Hindawi
Andrologia
Volume 2024, Article ID 1514237, 6 pages
https://doi.org/10.1155/2024/1514237

Research Article

Mood Disorders and Sexual Function in Infertile Men: Exploring the Relationship with Semen Analysis Results

Maryam Nakhaee Moghadam,[1] **Marjan Ghaemi**,[2] **Sina Eskandari Delfan**,[2] **Maryam Afshari**,[1] **Mahin Kaveh**,[1] **Nasim Eshraghi**,[2] **and Zahra Shahraki**[1]

[1]*Department of Obstetrics and Gynecology, School of Medicine, Amir al Momenin Hospital, Zabol University of Medical Sciences, Zabol, Iran*
[2]*Vali-E-Asr Reproductive Health Research Center, Family Health Research Institute, Tehran University of Medical Sciences, Tehran, Iran*

Correspondence should be addressed to Zahra Shahraki; zahra.shahraki@ymail.com

Received 14 May 2023; Revised 19 October 2023; Accepted 21 February 2024; Published 29 March 2024

Academic Editor: Haney Samir

Objective. The presence of infertility in couples not only results in heightened stress but also elevates the risk of developing psychological disorders, further exacerbating their situation. This study is designed to evaluate the relationship between semen analysis and depression, anxiety, and stress, as well as sexual function in infertile men. *Method*. This descriptive cross-sectional study was carried out at Amir Al-Momenin Hospital of Zabol between March 2019 and April 2020. The couples who were candidates for intracytoplasmic sperm injection according to male factors were recruited for the study. One hundered two men were asked to complete the depression, anxiety, and stress questionnaire (DASS-42) and the International Index of Erectile Function questionnaire (IIEF-15). The findings of the DASS and IIEF questionnaires were compared with the semen analysis test and reported. *Results*. The frequency of depression, anxiety, and moderate to very severe stress were found in 21 (20.6%), 40 (39.2%), and 23 (22.5%) cases, respectively. Surprisingly, 60 (59%) participants had erectile dysfunction. A significant correlation was found between mood disorders (depression, anxiety, and stress) and some components of the erectile function questionnaire, stress with erectile function ($p = 0.045$), depression with overall satisfaction ($p = 0.011$), and anxiety with intercourse satisfaction ($p = 0.048$) and overall satisfaction ($p = 0.037$). Also, there was a significant correlation between semen analysis parameters such as sperm motility with depression ($p = 0.035$) and anxiety ($p = 0.037$), normal sperm morphology with stress ($p = 0.034$), progressive sperm motility with orgasmic function ($p = 0.006$), and intercourse satisfaction ($p = 0.014$). *Conclusion*. The higher the mental health, the higher the erectile function. Improvement of mood disorders leads to improvement of semen parameters and increases the chances of pregnancy. Psychological support may be helpful so, in addition to medical treatment, these people should also receive supportive psychological treatment.

1. Introduction

Infertility is a medical condition marked by the inability to achieve a clinical pregnancy following 12 months of consistent and unprotected sexual intercourse. It is believed to impact approximately 8%–12% of couples in their reproductive years across the globe [1]. Male infertility is characterized as the incapacity of a man to successfully impregnate a fertile female, even after engaging in unprotected sexual intercourse for at least 1 year [2]. Males are found to be solely responsible for 20%–30% of infertility cases but contribute to 50% of cases overall [1]. Several studies have shown that the overall prevalence of infertility in Iran is 3.35%−13.2% [3–9]. Male infertility can be attributed to various factors, and these causes can be categorized based on their underlying origins. These classifications encompass endocrine disorders, typically resulting from hypogonadism, accounting for approximately 2%–5% of cases. Sperm transport disorders, including conditions like vasectomy, contribute to around 5% of cases. Primary testicular defects, characterized by abnormal sperm

parameters without a discernible cause, represent a substantial majority, accounting for 65%–80% of cases. Lastly, idiopathic cases, where infertile males exhibit normal sperm and semen parameters, make up approximately 10%–20% of cases [2]. Low semen quality is the primary factor leading to male infertility. In individuals possessing the requisite reproductive organs for procreation, infertility can arise from a decreased sperm count resulting from endocrine issues, medication usage, exposure to radiation, or infection. Testicular abnormalities, hormonal imbalances, or obstructions within the man's duct system could also contribute to this condition [10, 11]. Primary ciliary dyskinesia can be a potential underlying factor for infertility linked to immotile sperm [11, 12]. The exposure to chemical dust and pesticides can have harmful effects on male fertility, leading to negative impacts [11, 13]. Specifically, commonly used pesticides like DDT (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane) and industrial chemicals such as polychlorinated biphenyls, as well as environmental pollutants like dioxins, and certain human therapeutics like anticancer drugs, have been implicated in these harmful effects [11, 14, 15].

