Quantitative and Qualitative Analyses of Psychological Experience and Adjustment of *In Vitro* Fertilization-Embryo Transfer Patients

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Background: The aim of this study was to quantitatively analyze the psychosocial characteristics of *in vitro* fertilization-embryo transfer (IVF-ET) couples and normal couples, and to identify the influencing factors of psychological characteristics and pregnancy outcomes.

Material/Methods: There were 260 infertile couples undergoing IVF-ET and 277 healthy couples of childbearing age in Shengjing Hospital of China Medical University recruited into 2 groups. Psychosocial characteristics were compared to analyze the influencing factors of pregnancy outcomes after IVF-ET. In-depth interviews (n=11) and infertility-related forum posts (n=12) were adopted to obtain the data related to the psychological experience and adjustment. Nvivo 11 software was utilized to collect and analyze the data.

Results: The levels of anxiety and depression in the IVF-ET group were significantly higher (both $P<0.01$), the total scores of marital quality scale and social support scale were significantly lower (both $P<0.05$), immature defense mechanism score was significantly higher ($P<0.05$), and mature defense mechanism score ($P<0.05$) was significantly lower than those in the control group. Bod mass index (BMI), family's rural residence, marital quality, and immature and mature defense mechanisms were influencing factors of depression in IVF-ET female patients (all $P<0.05$). Marital quality, mature and immature defense mechanisms, concealment factors, and Harm Avoidance (HA) score were influencing factors of depression in IVF-ET males (all $P<0.05$). The age of the female patient was an independent influencing factor of IVF-ET pregnancy success rate ($P<0.01$).

Conclusions: The mental health levels of IVF-ET patients were worse than those of fertile couples. The younger the female infertile patient, the higher pregnancy rate of IVF-ET.

MeSH Keywords: Infertility • Insanity Defense • Obstetrics and Gynecology Department, Hospital • Psychological Theory • Psychology • Qualitative Research

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Background

Infertility is not only a physiological disease, but also a psychological and social disorder. It is defined as couples of childbearing age unable to become pregnant living together for at least 1 year without contraception interventions. For females aged over 35 years old, this period of time can be shortened to 6 months due to the decline of fertility [1]. According to relevant statistics, the incidence rate of infertility in China is estimated to be approximately 12.5% to 15%. The level of psychological stress caused by infertility is equivalent to that provoked by cancer or heart diseases [2].

The treatment methods of infertility mainly include drug ovulation induction therapy, hysteroscopic surgery therapy, intrauterine insemination therapy, and *in vitro* fertilization-embryo transfer (IVF-ET) [3]. IVF-ET is the core technology of assisted reproductive technologies. However, the clinical pregnancy rate of IVF-ET technology is roughly between 40% and 60%, and the particularity of conception mode, expensive cost, and complicated and lengthy disposal of the technology have brought different degrees of psychological pressure to IVF-ET patients [4]. The anxiety and depression levels of IVF-ET patients can be as high as 40% [5].

Infertility is considered as a physical and mental disease. Scholars have paid attention to the psychological health of infertile patients, but most of them focus on the infertile female rather than the male [6], whereas all family members will be affected by IVF-ET [7]. Researchers [8] have suggested that the mental health status of male infertile patients should not be ignored, whereas relatively few studies have been performed.

In this study, firstly, quantitative research was carried out to investigate the psychosocial characteristics of couples receiving IVF-ET, including emotion, marital quality and social support, individual factors, etc., aiming to comparatively analyze the differences of psychological characteristics between IVF-ET infertile couples and healthy couples and to explore the relevant factors affecting the emotional status of infertile patients. Moreover, qualitative approach was also adopted to explore the psychological experience and adjustment of IVF-ET couples using the grounded theory, and theoretical models were established to propose psychological interventions specifically suitable for IVF-ET patients.

Material and Methods

Study participants

In this cross-sectional survey, 260 pairs of infertile couples who received IVF-ET from February 2016 to October 2016 in

Shengjing Hospital of China Medical University were enrolled by using the convenient sampling method. All patients were aged 25 to 55 years old and could read and understand the questionnaires. They self-reported no history of mental illness, serious physical diseases, severe accidents or events in the family or life affecting psychological status. Written informed consents were obtained from all participants. According to the principle of balance, 277 pairs of healthy couples who had not been diagnosed with infertility were recruited into the control group. The control group consisted of couples who considered themselves healthy and attended a health screening. The exclusion criteria for the control group included prior chronic illnesses (i.e., renal, hepatic, respiratory, endocrinological and/or cardiovascular diseases), continual use of medicine, prior or current problems and/or treatment of infertility. In qualitative research, in-depth face-to-face interviews were performed from July 2016 to December 2016 and online forum posts of infertile patients were obtained and summarized from 2010 to date.

