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Correlations among hope, fertility quality of life and negative emotions for couples undergoing their first in vitro fertilization– embryo transfer: a cross-sectional analysis



Hui Ye^{1†}, Jing Zhao^{1†}, Yujie Zou¹, Xiaorun Song¹, Mi Xu¹, Yu Zhang¹, Lili Zhang^{2*} and Gaohua Wang^{3*}

Abstract

Background The global incidence of infertility is increasing, and infertility has become an important medical and social issue. With the widespread application of in vitro fertilization-embryo transfer (IVF-ET) technology, the mental health problems of patients undergoing this treatment have gradually attracted widespread attention. The purpose of this study was to explore the relationships among the level of hope, the fertility quality of life and negative emotions of patients who underwent IVF-ET treatment for the first time to provide a scientific basis for subsequent psychological support interventions.

Methods This study was a cross-sectional survey conducted at the Reproductive Medicine Center of Renmin Hospital of Wuhan University. From February 2023 to October 2023, 1425 patients who received IVF-ET treatment for the first time participated in the questionnaire survey. The survey content included the General Information Questionnaire, the Fertility Quality of Life (FertiQoL) Questionnaire, and the Herth Hope Index (HHI). Pearson correlation analysis was used to examine the relationships among the level of hope, fertility quality of life, and negative emotions.

Results The survey included 805 women and 620 men representing 603 couples. The level of hope in patients undergoing IVF-ET treatment for the first time was positively correlated with fertility quality of life (r=0.247, P<0.01), and the level of hope was negatively correlated with negative emotions (stress: r=-0.135, P<0.01; anxiety: r=-0.105, P<0.01; depression: r=-0.189, P<0.01). Fertility quality of life was negatively correlated with negative emotions (stress: r=-0.609, P<0.01; anxiety: r=-0.533, P<0.01; depression: r=-0.591, P<0.01). Among couples undergoing IVF-ET treatment for the first time, the husband's level of hope (r=0.131, P<0.01), fertility quality of life (r=0.372, P<0.01), and negative emotions (stress: r=0.181, P<0.01; anxiety: r=0.163, P<0.01; depression: r=0.210, P<0.01) were positively correlated with those of his wife.

Conclusions In patients undergoing their first IVF-ET treatment, there is a significant correlation among hope, fertility quality of life, and negative emotions. Moreover, within couples, the levels of hope, fertility quality of life, and negative emotions of husbands and wives mutually influence each other. Enhancing the level of hope in this

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population is conducive to alleviating negative emotions and improving their fertility quality of life. The mutual influence of spouses should not be overlooked in clinical practice, and psychological support for both partners should be emphasized.

Keywords Infertility, In vitro fertilization-embryo transfer, Hope, Fertility quality of life, Negative emotions

Introduction

One hundred eight-six million people worldwide are affected by infertility [1]. The "China Infertility Status Survey Report" released by the Maternal and Child Health Department of the National Health Commission of China in November 2024 reports that there are nearly 50 million infertile patients among the reproductive-age population in China, representing 12.5% to 15% of the reproductive-age population, whereas this proportion was only 2.5%–3% 20 years ago. Infertility, as a specific disease, has become an important medical and social problem [2]. In vitro fertilization-embryo transfer (IVF-ET) is one of the primary modalities for the treatment of infertility, and at present, the number of couples undergoing IVF-ET fertility treatment is increasing annually [3]. With the widespread use of IVF-ET, there has been increasing concern about the mental health of patients undergoing this treatment. Kong L et al. reported that the mental health of patients who underwent IVF-ET was significantly lower than that of normal couples of childbearing age [4]; this not only poses a threat to the physical and mental health of individuals but also has a negative impact on families and society. Infertility and IVF-ET are considered important medical issues that affect the quality of life of patients [5], and they are stressful life events that can lead to high levels of anxiety [6]. The prevalence of anxiety and depression among patients undergoing IVF-ET ranges from 10 to 50% [7-9]; the presence of anxiety and depression symptoms can easily lead to the interruption or discontinuation of treatment, which can affect patients' pregnancy outcomes [10]. In this context, both domestic and foreign psychologists believe that hope, as a positive motivational state based on a sense of inner success [11], can help individuals adapt to the status quo through cognitive, emotional, and behavioral adjustments and is a positive psychological force that guides patients in positively coping with the disease [12].