The connection between infertility and psychological stress is intricate. While infertile couples often experience heightened stress levels and face an increased likelihood of developing psychological disorders when compared to healthy couples, it is also noteworthy that elevated levels of psychological distress have been linked to a higher risk of infertility [16]. Stress can potentially impact male fertility by causing a decrease in testosterone production, which can be attributed to elevated levels of corticosteroids [17]. Psychological stress has the potential to decrease both the concentration and progressive motility of sperm, while also increasing the proportion of sperm with abnormal morphology [18, 19]. For individuals facing fertility problems, there has been a correlation observed between stress/depression and the quality of male semen [18, 20].

The condition known as erectile dysfunction (ED) is described as the continual inability to achieve and/or sustain a satisfactory erection of the penis that is adequate for satisfactory sexual performance [21]. Men who suffer from ED are at a higher risk of encountering psychological difficulties. The emotional consequences of ED manifest in various aspects of their marital relationship, their openness to addressing the issue, feelings of guilt and denial, depression, anger, diminished self-confidence and self-worth, and a sense of inadequacy as a man [22]. The purpose of this study is to investigate the relationship between mood disorders and both ED and semen analysis test results.

2. Method

2.1. Study Setting. This descriptive cross-sectional study was conducted at Amir Al-Momenin Hospital of Zabol from March 2019 to April 2020. The subjects were men over 18 years old who attended the infertility clinic and were candidates for intracytoplasmic sperm injection due to male factors.

2.2. Sampling Considerations. (i) Between 2 and 7 days before the test, ejaculation or intercourse should not have occurred and during this interval, caffeine, alcohol, drugs, and any medication should be avoided. Also, they have not been exposed to X-rays, radiotherapy, and chemicals such as insecticides or high heat, (ii) the sample should be prepared in the laboratory by artificial stimulation (masturbation) without using soap or lubricants that can be spermicides and without using a condom, and (iii) the whole sample should be poured into the container and it is better to hold the sampling container in hand to bring its temperature closer to body temperature, chilling slows sperm motility and can reduce the accuracy of the test.

Male infertility is characterized by the male's inability to impregnate a fertile female, even after engaging in unprotected intercourse for a minimum duration of 1 year [2]. If any of the WHO 2010 criteria for a man is less than normal, he is considered infertile [23]. The results of the semen analysis test of the couples who had infertility problems were examined to determine the couples whose infertility is caused by men. Sperm samples were obtained by masturbation and analyzed within 1 hr after ejaculation.

A computer-assisted semen analysis video-test method utilized metal for conducting semen analysis [24]. All samples were controlled by an experienced technician. Vitamin D was analyzed using electrochemiluminescence (ECL) method with Cobas e 411 analyzers. Then, the depression, anxiety, and stress status of the samples were collected and recorded based on the 42-question Depression Anxiety Stress Scale (DASS), and the ED status was collected based on the 15-question IIEF (Supplementary Material). These items were compared with sperm parameters such as sperm concentration, sperm motility, sperm progressive motility, and normal sperm morphology.

2.3. Sample Size Calculation. The sample size required to determine the correlation coefficient of 0.37 between the changes in the sperm count parameter and the anxiety score based on the results of Clarke et al.'s [25] study, considering the Type 1 error of 0.05 and the statistical power of 0.90, was calculated as 88 people using the following formula:

$$n = \left[\frac{(Z\alpha + Z\beta)}{C}\right]^2 + 3. \quad (1)$$

2.4. Data Collection. Data collection in this study was done through the Depression Anxiety and Stress Scale (DASS-42) questionnaire, the International Index of Erectile Function (IIEF-15) questionnaire, and laboratory results of semen analysis. Demographic information of the participants including age, sex, level of education, employment status, weight, height, and number of children was taken through a questionnaire prepared by researchers.