Baseline data

Sociodemographic characteristics were investigated through a self-designed questionnaire by researchers. According to the research purpose and content, the questionnaire items mainly included age, occupation, educational level, annual family income, number of children, family type. Clinical data mainly consisted of body mass index (BMI), causes of infertility, duration of infertility and oocyte retrieval cycle of female patients. IVF-ET parameters included average number of retrieved oocyte, normal fertilization rate (number of normal fertilized embryo/number of retrieved oocyte), high-quality embryo rate (number of high-quality embryo/number of cleavage of normal fertilized embryos), implantation rate (number of implanted embryo/number of transferred embryo), clinical pregnancy rate (number of clinical pregnancy/number of transfer cycle), and abortion rate (number of abortion/number of clinical pregnancy).

Self-rating depression scale (SDS)

The self-rating depression scale (SDS) [9] was carried out in the previous week, which consisted of 20 questions. The SDS scale is a 4-grade self-assessment scale with positive and negative scores. The total score is roughly the sum of all questions, the normal upper limit is 41 points, and the standard score is an integer part of the total score multiplied by 1.25. The lower the score, the better the psychological state, of which 53–62 points denote mild anxiety, 63–72 points represent moderate anxiety, and >72 points indicate severe anxiety.

Self-rating anxiety scale (SAS)

The SAS was carried out in the previous week to assess the subjective anxiety of the respondents, which included 20 questions.

The SAS is a 4-grade self-assessment scale with positive and negative scores. The total score is roughly the sum of all questions, the normal upper limit is 41 points, and the standard score is an integer part of the total score multiplied by 1.25. The lower the score, the better the psychological state. The threshold total score is 50 points, of which 50–59 points hint mild anxiety, 60–69 points represent moderate anxiety, and >70 points prompt severe anxiety.

Defense style questionnaire (DSQ)

The Defense style questionnaire (DSQ) [10] is a reliable questionnaire to describe the defense styles of the respondents. The 88-item DSQ can be utilized to calculate 24 types of defenses, which are classified into immature defense, intermediate defense and mature defense. Each item has a scoring scale of 1–9. The higher the score, the higher frequency of the defense mechanism.

Cloninger's temperament and character inventory (TCI-140)

The Cloninger's temperament and character inventory (TCI-140) [11] scale consists of temperament and personal character. Temperament also includes 4 advanced dimensions including Novelty Seeking (NS) (NS1, NS2, NS3, NS4), Harm Avoidance (HA) (HA1, HA2, HA3, HA4), Reward Dependence (RD) (RD1, RD2, RD3, RD4) and Persistence (PS) (PS1, PS2, PS3, PS4). Personal character consists of 3 advanced dimensions including Self-Directedness (SD) (SD1, SD2, SD3, SD4, SD5), Cooperativeness (CO) (CO1, CO2, CO3, CO4, CO5) and Self-Transcendence (ST) (ST1, ST2, ST3), 29 sub-dimensions in total. Each item has a scoring scale of 1–5. 1 represents totally inconsistent, 2 as mostly inconsistent, 3 as uncertain, 4 as mostly consistent to 5 completely consistent. The TCI-140 includes 4 validity items.

Chinese marital quality inventory (CMQI)

The Chinese marital quality inventory (CMQI) [12] consists of 90 items and each item has a scoring scale of 1–5. The CMQI scale includes a total of 10 dimensions. The higher the total score and factorial score, the better the marital quality. In this study, because the children's status of IVF-ET infertile patients was not comparable with that of healthy couples, the dimension of "children and marriage" was eliminated and not included in the total score of the dimension of marital quality.