Negative emotions are subjective feelings of inner discomfort and low mood [13] that can cause a nonspecific stress response; this response impacts the mediation of the neuroendocrine-immune axis, resulting in a reduction in natural killer cells and T lymphocytes, thus reducing the function of the immune system and causing a series of physiological discomfort symptoms. Many studies have demonstrated that depression and anxiety are two typical negative emotions [14] and that anxiety and depression are the most common negative emotions among infertility patients [15]; therefore, the negative emotions evaluated in this study included anxiety, depression and stress.

Fertility quality of life refers to the overall living conditions of infertile patients during the fertility process, including physical, psychological, cultural, emotional, and social aspects. Fertility quality of life focuses on the life experience and satisfaction of infertile patients when facing fertility difficulties [16]. For this purpose, experts from the European Society of Human Reproduction and Embryology (ESHRE) and the American Society for Reproductive Medicine (ASRM) jointly developed a specific assessment scale for evaluating the quality of life of patients with infertility, namely, the Fertility Quality of Life Scale (FertiQOL).

At present, studies on patients' hope levels, quality of life and negative emotions are focused mainly on patients with chronic diseases such as cancer [17–19], and they have reported that the level of hope in people with chronic diseases affects their mental health status and quality of life. At present, there is little research on the level of hope in IVF-ET patients, especially concerning the psychological problems of couples undergoing IVF-ET treatment for the first time. Usually, during infertility-related treatments, men often feel that they do not receive as much attention from medical staff as female patients do [20, 21]. In fact, studies have reported that husbands of women undergoing their first IVF-ET generally experience psychological distress [22], and the psychological needs of both spouses should be taken seriously during the treatment process [23, 24]. Therefore, this study aimed to investigate the correlation among the level of hope, the fertility quality of life and negative emotions of couples undergoing IVF-ET for the first time, with the goal of providing a scientific basis for improving the psychological health of infertile patients and carrying out appropriate nursing interventions.

Materials and methods Study population

A simple random sampling method was adopted to recruit 1499 patients who visited the outpatient clinic of the Center for Reproductive Medicine of the People's Hospital of Wuhan University and who underwent IVF-ET for the first time between February and October 2023 as the study subjects.

Inclusion criteria

Couples who were undergoing IVF-ET for the first time, those who were able to use a smartphone normally, and those who volunteered to participate in the entire study were included.

Exclusion criteria

Individuals with cognitive and communication disorders and those with a history of mental illness or recent use of psychotropic medications, such as antianxiety and depression medications, were excluded.

Survey tools

General information questionnaire

After the relevant literature was reviewed, a general information questionnaire, which collected data on sex, age, education level, place of residence, occupation, monthly income, number of marriages, and duration of infertility, was designed by the research team.

Herth Hope Index (HHI)

The HHI was designed and compiled in 1991 by American scholar Herth [25] and includes 30 items and 3 dimensions. It was later Sinicized and introduced into China by Zhao Haiping [26] and has been widely used to measure the level of hope of patients in China. The scale has 3 dimensions (4 items each): positive attitude (T), positive actions taken (P), and maintaining close relationships with others (I). A 4-point Likert-type scale is used to score each item. A total score of 12 to 23 indicates a low level of hope, a score of 24 to 35 indicates a medium level of hope, and a score of 36 to 48 indicates a high level of hope. The reliability coefficient α of the scale in this study was 0.717.

Fertility Quality of Life (FertiQoL) questionnaire

The FertiQoL [16] questionnaire is a specific scale developed in 2011 by experts from the American Society for Reproductive Medicine (ASRM) and the European Society of Human Reproduction and Embryology (ESHRE) to evaluate the quality of life of infertility patients. The Chinese version used in this study is available at http:// www.fertiqol.org/. The FertiQol questionnaire has 34 items and two subscales, the core FertiQoL subscale with 24 items and the treatment FertiQoL subscale with 10 items, with an additional 2 items used to collect background information; this questionnaire is used to assess overall satisfaction with physical health and quality of life. The core FertiQoL subscale is organized into four dimensions: the emotional, physical and mental, couple relationship, and social relationship dimensions. The treatment FertiQoL subscale includes the care and treatment tolerance dimensions. The FertiQoL questionnaire items are scored via a 5-point Likert-type scale ranging from 0 to 4, with 7 reverse-scored items, and the standardized score ranges from 0 to 100. Standardized scores for the subscales and total scale are calculated by multiplying the relevant raw score by 25 and dividing it by the number of items in the scale. The higher a patient's score is, the greater their quality of life. In this study, the reliability coefficient α was 0.934 for the total scale and 0.928 and 0.801 for the core FertiQoL and treatment FertiQoL subscales, respectively.