2.5. Depression Anxiety and Stress Scale (DASS-42) Questionnaire. This scale was first developed by Lovibond and Lovibond [23] to assess psychological state based on three subscales of depression, anxiety, and stress. This 42-question questionnaire evaluates each of the subscales with 14 questions, and the subject's score is equal to the sum of the scores of the statements of each subscale. The questions of this questionnaire are scored on a four-choice Likert scale in such a way that the expressions never, somewhat, often, and always are scored from 0 to 3, respectively. The higher the scores in this

Table 1: Grading of depression, anxiety, and stress subscales based on scores.

Subscale	Grading				
	Normal	Mild	Moderate	Severe	Very severe
Depression	0–9	10–13	14–20	21–27	≤28
Anxiety	0–7	8–9	10–14	15–19	≤20
Stress	0–14	15–18	19–25	26–33	≤34

questionnaire, the more severe the psychological problems. Based on the points obtained, the intensity of each subscale is determined in Table 1 [26].

The validity and reliability of this questionnaire were implemented by Lovibond on a nonclinical sample of 717 people. Internal consistency coefficients calculated with Cronbach's alpha for depression, anxiety, and stress subscales were 0.91, 0.84, and 0.90, respectively. In a similar study conducted by Moghaddam et al. [27] on 420 adult subjects in Tehran, the validity and reliability of this questionnaire were confirmed for Iranian samples [27].

2.6. The International Index of Erectile Function (IIEF-15) Questionnaire. This questionnaire was prepared by Rosen et al. [28] for self-evaluation of erectile function with good accuracy. This questionnaire consists of five subscales of erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction.

The ED subscale is used to check ED and according to the score obtained in this subscale, a score of 6–10 indicates severe disorder and a score of 11–16 indicates moderate disorder, a score of 17–21 indicates mild to moderate disorder, a score of 22–25 indicates mild disorder, and a score of 26–30 indicates no disorder (no ED). The validity and reliability of this questionnaire were implemented by Rosen et al. [28] on a sample of 278 people. The internal consistency coefficients calculated with Cronbach's alpha are ≤0.73 and ≤0.93. In a study conducted by Babazadeh et al. [29] on substance-dependent men, the validity and reliability of this questionnaire were confirmed for Iranian samples [29].

2.7. The Semen Analysis. Semen analysis is indeed the most common test used to evaluate infertile men. The World Health Organization (WHO) has established guidelines for normal values for each of these parameters in order to determine fertility status. According to the WHO recommendations, a normal sperm count should be greater than 15 million sperm per milliliter of semen. Sperm motility refers to the ability of sperm to move and swim effectively. The WHO defines normal sperm motility as having at least 40% of sperm showing progressive forward movement or 32% with rapid linear progression. Lastly, normal sperm morphology refers to the shape and structure of sperm. The WHO suggests that at least 4% of sperm should have a normal shape and size. If a man has abnormal values in each of these parameters, he is considered infertile [30].

2.8. Statistical Analysis. The data were analyzed using SPSS (version 26.0, SPSS Inc., Chicago, IL, USA). Quantitative parameters were reported as mean with standard deviations (SD) or median with interquartile range (IQR). The men with and without ED groups were compared using the Mann–Whitney U-test, which is a nonparametric test for differences between two independent groups. Pearson's correlation coefficient was used to test the correlations between psychological disorders and semen analysis parameters. The Significant level was set at $p < 0.05$.

Table 2: Demographic information of the participants.

Variable	Total number ($n = 102$)
Men's age (year)	28.8 (±5.5, 20–42)
Men's BMI (kg/m^2)	24.4 (±4.7, 14.7–42.2)
Woman's age (year)	24.7 (±5.8, 16–39)
Number of children	
0	72 (70.6%)
1	19 (18.6%)
2	9 (8.8%)
3	2 (2.0%)
Abortion history	
Positive	18 (17.7%)
Negative	84 (82.3%)
Duration of infertility (month)	25.6 (±21.5, 0–108)
Infertility type	
Primary	75 (73.5%)
Secondary	27 (26.5%)

Data are presented as mean (±SD, range) or numbers (%). BMI, body mass index.

3. Results

3.1. Demographic Information. The demographic information of the 102 participants is presented in Table 2. Among the participants, 74.5% experienced primary infertility, while 25.5% experienced secondary infertility. The participants had a mean age of 28.8 (±5.5) years, ranging from 20 to 42. The rate of primary infertility was 73.5%, and the rate of secondary infertility was 26.5% among the participants in the study. The mean duration of infertility was 25.6 (±21.5) months.

