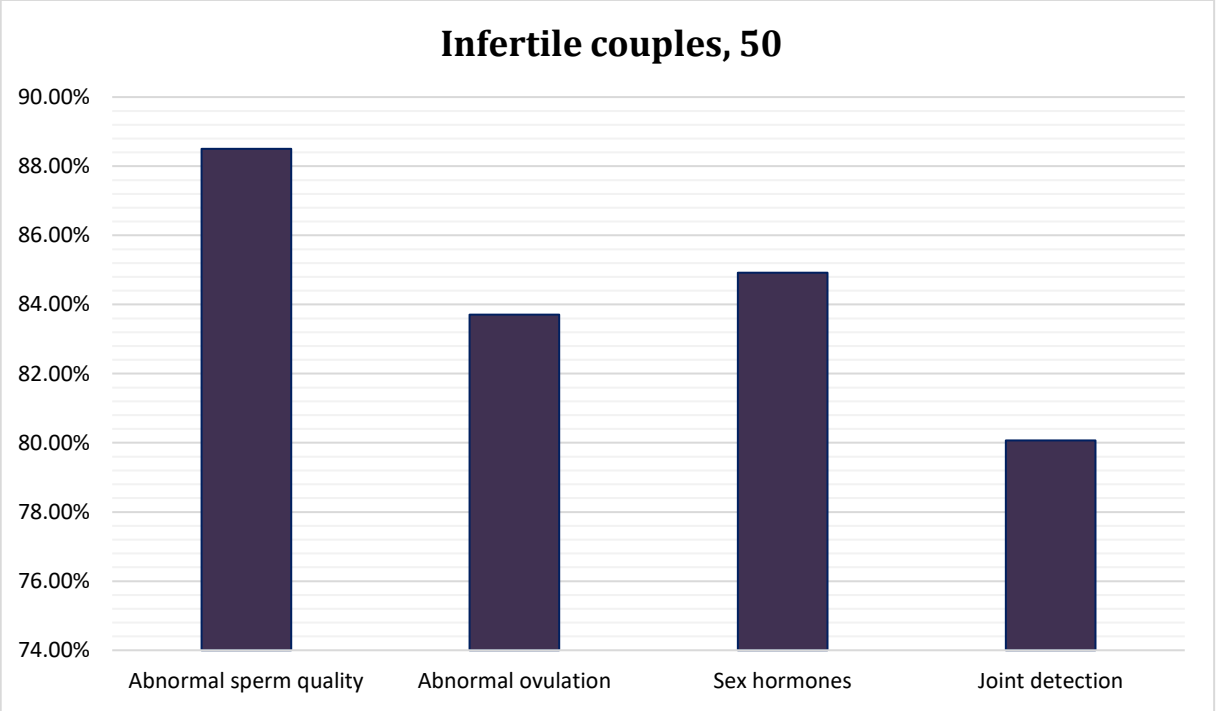

Figure 1. Enroll data of the positive rate of infertility detection.

4. Discussion

Our findings found almost all participants were in aged (26 - 30) years with 42.70%, males were 39 cases and, females were 50 cases, and 45 cases of cauples had obese. Studies suggest that sexually active couples who do not practice contraception have an approximate 25% likelihood of procuring a seed with each of their monthly cycles. Furthermore, Studies suggest [11,12,13] that 50% of such couples should be able to conceive within 3 months after they are married, 72% within 6 months, and 80% - 85% within a year after they are married, and with regards to infertility, it may strike nearly 10% of all such couples with the ability to reproduce.

Male infertility is usually associated with the decline in sperm quality, testicular injury, varicocele, reproductive tract infections, and so on [14]. The quality of sperm comprises of its number, motility, and shape. The new WHO [15] semen analysis manual states that the sperm density has to be not less than 15 million/ml, the ejaculate volume has to be ≥1.5 ml, and the percentage of forward motile sperm is to be not less than 32%. In terms of our study, findings shown semen volume was 2.80 ± 0.14 (ml) in infertile couples and 3.41 ± 0.18 in normal couples, rate of normal morphology was 2.90 ± 0.13 in infertile couples and 6.10 ± 0.24 in normal couples, and abnormal sperm index was 3.40 ± 0.10 in infertile couples and 1.14 ± 0.06 in normal couples.

