

Depression and Anxiety Among Men Undergoing ART Treatment

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Research

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Abstract

Objective: This prospective longitudinal study aimed at assessing the psychological status, especially depression and anxiety across different phases of ART treatments in subfertile men.

Methods: During January 2016 to December 2018, 1248 fertile couples were recruited to participate in the prospective study. The Self-rating Anxiety Scale (SAS) and the Self-rating Depression Scale (SDS) were used to evaluate the presence of mental health problems in both husbands and wives at the day of initiation, oocyte retrieval and embryo transplantation respectively. Clinical pregnancy is defined as the presence of at least one intrauterine gestational sac with ultrasound assessment after a positive human chorionic gonadotropin assessment.

Results: In total, 1248 infertile couples undergoing ART treatment participated in this prospective study. The clinical pregnancy rate was 42.4% in this study. The subject with SAS score ≥ 50 was classified as anxiety and SDS ≥ 53 as depression. The incidence of male anxiety and depression in the three assessment points in pregnant group were 8.48%, 8.07%, 8.07% and 9.04%, 8.90%, 10.71% respectively; In the nonpregnant group, the corresponding data were 9.75%, 6.05%, 10.02% and 6.43%, 6.99%, 9.07% respectively, and there was no significant difference between the two groups ($P > 0.05$).

Conclusions: Although the SAS and SDS scores were higher in the nonpregnant group than those in the pregnant group, there was no statistical difference in the incidence of anxiety and depression between the two groups, and we concluded that male anxiety and depression are not closely associated with the ART clinical pregnancy rate.

Introduction

Infertility is defined as a couple's inability or failure to conceive after regular, unprotected intercourse for 12 months, or due to an impairment of a person's capacity to reproduce either as an individual or with his/her partner.^[1] The World Health Organization estimates that the incidence of infertility is 10–15%, and it may be higher in developing countries. Male factors are believed to contribute at least partially to difficulties with achieving pregnancy in as many as 50% of infertile couples, and approximately 20% of couple infertility can be attributed solely to the male.^[2] Since the birth of the first baby conceived through in vitro fertilization (IVF) in 1978^[3], assisted reproductive technology (ART) has made great progress and is now more and more accepted by the public. As of 2019, the total number of births achieved through ART likely exceeds 8 million globally.^[4]

Anxiety and depression are the most frequently occurring psychological disorders among infertile couples.^[5] It is widely accepted that women are more likely to be affected than men by infertility problem, and there have been a large number of studies on the relationship between female psychological stress and the outcome of ART. In contrast, there are few researches about the influence of male psychological

stress on the outcome of ART. The purpose of this article is to investigate the prevalence of depression and anxiety of men during ART, and to explore the effects of anxiety and depression on ART results.

Methods

Participants and study design

1248 infertile couples undergoing ARTs were recruited at the Centre of Reproductive Medicine of Shanghai Jiao Tong University Affiliated Sixth People's Hospital between January 2016 and December 2018. Both in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) cycles were included. The presence of any complication during the ART cycle (such as risk of ovarian hyperstimulation syndrome, oocyte retrieval bleeding, pelvic sepsis, etc) were considered as exclusion criteria. No patient underwent psychological counseling, neither before nor during the treatment.

Ethics

The study was submitted to the ethics committee of Shanghai Jiao Tong University Affiliated Sixth People's Hospital. The study was conducted in accordance with the Helsinki Declaration. At enrollment, all patients (husbands and their partners) had written information about the study protocol, the specific consent was obtained, and a written informed consent to use non-sensitive data for research was signed.

Measures and data collection

A researcher formally interviewed all patients who met the inclusion criteria face to face in order to explain the study protocol and to ask for participation. Men and women were included in the study only after a formal written informed consent was obtained.

At enrollment, demographic and clinical (psychological and medical) data were recorded in both male and female patients. At each assessment point (the day of initiation, oocyte retrieval and embryo transplantation respectively), participants of infertile couples received the questionnaires and completed the survey in the clinic.