3.2. Semen Analysis Test Results. The results showed that out of the participants, 19.6% had a normal sperm count (≥15 × 10^6/mL), 35.3% had normal sperm motility, and 87.3% had normal sperm morphology. This suggests that a significant portion of the participants had abnormalities in these parameters (Table 3).

4. Results of DASS and IIEF Questionnaires

The results of the DASS and IIEF questionnaires of all participants are summarized in Tables 4 and 5. The frequency of depression, anxiety, and moderate to very severe stress of the participants was 21 (20.6%), 40 (39.2%), and 23 (22.5%), respectively. Out of the 102 participants, 60 individuals (59%) reported having ED, while the remaining 42 participants (41%) were classified as normal.

Table 3: Semen analysis results of the participants.

Variable		Total ($n = 102$)
Sperm count (10^6/mL)	<15	82 (80.4%)
	≥15	20 (19.6%)
Sperm motility (%)	<40	66 (64.7%)
	≥40	36 (35.3%)
Normal sperm morphology (%)	<4	13 (12.7%)
	≥4	89 (87.3%)

Data are presented as numbers (%).

Table 4: The scores of the DASS and IIEF questionnaires in the participants.

Variable	Total ($n = 102$)
DASS	
Stress, median (IQR)	9.5 (4–18)
Depression, median (IQR)	6 (4–12)
Anxiety, median (IQR)	6 (2–12.75)
IIEF	
Erectile function	23.1 (±5.2, 10–30)
Orgasmic function	7.6 (±1.8, 3–10)
Sexual desire	7.8 (±1.9, 3–10)
Intercourse satisfaction	12.1 (±2.7, 5–15)
Overall satisfaction	8.5 (±1.9, 3–10)

Data are presented as mean (±SD, range) or median (IQR). DASS, Depression Anxiety Stress Scale; IIEF, International Index of Erectile Function.

Table 5: The severity of erectile dysfunction in the participants.

Erectile dysfunction status ($n = 102$)	Number	Percent
Very severe	2	2
Moderate	12	11.7
Mild to moderate	20	19.6
Mild	26	25.5
Normal	42	41.2

Data are presented as numbers (%).

Table 6: Comparison of mood disorders among participants with and without erectile dysfunction.

	ED ($n = 60$)	No ED ($n = 42$)	p value
Depression (median, IQR)	10 (9, 5.5–14.5)	4 (6.75, 2–8.75)	<0.001*
Anxiety (median, IQR)	10 (12, 4–16)	3.5 (6.75, 1–7.75)	0.010*
Stress (median, IQR)	12 (12, 7–19)	5.5 (15.75, 2–17.75)	0.004*

Data are presented as median (interquartile range). ED, erectile dysfunction. *p value is significantly less than 0.05.

4.1. Investigating the Relationship between Mood Disorders and Erectile Dysfunction. The Mann–Whitney U-test revealed that the median scores of depression, anxiety, and stress were significantly higher in the ED group than in men who did not have ED ($p \leq 0.001$, $p = 0.010$, $p = 0.004$, respectively) (Table 6).

4.2. Investigating the Relationship between Mood Disorders and Semen Analysis Test Results. In the study using the Pearson test, a weak significant negative relationship was observed between certain subscales of semen analysis and DASS. The correlation coefficient values between sperm motility and depression, sperm motility and anxiety, and normal sperm morphology and stress were approximately −0.21 (Table 7).

5. Discussion

Based on the findings of this study, it is possible that depression, anxiety, and stress may affect the results of semen analysis. It was indicated that there is a weak negative relationship between increasing levels of depression, anxiety, and stress and the decrease in sperm motility and normal sperm morphology in infertile men. Although these correlations were weak, they support the theory that emotional disorders could impact semen quality.

The frequency of depression, anxiety, and moderate to very severe stress among the participants was 21 (20.6%), 40 (39.2%), and 23 (22.5%), respectively, and also 60 participants (59%) had ED. Our findings are consistent with the results of Khademi et al. [31], who reported that 61% of men in infertile couples had ED. Additionally, there was a significant difference in anxiety, depression, and stress scores between infertile men with ED and men without ED.