The normal range for sperm morphology states that healthy sperm should be ≤4% abnormal, and very few or 96% or more should be normal. In normal situations, tobacco use affects the production of male hormones, inflicts damage on the reproductive organs and system, can cause impotence or low sex drive, altered sperm shape, and, in the long run, results in infertility in men. [16,17,18]

In the case of women, it has been found that the principal factors affecting infertility result from damages or diseases affecting the reproductive organs, with the most affected organs being the uterus and the ovaries [19]. Female infertility, in most cases, may also stem from reproductive hormone imbalance and ovulation dysfunction. Research indicates that 15% of fertile couples present with ovulation dysfunction, while in about 40% of females diagnosed with infertility, there are menstrual disturbances such as hypomenorrhea or even amenorrhea, where menstrual periods cease completely and may also suppress the signs. [20,21]

In our findings, we enrolled hormone and ovulation data in both groups. Accorrding to infertile couples, we found FSH (U/L) was 34.21 ± 6.28, LH (mU/ml) was 3.18 ± 1.10, E2 (ng/L) was 22.56 ± 7.14, AMH (ng/ml) was 1.10 ± 0.19, AFC was 3.88 ± 0.18. In terms of normal couples, findings shown FSH (U/L) was 8.16 ± 0.43, LH (mU/ml) was 6.15 ± 0.67, E2 (ng/L) was 73.19 ± 6.08, AMH (ng/ml) was 3.97 ± 0.53, AFC was 7.50 ± 0.71.

As per the study findings, it is evident that the poor fertility quality in infertile patients will be due to their poor sperm activity, concentration, and survival rate, as well as their high abnormal sperm index. In the parameters examined for sex hormones, it can be noted that there are changes in sex hormones in the study group. FSH and LH are hormones that help in the regulation of reproductive processes; the hormone LH also has a function of inducing ovulation; then again, with FSH, the substance acts on the corpus luteum, stimulating the production of progesterone. In contrast, an elevation of the FSH level is observed in women with secondary amenorrhea and premature ovarian failure. A low level in the plasma indicates a possible dysfunction of the pituitary or hypothalamus, which causes infertility. Serum E2 levels are important for the diagnosis of irregularities in the menstrual cycle. When the serum sex hormone level is evaluated, how the hypothalamus and ovary work, the time of ovulation and the ovarian functions can be determined, as well as assisting in tracking the process of female infertility within clinicians.

5. Conclusion

The results showed that the immune system had a negative effect on the quality and motility of sperm, as well as sex hormones and ovulation, compared to the control group.