Short-form version of the Depression Anxiety Stress Scale-21 (DASS-21)

The DASS-21 was originally developed by Lovihond et al. [27]. The full version consists of 42 items divided into three subscales, each consisting of 14 questions: the depression, anxiety, and stress subscales. These subscales are used to examine the extent to which an individual experiences negative emotions such as depression, anxiety, and stress. We introduced the traditional Chinese version of the DASS-21 in 2010 and converted it into simplified Chinese; this is a streamlined version of the DASS-42 [28], which contains a total of 21 items measuring three types of negative emotional experiences: depression, anxiety, and stress. The depression, anxiety, and stress subscales each include seven items [29]. A 4-point Likert-type scale is used to score the items, and the sum of the seven item scores for each subscale is multiplied by two to obtain the total subscale score (0-42), with higher scores indicating more severe levels of depression, anxiety, or stress. In this study, the reliability coefficient α for the three factors was 0.836 for depression, 0.779 for anxiety, and 0.836 for stress. The internal consistency validity value of the total scale was 0.926.

Survey methods

A questionnaire was used in this study, and the research team consisted of a specialist from the Mental Health Center (chief physician), a doctor from the Reproductive Medicine Center (deputy chief physician), a director of nursing (deputy chief nurse), a head nurse (charge nurse), and three nurses (two charge nurses and one nurse practitioner). After uniform training of the research team, couples undergoing IVF-ET for the first time were given electronic questionnaires by the research nurses in the outpatient clinic of the Center for Reproductive Medicine on the day of document completion. After the purpose, significance, and process of the study were explained to the patients via homogeneous discourse to ensure that they could provide informed consent, the e-questionnaire code was given to the male and female patients who were willing to participate in the study individually. If both the husband and wife were willing to participate in the study, the electronic questionnaire code was provided to both. After the patients completed the questionnaires, completion was confirmed by two members of the research team, an Excel database was created, and data entry was carried out. Questionnaires with an answer length of less than 300 s and with a rate of continuous homogeneous answers of more than 30% were recognized as invalid questionnaires by the questionnaire system. A total of 1499 questionnaires were distributed, and 1425 valid questionnaires were collected, with an effective recovery rate of 95%.

Statistical analysis

The statistical analysis in this study was conducted via IBM SPSS Statistics 25.0 software (IBM Corporation). For quantitative information, normally distributed data were described using the mean \pm standard deviation, and data with a skewed distribution were described using the median (25% quartile ~ 75% quartile). Qualitative data are expressed as frequencies and percentages. For comparisons between groups, *t* tests were used for normally distributed data with a skewed distribution. The correlations of the level of hope with fertility quality of life and negative emotions were evaluated via Pearson correlation analysis. *P* < 0.05 was used to indicate a statistically significant difference, and *P* < 0.01 was used to indicate a significant difference.

Results

General information on the study population

Of the 1425 study subjects (including 805 women and 620 men, making up 603 couples), the average age was 33.52±4.675 years. Men (43.5%) averaged 34.13 ± 4.917 years (25–60 years old), and women (56.5%) averaged 33.04 ± 4.424 years (21-47 years old). The study included 1,425 subjects (805 women, 620 men), representing 603 couples. Among patients' educational levels, about one-quarter (23.8%) have junior high school education or below, nearly one-third (29.4%) have a bachelor's degree, and more than one-fifth (23.2%) have junior college education. Among them, 97.8% had no religious beliefs, 70.6% had siblings and 29.4% were only children. Within the study group, nearly two-thirds (64.4%) of the patients lived in urban areas. The vast majority (84.2%) of the patients were in their first marriage, and most patients (74.4%) had not received infertility-related treatment. The proportions of patients with primary infertility and secondary infertility were comparable (55.1% and 44.9%, respectively), and most patients (65.7%) had an infertility duration of within 3 years. The distribution of occupations is relatively balanced, and two-thirds of the patients (66%) have a monthly income of no more than 6000 yuan (see Table 1).