Social support rating scale (SSRS)

The self-assessment Social support rating scale (SSRS) [13] includes 3 dimensions of subjective support, objective support, and social support utilization with a total of 10 items, including
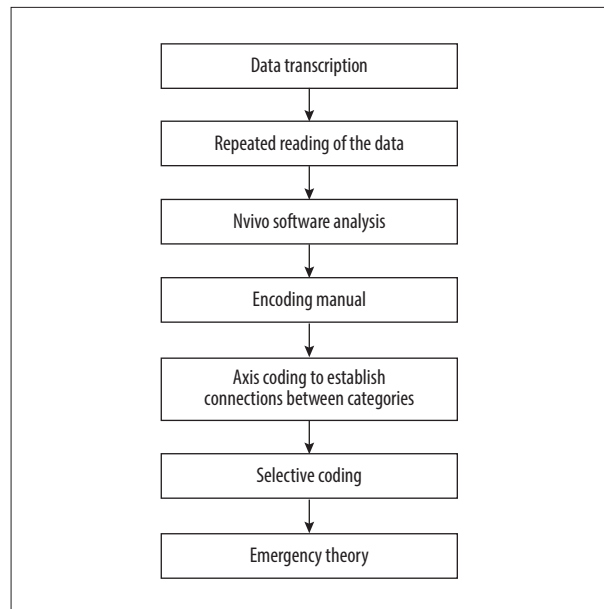

Figure 1. Flow chart of grounded theory.

4 items of subjective support, 3 items of objective support, and 3 items of social support utilization. The total score of social support is obtained by adding up the scores of 10 items, which reflects the overall social support status of the respondents.

Qualitative research

A total of 11 couples received in-depth face-to-face interviews and 12 online forum posts were collected. In this study, the grounded theory was proposed for data analysis [14]. The grounded theory constructs the infertile models through open coding, axis coding, and selection coding. Especially in the 3-level coding, the first step of this study was to analyze the original data, then classified the concept categories with high frequency of reference, further approached the main axis coding of the research topic, established a connection between the research topic and the data, and the third step was to integrate and refine the 2-level coding with selective coding to improve the topic. The steps of grounded theory analysis are illustrated in Figure 1.

Data collection

The recording of in-depth face-to-face interviews was converted into a verbal transcript, and the special intonation, voice, and emotion during the conversation were also recorded. Then, another researcher proofread the recorded text and checked it carefully for any errors or typos. The final word count in the recorded document was approximately 95 775. The data of the online forum posts were obtained and copied into a TXT-format file for subsequent use. The final word count of the online forum posts was roughly 123 053.

Statistical analysis

SPSS 21.0 statistical software was utilized for all data analyses (SPSS Inc., Chicago, IL, USA). A database was established to analyze the data obtained from the valid questionnaires. Descriptive statistics were used for descriptive analysis of various scales. Single sample *t*-test was utilized for comparative analysis between 2 groups. Chi-square test was used to compare the rate between 2 groups. Spearman rank correlation analysis was chosen for correlation analysis. Logistic regression was adopted to identify the relevant influencing factors. A *P* value of less than 0.05 was considered as statistical significance.

Results

Baseline characteristics

The baseline data of 260 IVF-ET assisted pregnant couples showed that the average age of female patients was 32.59±4.55 years; body mass index underweight accounted for 10.4%, healthy weight accounted for 58.5%, overweight accounted for 26.9%, obesity accounted for 3.5%, and very obese accounted for 0.8%. In the education assessment, 52.7% had junior college or undergraduate education. The average age of males was 34.53±5.52 years. 53.5% had junior college or undergraduate education. 92.3% had no children. 85.4% of the households live in urban areas. Except for the situation of children, there was no significant difference in age, female body mass index, educational level, occupation, family residence, annual family income and family type between IVF-ET group and control group (*P*<0.05) (Table 1).

Questionnaire collection

In this study, 330 pairs of IVF-ET infertile couples were administered with various questionnaires, 291 valid pairs of questionnaires were collected. After eliminating 31 missing and invalid questionnaires, 260 valid questionnaires were eventually collected with an effective rate of 89.35%. A total of 350 pairs of questionnaires were distributed in the control group, 326 of which were collected. Following eliminating 49 missing or invalid questionnaires, 277 valid questionnaires were finally obtained with an effective rate of 84.97%. Except for the status of children, no statistical significance was observed in terms of age, female BMI, educational level, occupation, family's residence, family annual income, and family type. All these parameters were matched between 2 groups.