6. References

1. Cao, Q.C., Lai, Y.H. and Chen, H.L. (2021) Analysis of the Value of Combined Detection of Estradiol, Progesterone and Anti HCG Antibody in the Diagnosis of Female Infertility. Sichuan Journal of Physiological Sciences, 43, 794-795.
2. Zhang, H.J., Zhou, G.Y., Zhang, G.H., et al. (2021) Application of Serum Hormone Combined with Immune Antibody in Infertility Screening. Clinical Research, 29, 120-121.
3. Zhang, G.L. and Huang, Z.H. (2020) The Clinical Value of Serum Reproductive Hormone, Acrosin Antibody and Sperm Protein 17 Antibody in Infertile Women. China Maternal and Child Health Care, 35, 2673-2675.
4. Tang, M., Nie, A., Chen, M., et al. (2021) The Expression and Significance of Serum LH, FSH, E2, T, P, PRL in Infertility Patients. Contemporary Medicine, 27, 58-61.
5. Li, S.J. (2021) Analysis on the Significance of Serum Sex Hormone Indicators in Infertile Women. Journal of Shanxi Health Vocational College, 31, 39-40.
6. Schisterman, E.F., Sjaarda, L.A., Clemons, T., et al. (2020) Effect of Folic Acid and Zinc Supplementation in Men on Semen Quality and Live Birth among Couples Undergoing Infertility Treatment: A Randomized Clinical Trial. JAMA, 323, 35-48.
7. Lundy, S.D., Sangwan, N., Parekh, N.V., et al. (2021) Functional and Taxonomic Dysbiosis of the Gut, Urine, and Semen Microbiomes in Male Infertility. European Urology, 79, 826-836.
8. Li, G.Y., Liu, J., and Wang, Y.Y. (2017) The Significance of Combined Detection of Sperm Quality, Sex Hormone and Ovulation in the Diagnosis of Infertility. Chinese Practical Medicine, 12, 60-61.
9. Zhang, Y.T. (2017) The Value of Sex Hormone Test in the Diagnosis of Infertility. Journal of Community Medicine, 15, 21-22. 10.
10. Li, Y.L., Lou, Q.W. and Chen, X.G. (2011) The Application of Combined Detection of Sperm Quality, Sex Hormone and Ovulation in the Analysis of Infertility Etiology. Shandong

Pharmaceutical, 51, 99-100. 11.

11. Song, X.Y., Song, B., and Feng, G.M. (2016) Study on the Diagnostic Value of Three Combined Tests in Infertility. International Journal of Laboratory Medicine, 37, 2619-2621. 12.
12. He, H.Q., Zhou, Y.Y. and Song, S.Z. (2002) Analysis of Detection Results of Chlamydia Trachomatis and Ureaplasma urealyticum in 92 Infertile Couples. Chinese Journal of Family Planning, 10, 554-555. 13.
13. Donders, G.G.G., Bosmans, E., Reumers, J., et al. (2022) Sperm Quality and Absence of SARS-CoV-2 RNA in Semen after COVID-19 Infection: A Prospective, Observational Study and Validation of the Sperm COVID Test. Fertility and Sterility, 117, 287-296.
14. Zhang, H., He, J., Zhao, Y., et al. (2021) Effect of Glutathione S-Transferase Gene Polymorphisms on Semen Quality in Patients with Idiopathic Male Infertility. Journal of International Medical Research, 49.
15. Yang, S.Y., Yang, Z.H., and Chen, X.L. (2018) Study on the Detection Value of AsAb, EmAb, AcAb, AoAb, ToxAb in Peripheral Blood and Endometrium of Infertile Patients. Hebei Medical Journal, 40, 368-371.
16. Wang, L.J. (2017) Comparison of Three Detection Techniques in Detection of Ureaplasma urealyticum in Infertile Patients. Laboratory and Laboratory Medicine, 35, 239-240.
17. Wen, H.Y., Jiang, Y.Y. and Miao, L.L. (2018) Study on the Detection Value of EMAb, AsAb and AMH in Peripheral Blood of Infertile Patients. Journal of Modern Integrated Chinese and Western Medicine, 27, 1909-1911.
18. Chen, Y.Q., Li, J., Jing, X.Z., et al. (2022) Diagnostic Value of Combined Detection of miR-34b, miR-122 and miR-429 in Semen for Male Infertility. International Journal of Laboratory Medicine, 43, 2046-2048.
19. Guo, M. (2012) Analysis of the Results of Serum Antisperm Antibodies in Infertile Patients in Xinjiang (A Report of 1200 Cases). Chinese Journal of Aesthetic Medicine, 21, 295-296.
20. Zhang, H., Liu, R.M., Wu, Z., et al. (2003) Application of Antisperm Antibody Detection in Infertility. Journal of Cell and Molecular Immunology, 19, 614-614.
21. Liang, Y.H., Zhang, J. and Xie, Q. (2018) Detection and Clinical Significance of Peripheral Blood DNT Cells and T Cell Subsets in Female Infertile Patients. Journal of Ningxia Medical University, 40, 971-974.