Levels of hope, fertility quality of life and negative mood scores in patients undergoing IVF-ET for the first time

Among the patients who underwent IVF-ET for the first time, the level of hope in women did not differ from those in men [35 (34–37) vs. 35 (34–38), P=0.656], as shown in Fig. 1. The fertility quality of life of women was significantly lower than that of men [69.86 (60.29–78.68) vs. 76.47 (67.65–83.82), P<0.01], as shown in Fig. 2. Negative emotions were significantly greater in women than in men [Stress, 8 (4–14) vs. 6 (2–10), P<0.01; Anxiety, 4 (2–8) vs. 2 (0–6), P<0.01; Depression, 4 (0–8) vs. 2 (0–6), P<0.01], as shown in Figs. 3, 4, 5. See Table 2.

Correlation of the level of hope with fertility quality of life and negative emotions in patients undergoing IVF-ET for the first time

Pearson's correlation analysis revealed that the level of hope in first-time IVF-ET patients was positively correlated with fertility quality of life (r=0.247, P<0.01), as shown in Fig. 6. The level of hope in first-time IVF-ET patients was negatively correlated with negative emotions (stress: r=-0.135, P<0.01; anxiety: r=-0.105, P<0.01; depression: r=-0.189, P<0.01), as shown in Figs. 7, 8, 9. The fertility quality of life of patients undergoing IVF-ET for the first time was negatively correlated with negative emotions (stress: r=-0.609, P<0.01; anxiety: r=-0.533, P<0.01; depression: r=-0.591, P<0.01), as shown in Figs. 10, 11, 12. See Table 3.

Correlation of the level of hope with fertility quality of life and negative emotions among first-time IVF-ET patients

Pearson's correlation analysis revealed that the level of hope, fertility quality of life and negative emotions were positively correlated in couples undergoing IVF-ET for the first time (hope: r=0.131 and P<0.01, as shown in Fig. 13; fertility quality of life: r=0.372 and P<0.01, as shown in Fig. 14; stress: r=0.181 and P<0.01, as shown in Fig. 15; anxiety: r=0.163 and P<0.01, as shown in Fig. 16; depression: r=0.210 and P<0.01, as shown in Fig. 17). See Table 4.

Discussion

Epidemiological data demonstrate that, worldwide, with the increasing number of infertile patients, infertility has become a global issue, affecting nearly onesixth of the reproductive-age population [30]. Both infertility itself and IVF-ET treatment have a substantial impact on the mental health of affected couples [31, 32]. The levels of hope in first-time IVF-ET patients in

Features	Number of participants (n)	Percentage (%)
Sex		
Male	620	43.5
Female	805	56.5
Age (years)		
< 30	277	19.4
30–35	730	51.2
36–40	307	21.5
>40	111	7.8
Education level		
Junior high school and below	339	23.8
Technical secondary school	119	8.4
Senior high school	126	8.8
Junior college	330	23.2
Undergraduate	419	29.4
Master's degree or higher	92	6.5
Religious beliefs		
Yes	32	2.2
No	1393	97.8
Place of residence		
City	918	64.4
Township	232	16.3
Countryside	275	19.3
Only child		
Yes	419	29.4
No	1006	70.6
Previous treatment history		
Yes	365	25.6
No	1060	74.4
Marital status		
First marriage	1200	84.2
Remarriage	225	15.8
Infertility diagnosis		
Primary infertility	785	55.1
Secondary infertility	640	44.9
Duration of infertility		
< 1 vear	227	15.9
1–3 years	710	49.8
3-5 years	236	16.5
> 5 years	252	17.7
Occupation	232	17.7
Worker	213	14.9
Farmer	89	62
Self-employed	192	13.5
Executive	59	41
Utility	189	13 3
Other	683	47.9
Monthly personal income	505	17.2
	251	246

Table 1 General information of patients undergoing IVF-ET forthe first time

Table 1 (continued)