SAS and SDS scores

The SAS score of female patients receiving IVF-ET was 42.72±7.60, and the SDS score was 47.66±10.06. The SAS score of IVF-ET men was 41.26±8.13, and the SDS score was 44.34±9.55, which were all significantly higher compared with those in the control group (all *P*<0.01). There was a total of 37 female patients with a SAS score ≥50, and the anxiety rate was calculated as 14.2%. Eighty female patients had an SDS score ≥53 with a depression rate of 30.8%. Anxiety and depression coexisted in 23 patients with a rate of anxiety complicated with depression of 8.85%. Thirty-three male cases had a SAS score ≥50 with an anxiety rate of 12.7%. Fifty-four males obtained an SDS score ≥53 and the depression rate was 20.8%. Anxiety and depression coexisted in 16 male cases (6.15%). The anxiety and depression scores of female cases in the IVF-ET group and the control group were both significantly higher compared with those of their spouses.

DSQ scale

In the IVF-ET group, the score of immature defense mechanism in the female cases was calculated as 34.79±8.58, significantly higher than 32.87±7.06 in the control group (*P*=0.005). For the male cases, the score of immature defense mechanism in the IVF-ET group was 35.53±8.29, considerably higher compared with 33.7±9.37 in the control group (*P*=0.017). However, the scores of mature defense mechanism of IVF-ET female and male cases were 16.53±3.82, and 16.58±4.23, which were significantly lower compared with 17.31±3.7 and 17.44±3.43 (*P*=0.016, *P*=0.010) in the control group. The scores of intermediate defense mechanism did not significantly differ in the female cases (60.47±8.78, 60.9±8.46; *P*=0.559) and male cases (60.17±7.37, 60.43±9.36; *P*=0.720) between 2 groups.

TCI-140

Compared with the control group, the score of the SD dimension of the female patients was 66.83±9.14, significantly higher compared with 64.77±8.39 in the control group (*P*=0.007). The scores of all dimensions did not significantly differ in the male participants between the IVF-ET group and the control groups (all *P*>0.05). In terms of the sub-dimensional scores, the scores of the NS4, P3, and S2 sub-dimensions in the female infertile patients were calculated as 13.90±2.85, 18.68±4.65, and 17.79±2.68, significantly higher compared with 13.25±2.88, 17.52±3.49, and 17.35±2.46 in the control group (*P*=0.001, *P*=0.008, *P*=0.048), respectively. The scores of C3 and ST3 in the male IVF-ET patients were calculated as 12.92±2.06 and 12.21±3.30, remarkably higher compared with 12.04±2.57 and 11.27±3.60 in the control group (*P*=0.000, *P*=0.002), respectively.

CMQI

Compared with the normal control group, the total scores for marital quality in the female and male patients undergoing

Table 1. Baseline characteristics.

	Control group (n=277)		IVF-ET group (n=260)		t/χ^2	P
Female age, mean ±SD	33.38±5.90		32.59±4.55		1.745	0.082
BMI, n (%)					2.810	0.590
Underweight (≤19 kg/m²)	33	(11.9)	27	(10.4)		
Healthy weight (19~24 kg/m²)	163	(58.8)	152	(58.5)		
Overweight (24~29 kg/m²)	74	(26.7)	70	(26.9)		
Obesity (29~34 kg/m²)	7	(2.5)	9	(3.5)		
Very obese (>34 kg/m²)	0	(0.0)	2	(0.8)		
Female educational level, n (%)					6.121	0.106
Junior high school and below	89	(32.1)	60	(23.1)		
Secondary and High Schools	39	(14.1)	36	(13.8)		
College and undergraduate	127	(45.8)	137	(52.7)		
Master and above	22	(7.9)	27	(10.4)		
Female occupation, n (%)					7.719	0.102
Worker	27	(9.7)	18	(6.9)		
Peasant	55	(19.9)	33	(12.7)		
Technical and managerial personnel	104	(37.5)	111	(42.7)		
Self-employed person	50	(18.1)	49	(18.8)		
Others	41	(14.8)	49	(18.8)		
Male age (mean ±SD)	34.91±6.00		34.53±5.52		0.761	0.447
Male educational level, n (%)					6.022	0.111
Junior high school and below	83	(30.0)	67	(25.8)		
Secondary and High Schools	37	(13.4)	29	(11.2)		
College and undergraduate	144	(52.0)	139	(53.5)		
Master and above	13	(4.7)	25	(9.6)		
Male occupation, n (%)					6.234	0.182
Worker	37	(13.4)	40	(15.4)		
Peasant	46	(16.6)	30	(11.5)		
Technical and managerial personnel	100	(36.1)	106	(40.8)		
Self-employed person	56	(20.2)	40	(15.4)		
Others	38	(13.7)	44	(16.9)		
Family residence, n (%)					0.086	0.769
Urban area	234	(84.5)	222	(85.4)		
Rural area	43	(15.5)	38	(14.6)		
Annual income (RMB), n (%)					3.618	0.460
44 000 or less	99	(35.7)	76	(29.2)		
45 000 to 80 000	95	(34.3)	92	(35.4)		
81 000 to 115 000	50	(18.1)	52	(20.0)		
116 000 to 150 000	13	(4.7)	13	(5.0)		
More than 150 000	20	(7.2)	27	(10.4)		