Sociodemographic variables (such as age, level of education, and profession), clinical data, including the presence and number of previous pregnancies, the presence and number of previous failed ART treatments, and the cause of infertility, were collected from ART medical records.

The Self-rating Anxiety Scale (SAS) and the Self-rating Depression Scale (SDS) were used to evaluate the presence of mental health problems. The SAS and SDS are two norm-referenced scales and both are 20 item Likert scales, in which items tap psychological and physiological symptoms and are rated by respondents according to how each applied to them within the past week, using a 4-point scale ranging from 1 (none, or a little of the time) to 4 (most, or all of the time). The scores of each item were accumulated and the index score was equal to crude score multiplied by 1.25. The subject with SAS

score ≥ 50 was classified as anxiety and SDS ≥ 53 as depression, the higher the score, the more serious the anxiety or depression.

Data Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 22, for Windows (NY, USA). Pearson's chi-square test and univariate analysis of variance (ANOVA) were performed to test for differences in the demographic and clinical characteristics of the sample. Negative binomial regression model was used to examine the effect of psychological distress on clinical pregnancy. In addition, comparison between pregnant and nonpregnant couples on anxiety and depression scores was done using independent t test.

A P value less than 0.05 was considered statistically significant.

Results

Characteristics of the sample

The final sample included 1248 infertile couples. In 29.9% of cases, infertility was due to a male factor; in 38.3%, due to a female factor; and in 24.5%, due to both male and female, and 7.3% of patients suffered from unexplained infertility. Clinical pregnancy is defined as the presence of at least one intrauterine gestational sac with ultrasound assessment after a positive human chorionic gonadotropin assessment. The ART cycle was successful for 42.4% of the sample.

The main demographic characteristics of the final sample are shown in Table 1. Except for age, no significant differences between men and women for demographic variables were found (all P values > 0.05). None of the patients reported to have suffered of a relevant psychiatric problem in the past years.

Table 1. Main demographic characteristics of the research objects

characteristics	nonpregnant (n=719)	Pregnant (n=529)	t/ χ^2 value	P value
Age	34.12±4.217	32.53±4.226	4.319	P=0.001
Partner's age	32.06±5.178	30.73±4.163	4.563	P=0.001
Level of Education			1.318	0.103
Middle school or below	111 (15.4%)	85 (16.1%)		
High school	177 (24.6%)	136 (25.7%)		
College or above	431 (60.0%)	308 (58.2%)		
Occupation			3.554	0.059
Unemployed	136 (18.9%)	88 (16.6%)		
Employed	583 (81.1%)	441 (83.4%)		
Infertility duration (years)	3.42±2.654	3.14±2.264	1.892	0.059
Cause of infertility			0.666	0.717
Female factor	279 (38.8%)	200 (37.8%)		
Male factor	214 (29.8%)	159 (30.1%)		
Both	178 (24.7%)	127 (24.0%)		
unknown	48 (6.7%)	43 (8.1%)		
Infertility type			2.124	0.064
Primary	429 (59.7%)	328 (62.1%)		
Secondary	290 (40.3%)	191 (37.9%)		

The subject with SAS score ≥ 50 was classified as anxiety and SDS ≥ 53 as depression. As seen in Table 2, the mean anxiety scores of men in pregnant group were 37.02 ± 8.898 , 35.60 ± 9.506 and 35.75 ± 8.977 on the initiation day, oocyte retrieval day and embryo transplantation day, respectively, which were significantly lower than those in nonpregnant group (39.42 ± 7.632 , 38.21 ± 7.591 and 38.28 ± 8.285 , $P = 0.000$). Similarly, the mean depression scores of men in pregnant group time points were 36.73 ± 10.196 , 35.62 ± 10.198 and 36.08 ± 10.816 , which were lower than those in nonpregnant group (39.28 ± 8.763 , 37.54 ± 8.976 and 38.36 ± 9.951 , $P = 0.000$). However, the incidence of male anxiety and depression in the three assessment points in pregnant group were 8.48%, 8.07%, 8.07% and 9.04%, 8.90%, 10.71% respectively; in the nonpregnant group, the corresponding data were 9.75%, 6.05%, 10.02% and 6.43%, 6.99%, 9.07% respectively, and there was no significant difference between the two groups ($P > 0.05$). (Table 3.)