Features	Number of participants (n)	Percentage (%)	
3000–6000 yuan	590	41.4	
6000–10000 yuan	320	22.5	
>10,000 yuan	164	11.5	



Fig. 1 Comparison of hope scores between male and female patients undergoing IVF-ET for the first time



Fig. 2 Comparison of fertility quality of life scores between male and female patients undergoing IVF-ET for the first time



Fig. 3 Comparison of stress scores between male and female patients undergoing IVF-ET for the first time



Fig. 4 Comparison of anxiety scores between male and female patients undergoing IVF-ET for the first time

this study were in the middle to high range, and there was no difference in the level of hope between men and women; this result is consistent with the findings of Tang et al. [33] on the levels of hope during treatment in 221 female patients with infertility and the findings of Omani Samani et al. [34]. As the science of assisted reproductive technology continues to evolve, an increasing number of infertile patients are successfully achieving pregnancy, which increases the confidence



Fig. 5 Comparison of depression scores between male and female patients undergoing IVF-ET for the first time

of patients undergoing IVF-ET and makes them more willing to cooperate in the completion of related treatments, with both male and female patients having high hopes regarding their treatment outcomes.

In this study, the fertility quality of life of patients undergoing IVF-ET for the first time was slightly higher than that reported in the study by Wdowiak et al. [35], but the overall fertility quality of life of these patients is still poor and needs improvement. Among the patients in this study, the fertility quality of life of women was significantly lower than that of men, which is consistent with the results of Navid et al. [36-38]. The possible reasons are related not only to infertility itself but also to the long duration of IVF-ET treatment and the complexity of the process, especially for patients undergoing IVF-ET for the first time, which causes varying degrees of disturbances and burdens on their normal lives and affects the quality of their reproductive life to a certain extent. Moreover, in the process of IVF-ET, women must cooperate with a doctor to complete various examinations and treatments, return to the hospital several times, follow the doctor's instructions to take a variety of drugs, perform injections and complete a certain number of surgical operations; on the other hand, men's treatments are relatively simple. Influenced by traditional Chinese concepts, people often believe that having children and raising them is more the responsibility of women and that women are naturally supposed to bear more family responsibilities. Therefore, infertility leads to a variety of mental pressures and responsibilities for women, which, in turn, further reduces their fertility quality of life. In future clinical work and

	Hope score	Fertility quality of life score	Stress Score	Anxiety Score	Depression Score
Male	35 (34–38)	76.47 (67.65–83.82)	6 (2–10)	2 (0–6)	2 (0–6)
Female	35 (34–37)	69.86 (60.29–78.68)	8 (4–14)	4 (2–8)	4 (0–8)
Ζ	-0.445	- 8.892	- 6.293	-6.009	-4.317
P value	0.656	0.000	0.000	0.000	0.000

Table 2 Levels of hope, fertility quality of life, and negative mood scores in patients undergoing IVF-ET for the first time



Fig. 6 Analysis of the correlation between hope and quality of reproductive life in patients undergoing IVF-ET for the first time



Fig. 7 Analysis of the correlation between hope and stress in patients undergoing IVF-ET for the first time

scientific research on the quality of life of couples experiencing infertility, more attention, understanding and support should be given to women.

The results of the present study indicated that firsttime IVF-ET patients have significant negative emotions, which is consistent with the results of several studies [39, 40] conducted at home and abroad. Negative emotions are significantly greater in female patients than in male patients, which has also been confirmed by several



Fig. 8 Analysis of the correlation between hope and anxiety in patients undergoing IVF-ET for the first time



Fig. 9 Analysis of the correlation between hope and depression in patients undergoing IVF-ET for the first time

studies [38, 41–43]. Although infertility is not life-threatening, it can still be a stressful life experience for couples, which is related to a person's social nature [44]. Many couples experiencing infertility seek medical care for a long period before IVF-ET fertility treatment is recommended, and both previous medical experience and the upcoming long and complicated IVF-ET procedure can contribute to the development of negative emotions in



Fig. 10 Analysis of the correlation between fertility quality of life and stress in patients undergoing IVF-ET for the first time



Fig. 11 Analysis of the correlation between fertility quality of life and anxiety in patients undergoing IVF-ET for the first time