Table 1 continued. Baseline characteristics.

	Control group (n=277)		IVF-ET group (n=260)		t/χ²	P
Family type, n (%)					0.736	0.391
Couples live together	202	(72.9)	198	(76.2)		
Live with parents	75	(27.1)	62	(23.8)		
Situation of children, n (%)					362.475	0.000*
None	28	(10.1)	240	(92.3)		
Yes	249	(89.9)	20	(7.7)		

SD – standard deviation; BMI – body mass index; IVF-ET – *in vitro* fertilization-embryo transfer.

Table 2. Comparison of SSRS Scores between the IVF-ET and control groups.

	Female				Male			
	Control group (n=277 pairs)	IVF-ET group (n=260 pairs)	t	P	Control group (n=277 pairs)	IVF-ET group (n=260 pairs)	t	P
Total score of social support	41.35±6.66	38.93±7.03	4.108	0.000*	41.29±7.32	38.00±6.93	5.341	0.000*
Objective support score	9.96±2.67	10.19±2.86	−0.957	0.339	9.85±2.88	10.25±2.98	−1.618	0.106
Subjective support score	23.78±3.95	21.52±4.11	6.473	0.000*	24.09±3.87	20.52±4.55	9.767	0.000*
Social support utilization	7.61±2.14	7.21±1.87	2.322	0.021**	7.35±2.53	7.22±2.05	0.641	0.522

* $P<0.01$, ** $P<0.05$; IVF-ET – *in vitro* fertilization-embryo transfer.

IVF-ET were significantly lower. The scores for economic arrangement, emotion and sex, and family role of the infertile female patients receiving IVF-ET were significantly lower compared with those in the control group. For the male participants the scores of husband-wife communication, economic arrangement, emotion and sex, and life concept in the IVF-ET group were remarkably lower compared with those in the normal control group.

SSRS

The total scores for social support, subjective support, and support utilization of female patients undergoing IVF-ET were significantly lower compared with those in the control group (all $P<0.05$). The total scores for social support and subjective support of male patients receiving IVF-ET were significantly lower than those in the control group (both $P<0.05$), as illustrated in Table 2.

Influencing factors of anxiety and depression in IVF-ET couples

BMI, total score of marital quality, immature and defense mechanisms, duration of infertility, and other causes of infertility were the main influencing factors of anxiety of female patients undergoing IVF-ET (all $P<0.05$). BMI, rural family's residence, total score of marital quality, and immature and mature defense mechanisms were the main influencing factors of depression in female patients treated with IVF-ET (all $P<0.05$). The main influencing factors of anxiety in male patients receiving IVF-ET were the rural family's residence, total score of marital quality, immature and mature defense mechanisms, concealment factors, HA, and ST (all $P<0.05$). The total score of marital quality, mature and immature defense mechanisms, concealment factors, and HA were the main influencing factors of depression in male patients receiving IVF-ET (all $P<0.05$).