Depression, anxiety, and stress are psychological conditions that can have a significant impact on various aspects of an individual's health. In recent years, researchers have been exploring the potential effects of these psychological factors on male fertility. Several studies have investigated the relationship between depression, anxiety, and stress and their impact on sperm quality. The findings from the research conducted by Wang et al. [32] involving 896 individuals, revealed a correlation between depression and semen characteristics (such as semen concentration, semen volume, total sperm count, and progressive motility of sperm) in males. Additionally, they observed a nonlinear decrease in depression in relation to semen volume and progressive motility of sperm. Furthermore, another study suggested that interventions targeting psychological well-being may have potential benefits for improving male fertility outcomes [33].

Psychological disorders such as anxiety and depression have been found to be significantly correlated with ED. Many studies have evaluated this relationship and provided valuable insight into the association between psychological well-being and sexual function in infertile men [34–36]. These findings are consistent with the results of our study. Gao et al. [37] examined the occurrence of sexual dysfunction and psychological distress in men experiencing infertility and explored potential connections between them. In their investigation, they found that there were inverse correlations between the IIEF-5 score and levels of anxiety or depression.

Ramezanzadeh et al. [38] investigated anxiety and stress in infertile men about 41% of them had depression and about 87% of them had anxiety. Depression and anxiety had a significant relation with the duration of infertility. Wdowiak

Table 7: Correlation between semen analysis test and subscales of DASS questionnaire.

		Stress	Depression	Anxiety
Sperm count	Correlation coefficient	0.156	0.048	0.113
	p value	0.123	0.642	0.262
Sperm motility	Correlation coefficient	−0.181	*−0.214	*−0.208
	p value	0.073	0.035	0.037
Sperm progressive motility	Correlation coefficient	−0.074	−0.149	−0.170
	p value	0.469	0.142	0.089
Normal sperm morphology	Correlation coefficient	*−0.213	−0.184	−0.141
	p value	0.034	0.070	0.161

*Correlation is significant at the 0.05 level (two-tailed).

et al. [39] reported that emotional disorders in men treated for infertility were associated with hormonal changes, specifically decreased secretion of sex hormone binding globulin (SHBG) and dehydroepiandrosterone sulfate (DHEA-S), as well as increased secretion of cortisol and prolactin. These hormonal changes were found to be responsible for the development of depression and anxiety.

As far as we know, this is the first report to determine the relationship between mood disorders and ED, semen analysis test results and ED, and mood disorders and semen analysis test results in Iran simultaneously. There are a few limitations in the present study, namely the small sample size and the lack of a multicenter research design. To enhance the validity and generalizability of the results, it is advised to conduct larger scale studies in the future.

6. Conclusion

According to the results of this study, the higher the mental health, the higher the erectile function. Improvement of mood disorders leads to improvement of semen parameters and increases the chances of pregnancy. Psychological support may be helpful so, in addition to medical treatment, these people should also receive supportive psychological treatment. Counseling sessions should be held to make couples more familiar with the importance of mental health and how to improve it. Further large-scale studies are suggested to extend the results.

Data Availability

Data are available upon request.

Ethical Approval

This study received approval from the institutional review board at Zabol University of Medical Sciences (ZUMS), and it followed the guidelines set forth in the Helsinki declarations (No: IR.ZBMU.REC.1399.136).

Consent

Informed consent was obtained from all participants, and their information remained confidential. Also, the participants were assured that they could freely leave the study at any stage of the study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Supplementary Materials

The Depression Anxiety and Stress Scale (DASS-42) questionnaire. (*Supplementary Materials*)

References

[1] M. V. Borght and C. Wyns, "Fertility and infertility: definition and epidemiology," *Clinical biochemistry*, vol. 62, pp. 2–10, 2018.

[2] S. Leslie, T. Soon-Sutton, and M. Khan, "Male infertility," 2023.

[3] A. Aflatounian, H. S. Seyed, and N. Tabibnezhad, "The epidemiological and etiological aspects of infertility in Yazd province of Iran," 2009.

[4] S. Afroughi and M. J. E. Pouzesh, "The environmental study on assessing the infertility and its risk factors: a population-based study of married couples in Iran," *Enviromental Sciences, Medicine*, vol. 28, no. 107, pp. 73–79, 2019.

[5] A. B. Y. Ahmadi, K. Madaen, S. Hajebrahimi, A. Ehsannejad, and H. Koushavar, "Prevalence of infertility in Tabriz in 2004," 2006.