Fig. 12 Analysis of the correlation between fertility quality of life and depression in patients undergoing IVF-ET for the first time

these couples. In addition, couples experiencing infertility via IVF-ET treatment experience great financial pressure, and for many families, considerable financial expenses also cause psychological distress. At the same time, under the influence of traditional Chinese ideology, most families regard childbearing as a woman's most basic obligation and often attribute the fault of infertility to women; even if female infertility is not the cause, women are blamed and held accountable [41]. Many female patients believe that infertility is unfilial and habitually attributes the fault of family incompleteness to themselves [45], which places a greater spiritual burden on them and their families. In addition, during IVF-ET treatment, women undergo more medical interventions and various types of invasive operations [46], and the fear of treatment and pain caused by medical operations exacerbates their negative emotions [47]. Therefore, more care and help should be given to female patients while also considering the negative psychological state of couples experiencing infertility.

The results of this study demonstrate that the overall level of hope of first-time IVF-ET patients was positively correlated with their fertility quality of life, implying that the higher the level of hope a patient had, the greater their fertility quality of life. This finding is consistent with the findings of Huang et al. [48] that higher levels of hope in cancer patients led to a greater quality of life. This may be because hope is a scientifically rationalized response produced by an individual in the face of a stimulus and involves positive yearning for the future [49, 50]. The higher the level of hope in first-time IVF-ET patients is, the greater the confidence they have in the treatment outcome and are fully prepared to undergo the complicated treatment process, and a positive and scientific coping response will have a smaller impact on their lives, which will be conducive to improving their fertility quality of life. The present study also revealed that the overall levels of hope and negative emotions in this group of patients are negatively correlated, indicating that the higher a patient's level of hope is, the less negative emotions they have, a finding that is consistent with the findings of Omani Samani et al. [34]. Hope is a kind of confidence and expectation to solve a problem when an individual faces a difficult situation and is a kind of psychological force that helps patients cope positively with the disease. Intervention studies based on Syder's theory of hope have demonstrated that increasing a patient's level of hope through hope therapeutic intervention can reduce their negative emotions, such as depression and anxiety, and ultimately enable them to look to the future with a positive and rational attitude [50, 51]. Conversely, a low level of hope exacerbates anxiety, depression, and other negative emotions, and negative emotions can lead to further decreases in the level of hope. Moreover, the present study revealed a negative correlation between the overall level of negative emotions and the fertility quality of life in such patients, indicating that when the level of negative emotions is high, the quality of reproductive life is low, and when the level of negative emotions is low, the quality of reproductive life is high, which is consistent with the results of studies by Song et al. [52] and

Table 3	3 Correlations of the level of hope with fertility quality of life and negative emotions in patients under	going IVF-ET for	r the first
time			

	Hope score	Fertility quality of life score	Stress score	Anxiety score	Depression score
Hope score	1				
Fertility quality of life score	0.247**	1			
Stress score	-0.135**	-0.609**	1		
Anxiety score	-0.105**	-0.533**	0.770**	1	
Depression score	-0.189**	-0.591**	0.789**	0.750**	1

** Indicates P < 0.01



Fig. 13 Analysis of hope in patients undergoing IVF-ET for the first time



Fig. 14 Analysis of fertility quality of life in patients undergoing IVF-ET for the first time

 $\begin{array}{c} 40 \\ r=0.181 \\ p < 0.01 \\ 0 \\ 10 \\ 0 \\ 0 \\ 10 \\ 20 \\ 30 \\ 0 \\ 0 \\ 10 \\ 20 \\ 30 \\ 40 \\ 50 \\ 5core Of Male Stress In Couples \\ \end{array}$

Fig. 15 Analysis of stress in patients undergoing IVF-ET for the first time



Fig. 16 Analysis of anxiety in patients undergoing IVF-ET for the first time

Woods et al. [53]. IVF-ET is considered a stressful life event that causes high anxiety [6], and the level of negative emotions in IVF-ET patients is significantly greater than that in healthy couples of childbearing age [4]; however, the majority of couples experiencing infertility are undiagnosed or fail to receive relevant psychosocial

supportive treatments [54], especially those who are undergoing IVF-ET for the first time and who do not routinely receive psychological guidance prior to the start of the treatment cycle. In particular, couples undergoing IVF-ET for the first time do not routinely receive