Influencing factors of pregnancy outcomes in IVF-ET couples

Univariate logistic regression analysis demonstrated that age, duration of infertility, oocytes retrieved cycle, and number of retrieved oocytes were the influencing factors of the success rate of IVF-ET ($P<0.05$). If the success rate was utilized as a dependent variable, then age, duration of infertility, cycle and number of retrieved oocytes were included in the multivariate logistic regression model. The results demonstrated that
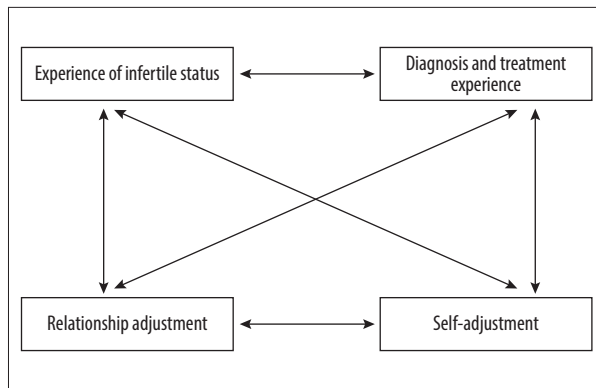
Figure 2. Model of psychological experience and adjustment in *in vitro* fertilization-embryo transfer couples.

age was the independent influencing factor of the success rate of IVF-ET (*P*<0.05). The older the female patient, the lower the success rate.

Establishment of theoretical model

Based on the grounded theory in qualitative research, the psychological experience and adjustment of infertile patients undergoing IVF-ET were investigated according to the following 4 themes including the experience of infertility status, experience of diagnosis and treatment process, relationship adjustment, and self-adjustment. The 4 themes were mutually interacted. The experience of infertility status and the experience of diagnosis and treatment process affected the relationship adjustment and self-adjustment, which also impacted the experience of infertility status and diagnosis and treatment process. Based on the aforementioned analyses, a theoretical model was established to reflect the psychological experience and adjustment model of IVF-ET couples to illustrate the correlation among the 4 themes, as illustrated in Figure 2.

Discussion

Previous studies [5,15] have demonstrated that anxiety and depression can be aroused by infertility and assisted reproductive technologies, and the risk of anxiety and depression in females is higher than in their male spouses [16]. Approximately 30% of infertile female patients treated by IVF-ET and 10% of male patients are diagnosed with mental disorders, such as anxiety and depression. In this study, the risk of anxiety and depression in the IVF-ET group was significantly higher than that in the control group, which was consistent with previous findings. Meantime, the level of anxiety and depression of infertile female patients was higher than that of their male spouses, suggesting that females bear more pressure than males in the process of IVF-ET, probably due to the pain and pressure brought about by IVF-ET and the fact that females

themselves are considered to be more sensitive and vulnerable than males [7].

At present, the marital quality score of patients undergoing IVF-ET remains debated. A variety of factors affect marital satisfaction, including demographic factors, mental health status, quality of life, socio-economic and family support, and sexual function. This study found that the total marital quality score of female patients and male patients in the IVF-ET group was significantly lower than the control group. Among these scores, economic arrangement, emotion and sex, and family role of IVF-ET female patients were significantly lower than the control group. Meanwhile, scores for marital communication, economic arrangement, emotion and sex, and life concept of IVF-ET male patients were significantly lower than the control group, suggesting that IVF-ET patients have lower marital quality than healthy couples. Female infertile patients were mainly reflected in the 3 aspects of economic arrangement, emotion and sex, and family role in marriage, while males were mainly reflected in the 4 aspects of husband-wife communication, economic arrangement, emotion and sex, and life concept. In terms of marital quality of IVF-ET patients, the conclusion drawn from this study was similar to that of most previous studies [17,18], probably due to the negative impact of infertility on marital quality. During the IVF-ET, both males and females are under great psychological pressure, which is likely to affect the marital relationship. Masoumi et al. [19] found that infertile patients have lower sexual satisfaction and marital satisfaction, as well as lower quality of life than the healthy counterparts. Therefore, more research and intervention should be carried out on IVF-ET couples to improve their quality of life and marital satisfaction.

The SRSS in this study demonstrated that the total score, subjective support score, and social support utilization score of IVF-ET female patients were significantly lower than those of healthy controls. The total score of social support and subjective support score of IVF-ET male patients were also lower than those in the control group. In China, it is traditionally recognized that a childless lifestyle is not understood by the public. Infertile patients tend to avoid or withdraw from the topics related to children's birth and education during conversations with their relatives and colleagues. Therefore, it is necessary to deliver social support to infertile couples undergoing IVF-ET [20].