[6] A. Moghaddam, F. T. Âmiri, and F. Taringou, "He prevalence of infertility in central region of Mazandaran province in 1999," *Journal of Mazandaran University of Medical Sciences*, vol. 10, no. 27, pp. 12–18, 2000.

[7] M. S. G. Naz, G. Ozgoli, and K. J. Sayehmiri, "Prevalence of infertility in Iran: a systematic review and meta-analysis," *Urology Journal*, vol. 17, no. 4, pp. 338–345, 2020.

[8] M. Nojomi, M. Ashrafi, and J. Koohpayehzadeh, "Study of couples infertility in the west of Tehran in the year of 2000," *The Journal of Womens Health, Issues and Care*, vol. 8, no. 27, pp. 633–639, 2002.

[9] M. R. Safarinejad, "Infertility among couples in a population-based study in Iran: prevalence and associated risk factors," *International Journal of Andrology*, vol. 31, no. 3, pp. 303–314, 2008.

[10] A. Mishail, S. Marshall, D. Schulsinger, and Y. Sheynkin, "Impact of a second semen analysis on a treatment decision making in the infertile man with varicocele," *Fertility and Sterility*, vol. 91, no. 5, pp. 1809–1811, 2009.

[11] M. Mustafa, A. Sharifa, J. Hadi, E. IIIzam, S. J. Aliya, and M. Sciences, "Male and female infertility: causes and management," vol. 18, pp. 27–32, 2019.

[12] T. Avidor-Reiss, A. Khire, E. L. Fishman, and K. H. Jo, "A typical centrioles during sexual reproduction," *Frontiers in Cell and Developmental Biology*, vol. 157, no. 2, Article ID 21, 2015.

[13] J. Mendiola, A. M. Torres-Cantero, J. M. Moreno-Grau et al., "Exposure to environmental toxins in males seeking infertility treatment: a case-controlled study," *Reproductive BioMedicine Online*, vol. 16, no. 6, pp. 842–850, 2008.

[14] U. J. A. D'Souza, "Tamoxifen induced multinucleated cells (symplasts) and distortion of seminiferous tubules in rat testis," *Asian Journal of Andrology*, vol. 5, no. 3, pp. 217–220, 2003.

[15] U. J. A. D'Souza, "Effect of tamoxifen on spermatogenesis and tubular morphology in rats," *Asian Journal of Andrology*, vol. 6, no. 3, pp. 223–226, 2004.

[16] G. Simionescu, B. Doroftei, R. Maftei et al., "The complex relationship between infertility and psychological distress (review)." *Experimental and Therapeutic Medicine*, vol. 21, no. 4, Article ID 306, 2021.

[17] S. T. Arya and B. Dibb, "The experience of infertility treatment: the male perspective," *Human Fertility*, vol. 19, no. 4, pp. 242–248, 2016.

[18] S. Karavolos, N. Panagiotopoulou, H. Alahwany, and S. Martins da Silva, "An update on the management of male infertility," *The Obstetrician & Gynaecologist*, vol. 22, no. 4, pp. 267–274, 2020.

[19] Y. Li, H. Lin, Y. Li, and J. Cao, "Association between socio-psycho-behavioral factors and male semen quality: systematic review and meta-analyses," *Fertility and Sterility*, vol. 95, no. 1, pp. 116–123, 2011.

[20] E. Z. Drobnis, A. K. Nangia, E. Z. Drobnis, and A. K. Nangia, "Psychotropics and male reproduction," in *Impacts of Medications on Male Fertility*, Advances in Experimental Medicine and Biology, pp. 63–101, Springer, 2017.

[21] V. Ciaccio and D. Di Giacomo, "Psychological factors related to impotence as a sexual dysfunction in young men: a literature scan for noteworthy research frameworks," vol. 12, no. 4, pp. 501–512, 2022.

[22] H. Z. Huri, N. D. Mat Sanusi, A. H. A. Razack, and R. J. Mark, "Association of psychological factors, patients' knowledge, and management among patients with erectile dysfunction," *Patient Prefer Adherence*pp. 807–823

[23] P. F. Lovibond and S. H. Lovibond, "The structure of negative emotional states: comparison of the depression anxiety stress scales (DASS) with the beck depression and anxiety inventories," *Behaviour Research and Therapy*, vol. 33, no. 3, pp. 335–343, 1995.