Table 2
The SAS and SDS scores in pregnant and nonpregnant groups

Assessment items	SAS score (mean ± SD)			SDS score (mean ± SD)		
	Initiation day	Oocyte retrieval day	Embryo transplantation day	Initiation day	Oocyte retrieval day	Embryo transplantation day
Pregnant(n = 529)	37.02 ± 8.898	35.60 ± 9.506	35.75 ± 8.977	36.73 ± 10.196	35.62 ± 10.198	36.08 ± 10.816
Nonpregnant(n = 719)	39.42 ± 7.632	38.21 ± 7.591	38.28 ± 8.285	39.28 ± 8.763	37.54 ± 8.976	38.36 ± 9.951
T value	-5.119	-5.384	-5.135	-4.473	-3.523	-3.808
P value	0.000	0.000	0.000	0.000	0.000	0.000

Table 3
Incidence of anxiety and depression in pregnant and nonpregnant groups

Assessment items	Anxiety rate (positive)			Depression rate (positive)		
	Initiation day	Oocyte retrieval day	Embryo transplantation day	Initiation day	Oocyte retrieval day	Embryo transplantation day
Pregnant(n = 529)	9.75% (47)	6.05% (32)	10.02%(53)	6.43% (34)	6.99% (37)	9.07%(48)
Nonpregnant(n = 719)	8.48% (61)	8.07% (58)	8.07%(58)	9.04% (65)	8.90% (64)	10.71%(77)
χ ² value	0.058	1.854	1.433	2.840	1.490	0.905
P value	0.809	0.173	0.231	0.091	0.222	0.342

Discussion

Approximately 15% of heterosexual couples of reproductive age experience difficulties conceiving when pregnancy is desired, and in up to half of these couples, infertility is attributable to the male partner.^[6] In the world's resource-constrained low and lower-middle income countries, the prevalence of infertility in couples is thought to be higher because of undetected and untreated reproductive tract infections.^[7]

ART includes several techniques that involve different levels of medicalization. In Vitro Fertilization (IVF) and Intracytoplasmic Sperm Injection (ICSI) are the most widely used ART procedures worldwide and are thus the focus of this study. In 1978, the birth of Louise Brown marked the first successful application of IVF technology.^[3] ICSI technology was first applied and reported in 1992 by Palermo.^[8] It is estimated that at the end of this century, 157 million babies – corresponding to 1.4% of global population – will be born

through ART.^[9] Both IVF and ICSI treatments involve a complex and demanding regimen, and repeated treatment cycles are usually necessary to achieve pregnancy. It was originally reported by Edwards and colleagues in 1980 that the pregnancy rate of IVF was 6%^[10], but now the success rate is close to 50%.^[4] Although ART is more and more widely used, the clinical pregnancy rate of 50% still means that a large number of infertile couples have to experience the possibility of multiple failures. Multiple visits, a large amount of time and money spent, and not too high success rate, these may have adverse effects on the psychology of infertile couples.^[11] A large number of literatures have been reported that experience of ART significantly affects patients' quality of life^[12-16], given also its negative impact over individual psychosocial well-being^[17], depression and anxiety^[18, 19]. The stress of infertility treatment was ranked second to that involving the death of a family member or divorce by couples undergoing this treatment.^[20] About 23% of couples who experienced the ART gave up with treatments because of the serious emotional burden.^[21] Previous studies on major depression in infertile people yielded a prevalence of 36.7% in the USA.^[22]

Although it is generally accepted that infertility and ART treatment can cause significant psychological stress to couples, it is still under discussion that whether psychological factors have any independent influence on the outcome of ART treatment. Some researchers have found that psychological problems have adverse effects on therapeutic success and decreasing psychological distress might increase the likelihood that treatment of infertility is successful.^[23-25] Other researchers, meanwhile, offered a different view. Harlow and co-workers found no evidence that psychological stress has any influence on the outcome of IVF.^[26] The groups conceiving and not conceiving had similar levels of state and trait anxiety. Anderheim L. and colleagues had the same conclusions in their studies.^[27] Milad MP and colleagues also found that high levels of anxiety and stress did not predict an adverse pregnancy outcome.^[28]