Fig. 17 Analysis of depression in patients undergoing IVF-ET for the first time

Table 4 Correlations of the level of hope with fertility quality of life and negative emotions in first-time IVF-ET patients

	Female				
	Hope score	Fertility quality of life score	Stress score	Anxiety score	Depression score
Male	0.131**	0.372**	0.181**	0.163**	0.210**
** Indi	cates P < 0.01				

psychological guidance prior to the formal start of the cycle, and the higher a patient's level of negative emotions is, the more their fertility quality of life is affected. In contrast, when infertility patients receive psychological counseling to improve their negative emotions, their quality of life improves [55].

In this study, hope, fertility quality of life and negative emotions were positively correlated in first-time IVF-ET patients, indicating that when a husband's hope, reproductive quality of life and negative emotions were high, his wife's hope, fertility quality of life and negative emotions were also high,. Conversely, when a husband's level of hope, fertility quality of life, and negative emotions were low, his wife's hope, fertility quality of life, and negative emotions were also low, which is consistent with the results of some previous studies conducted overseas [55, 56]. The reason why the level of hope, fertility quality of life and negative emotions are mutually influenced by first-time IVF-ET patients is that couples, as a whole, live together in a common environment for a long period, and when faced with a common life event that requires both partners to bear and experience a series of consequences, their psychological status and quality of life are closely linked. Therefore, while attention is given to the psychological health of female infertility patients, considerable psychological support should also be provided to their partners, and both partners should be encouraged to participate in and receive relevant psychological interventions [56].

Conclusion

This study investigated the levels of hope among men and women undergoing IVF-ET are fairly good, but there are obvious negative emotions, and the quality of fertility life needs further improvement. The results of this study indicate that their levels of hope are positively correlated with the quality of fertility life and negatively correlated with negative emotions respectively, and negative emotions are negatively correlated with the quality of fertility life. Moreover, between the husband and wife, both of them will positively influence each other in terms of the level of hope, the quality of fertility life and negative emotions. As the main intervention recommended for all kinds of infertile couples, psychological intervention can effectively relieve psychological pain and is related to a significant increase in the pregnancy rate [57-59]. Therefore, we suggest that active psychological interventions should be carried out for male and female patients who receive IVF-ET for the first time, especially for female patients, and predict that these interventions will help improve their levels of hope, alleviate negative emotions and contribute to the improvement of their fertility quality of life.

Limitations and prospects

This study investigated only the level of hope, fertility quality of life, and negative emotions of first-time IVF-ET patients before the start of treatment and did not assess the psychological status of male and female patients at different stages of treatment; therefore, this study failed to evaluate the changes in the psychological status of IVF-ET patients throughout the cycle of treatment. This was a single-center study, so the conclusions of the study have certain limitations. In the future, multicenter, large-sample, and longer-duration studies are needed to further investigate the trajectory of hope, fertility quality of life, negative emotions, and other mental health states of couples undergoing IVF-ET and to understand the factors that influence these variables and their effects on treatment outcomes. These findings provide a better scientific basis for the development of relevant clinical interventions.

Abbreviations

IVF-ET	In vitro fertilization-embryo transfer
HHI	Herth Hope Index
FertiQoL	Fertility quality of life
DASS-21	Short-form version of the Depression Anxiety Stress Scale-21

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Author contributions

H.Y. designed, recorded and analyzed the data and wrote the manuscript. J.Z. designed, recorded, and supervised the study, ensured the conduct of the study and provided financial support. Y.J. Z. confirmed the final version of the manuscript. X.R. S. was involved in conducting the statistical analysis. M.X. and Y.Z. helped collect the data. L.L. Z. guided the entire research process. G.H. W. guided the entire research process and provided financial support. All the authors read and approved the final manuscript.

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Availability of data and materials

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

Declarations

Ethics approval and consent to participate

This study was approved by the Clinical Research Ethics Committee of Wuhan University People's Hospital under approval number WDRY2023-K005. Informed consent was obtained from all participants for this study. Prior to formal participation in the study, we informed the participants of the main purpose and the content of the study to ensure that all participants volunteered to participate in the study and that their data were kept confidential.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Page 12 of 12

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