[24] S. S. Casagrande, B. Linder, and C. C. Cowie, "Prevalence of gestational diabetes and subsequent type 2 diabetes among U. S. women," *Diabetes Research and Clinical Practice*, vol. 141, pp. 200–208, 2018.

[25] R. N. Clarke, S. C. Klock, A. Geoghegan, and D. E. Travassos, "Relationship between psychological stress and semen quality among in-vitro fertilization patients," *Human Reproduction*, vol. 14, no. 3, pp. 753–758, 1999.

[26] K. S. Al-Gelban, H. S. Al-Amri, and O. Mostafa, "Prevalence of depression, anxiety and stress as measured by the depression, anxiety, and stress scale (DASS-42) among secondary school girls in Abha, Saudi Arabia," *Sultan Qaboos University Medical Journal*, vol. 9, no. 2, Article ID 140, 2009.

[27] M. A. A. Moghaddam, F. S. Saed, P. Dibajnia, and J. Zangeneh, "A preliminary validation of the depression, anxiety and stress scales (DASS) in non-clinical sample," *Clinical Psychology and Personality*, vol. 6, no. 2, pp. 23–38, 2008.

[28] R. C. Rosen, A. Riley, G. Wagner, I. H. Osterloh, J. Kirkpatrick, and A. Mishra, "The International Index of Erectile Function (IIEF): a multidimensional scale for assessment of erectile dysfunction," *Urology*, vol. 49, no. 6, pp. 822–830, 1997.

[29] M. H. Sh. Babazadeh, V. Sadeghi-Firoozabadi, and N. Gohari-Derakhshande, "Study of psychometric properties of the International Index of Erectile Function (IIEF) in substance dependent men," *Quarterly of Applied Psychology*, vol. 14, no. 4, pp. 435–457, 2020.

[30] K. Baker, J. Li, and E. Sabanegh Jr, "Analysis of semen parameters in male referrals: impact of reference limits, stratification by fertility categories, predictors of change, and comparison of normal semen parameters in subfertile couples," *Fertility and Sterility*, vol. 103, no. 1, pp. 59–65.e5, 2015.

[31] A. Khademi, A. Alleyassin, M. Amini, and M. Ghaemi, "Evaluation of sexual dysfunction prevalence in infertile couples," *The Journal of Sexual Medicine*, vol. 5, no. 6, pp. 1402–1410, 2008.

[32] Y. Wang, Y. Zhang, Y. Yang et al., "Association of depression with sperm quality: a multicentre cross-sectional study in China during the COVID-19 pandemic," 2021.

[33] A. Ilacqua, G. Izzo, G. P. Emerenziani, C. Baldari, and A. Aversa, "Lifestyle and fertility: the influence of stress and quality of life on male fertility," *Reproductive Biology and Endocrinology*, vol. 16, no. 1, Article ID 115, 2018.

[34] G. Corona, E. Mannucci, L. Petrone et al., "Psycho-biological correlates of free-floating anxiety symptoms in male patients with sexual dysfunctions," *Journal of Andrology*, vol. 27, no. 1, pp. 86–93, 2006.

[35] F. A. Yafi, L. Jenkins, M. Albersen et al., "Erectile dysfunction," *Nature Reviews Disease Primers*, vol. 2, no. 1, pp. 1–20, Article ID 16003, 2016.

[36] R. M. Coward, C. Stetter, A. Kunselman et al., "Fertility related quality of life, gonadal function and erectile dysfunction in male partners of couples with unexplained infertility," *Journal of Urology*, vol. 202, no. 2, pp. 379–384, 2019.

[37] J. Gao, X. Zhang, P. Su et al., "Relationship between sexual dysfunction and psychological burden in men with infertility: a large observational study in China," *The Journal of Sexual Medicine*, vol. 10, no. 8, pp. 1935–1942.

[38] F. Ramezanzadeh, M. M. Aghssa, N. Abedinia, F. Zayeri, N. Khanafshar, and M. Jafarabadi, "Surveying of relationship between anxiety, depression and duration of infertility," vol. 1271, pp. 334–337, International Congress Series, 2004.

[39] A. Wdowiak, A. Bien, G. Iwanowicz-Palus, M. Makara-Studzińska, and I. Bojar, "Impact of emotional disorders on semen quality in men treated for infertility," *Neuro-Endocrinology Letters*, vol. 38, no. 1, pp. 50–58, 2017.