The effect of male psychological stress on reproduction is even more controversial. An association between psychological stress and sperm quality has been observed in some studies^[29, 30], while others have found that the effect of psychological stress on sperm quality is small or non-existent.^[31]

Our results show that the incidence of anxiety and depression in subfertile men was about 8%, which was lower than that reported above. There was also no significant difference in the incidence of anxiety and depression between the pregnant and nonpregnant groups during ART treatment. We may consider the reasons as follows: 1. In the traditional concept of Chinese people, the reasons for not having children are mostly attributed to women, and men are less exposed to social pressure; 2. In the process of ART treatment, men only need to cooperate with their wives to complete the examination and provide semen samples without suffering physical pain; 3. Men have a wider social circle at work and in life, which is conducive to diverting attention from infertility and ART treatment. However, the scores of anxiety and depression in the nonpregnant group were higher than those in the pregnant group, considering that the psychological stress in the nonpregnant group was higher than that in the pregnant group, but the degree did not meet the diagnostic criteria for anxiety and depression. This also suggests that in the process of

ART treatment, male patients should be told that anxiety and depression are not necessarily related to the outcome of ART treatment. However, when patients are prone to anxiety and depression, providing necessary psychological support will also benefit them.

This study had some strengths which are worth considering. Firstly, we measured the anxiety and depression scores at three time points of initiation day, oocyte retrieval day and embryo transplantation day in chronological order. The use of a longitudinal research design ensured a more detailed perspective on the evolution of male anxiety and depression throughout the ART treatment. Although there was little change in the men's scores at each point in the study, this further reinforces the reliability of the results, compared to that much of the current available literature on psychological stress in ART patients is based upon cross-sectional designs. Secondly, we have a sample size of over 1000, large enough to reduce the measurement error and improve the accuracy of the conclusion. Thirdly, our sample comprised both men and women. Since infertility is a problem for both husband and wife, it is more helpful for both couples to complete the SAS and SDS questionnaire at the same time and place for the credibility of the results.

The current study had several limitations. First of all, although our sample size is relatively large, it is still a single center study, lacking multi center population data in different places, so the generalization of the results may be limited. Second, in the present study only self-reporting instruments were administered. Although these measures offer several advantages, it could be useful for a deeper understanding of the infertility experience to also have qualitative measures that allow one to capture the nature of an individual's experience. Third, although we have evaluated the anxiety and depression of both husband and wife at the same time, the difference in the degree of psychological impact of infertility on husband and wife and the relationship between husband and wife need further statistical analysis and research.

Conclusions

The incidence of anxiety and depression in men during ART treatment was about 8%. Although the SAS and SDS scores were higher in the nonpregnant group than those in the pregnant group, there was no significant difference in the incidence of anxiety and depression between the two groups. This study suggests that in the process of ART treatment, male patients should be told that anxiety and depression are not necessarily related to the outcome of ART treatment.

Declarations

Ethics approval and consent to participate

The study was approved by the Ethics Committee of Shanghai Jiao Tong University Affiliated Sixth People's Hospital. All patients (husbands and their partners) had written information about the study protocol, the specific consent was obtained, and a written informed consent to use non-sensitive data for research was signed.

Consent for publication

Written informed consent for publication was obtained from all participants.

Availability of data and materials

The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

Competing interests

None

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Authors' contributions

Zhangshun Liu: Study design and conception, data analysis, and manuscript writing; Li Zhang: Study design and conception, data interpretation, manuscript editing; Hongfang Shao: Study design and conception, data analysis; Mian Huo: Questionnaire investigation, data acquisition; Jie Chen: Questionnaire investigation, data acquisition; Minfang Tao: Study design and conception, data interpretation, and manuscript editing.

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