The score of immature defense mechanism of the IVF-ET couples was significantly higher, whereas the score of mature defense mechanism was significantly lower than those of the healthy counterparts. It is presumed that the infertile patients were under greater pressure than the normal controls, and they are more likely to apply immature defense mechanisms rather than mature defense mechanisms.

Personality traits affect interpersonal relationships, social interactions, therapeutic procedures, and basically all human activities. This study found that the SD dimension score in the female IVF-ET patients was significantly higher than that in control group, whereas the scores of all dimensions did not differ in the males between the IVF-ET group and the control group, possibly because females are more affected by infertility and the pressure of IVF-ET than males. At present, the temperament and character of IVF-ET patients have not been investigated in China. Bidzan et al. [4] evaluated the infertility-induced loneliness of infertile females, indicating that the personality traits of infertile females are similar to those of healthy females. Nevertheless, the personal character of infertile females with certain pathological characteristics are different from those of fertile females, manifested by their decreased ability to adapt to pressure.

Gender, age, and educational level of infertile patients have been proven to be related to the mental health status during IVF-ET. Low economic income and educational level will also have negative effects on the mental health of infertile patients receiving IVF-ET [5]. The pressure level of infertile female patients due to decreased ovarian reserve function (DOR) is higher than that of infertile females due to other causes [21], which is consistent with the results of this study.

The relationship between infertility and psychological factors has not been fully understood. Some scholars put forward the hypothesis that biological effects caused by chronic stress hinder the successful implantation of embryos [22], thus affecting the fertility. IVF-ET may resolve this issue and improve the pregnancy success rate of infertile patients. However, most scholars [23] believe that stress is an important factor that affects the physical and mental state of healthy people and interferes with the balance of the body. Psychological stress can affect the biological characteristics of female reproduction by targeting the levels of ovaries, follicles, and oocytes. Research [24] shows that anxiety and depression symptoms appear to have a negative impact on the treatment of infertility, which may be a risk factor for a lower pregnancy rate. Although this study cannot prove that the psychological state of IVF-ET patients had an impact on the outcome of IVF-ET, the anxiety and depression of couples undergoing IVF-ET were significantly higher than those of normal controls, and the marital quality and social support level were lower than those of normal couples.

At present, much emphasis has been placed on quantitative research on the psychological status of infertile patients. For psychological research, quantitative and qualitative methods can complement each other [25,26]. In this study, a qualitative research method was adopted and the psychological experience and adjustment of infertile patients receiving IVF-ET were classified into 4 themes including the experience of infertility status, the experience of diagnosis and treatment process, the relationship adjustment and the self-adjustment. Each theme consists of its own sub-themes.

Compared with female patients, male patients are less willing to express their infertility problems, take fewer actions to seek treatment, and might bear more psychological burden. On the other hand, male patients consider that infertility negatively affected masculine characteristics and might provoke humiliation [27].

In this investigation, couples undergoing IVF-ET are willing to seek assistance, whereas they have no access to professional psychological counseling. Infertility itself and IVF-ET have a certain influence on the marital relationship of IVF-ET couples. Encountered with these pressures, infertile patients are willing to communicate with infertile peers, suggesting that group or family psychological counselling and proper interventions should be delivered for IVF-ET couples. Due to the increasing popularity of Internet, more and more IVF-ET pregnant female patients seek treatment and psychological support through the Internet, prompting that physicians should accelerate the development of internet-based psychological interventions to reduce the psychological pressure of IVF-ET pregnant patients.

Conclusions

Quantitative research reveals that the mental health level of IVF-ET couples is worse than that of healthy couples. Defense style, marital quality, temperament and personal character, female BMI, family residence, duration of infertility, and causes of infertility exert effect on the emotion of IVF-ET patients. The younger the age of female patients, the higher the pregnancy rate of IVF-ET. However, marital quality, defense style, temperament and personal character exert no effect on the success rate of IVF-ET. IVF-ET not only brings a physical painful experience to infertile patients, but also provokes inner turmoil after the diagnosis of infertility. Qualitative research demonstrates that the relationship changes between IVF-ET patients, their spouses and relatives when the connection with embryos and future children has been established. IVF-ET patients can cope with the stress by adjusting their self-cognition and behaviors. Group and family psychological counselling therapy and internet-based psychological interventions probably mitigate the psychological pressure of infertile patients treated with IVF-ET.

Conflict of interests

None.

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