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Effects of a positive psychological intervention on the mental health and happiness of patients undergoing *in vitro* fertilization.

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Abstract

The aims of this study were to investigate the effects of a positive psychological intervention on the mental health and happiness of patients undergoing *In vitro* fertilization (IVF), and to observe the pregnancy outcome of the IVF patients. Two hundred infertile women requiring IVF were randomly divided into an intervention group (Group I) and a control group (Group C), with 100 patients in each group. Both groups were given routine treatment and IVF nursing. Group I was further provided with a positive psychological intervention. The Symptom Checklist-90 (SCL-90) and Memorial University of Newfoundland Scale of Happiness were used to evaluate the mental health and happiness of patients. The difference in the pregnancy outcome between the two groups was also observed. The total SCL-90 score, total average score, number of positive items, interpersonal sensitivity score, depression score, and anxiety score in Group I were significantly lower than in Group C (P<0.05). The total happiness score, positive affect score, and positive experience score in Group I were significantly higher than in Group C (P<0.01), whereas the negative affect score and negative experience score in Group I were significantly lower than in Group C (P<0.01). Thus, a positive psychological intervention can improve the mental health and happiness of patients undergoing IVF, and improve the clinical pregnancy rate.

Keywords: *In vitro* fertilization, Psychological intervention, Mental health, Happiness.

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Introduction

As a major innovation in human reproductive technologies, *in vitro* fertilization (IVF) embryo transfer has opened up a new way for the treatment of infertility. However, due to its complex processes, high treatment costs, and uncertain treatment outcomes, the patients receiving this treatment often experience anxiety, depression, and other adverse emotional reactions, which seriously affect the patients' mental health [1,2]. The majority of the patients suffer from both physical and psychological pressure, resulting in the reduction of the quality of life and subjective happiness of these patients [3,4]. How to improve the mental health and happiness of the patients undergoing IVF using effective, simple, and feasible intervention methods has become an important issue for workers in reproductive medicine.

Positive psychological intervention is based on the theory of positive psychology, which emphasizes the stimulation of the patients' actual or potential inherent positive qualities and positive force. It thus establishes a high-quality personal life and social life [5,6]. A positive psychological intervention involves activities that target the improvement of individual positive emotions, and results in individuals with positive emotions being more healthy and happy [7]. Positive psychological intervention, which began earlier in foreign countries, has gradually increased in China in recent years, and its effects have been studied in health groups, children, elderly patients, patients with mental illness, critically ill patients, and patients with chronic diseases. It helps the patients to build confidence and hope, mobilize their potential, improve their mental health, and improve their happiness [8-10]. However, there have been fewer studies of positive psychological intervention for infertile patients. Therefore, the purpose of this study was to apply a positive psychological intervention to patients undergoing IVF, with the aims of investigating its role in improving the mental health and happiness of such patients and providing evidence for clinical psychological intervention.

Materials and Methods

Subjects

A total of 200 infertile women who planned to undergo IVF in the Department of Reproductive Genetics of our hospital from February 2016 to August 2016 were randomly divided into an intervention group (Group I; 100 cases) and a control group

(Group C; 100 cases). The reasons for infertility included tubal and pelvic factors in 108 cases, ovulation disorders in 45 cases, endometriosis in 16 cases, and three or more failures of intrauterine insemination in 31 cases. Twenty-two patients had a previous history of IVF, and 42 patients had received adjuvant treatment by hysteroscopy. All of the patients were involved in long or ultra-long protocols, and there was no significant difference in terms of age, educational level, infertility duration, infertility reason, or treatment protocol between the two groups (P>0.05). This study was conducted in accordance with the declaration of Helsinki. This study was conducted with approval from the Ethics Committee of Tangshan Maternal and Child Health Hospital. Written informed consent was obtained from all participants.

General questionnaire

A general questionnaire, which was designed by the researchers, was used to collect data regarding age, educational level, economic level, residence, occupation, and infertility duration.

Symptom checklist-90 (SCL-90)

The SCL-90, which was developed by Derogatis [11], is the most widely used mental health scale. It uses a five-point scoring system. The scale consists of 90 items, and includes 10 factors: namely, somatization, compulsion, interpersonal sensitivity, depression, anxiety, hostility, horror, paranoia, psychoticism, and an "others" category. It can be applied to a range of ages, from junior high school students to adults. Each item is scored (five points) according to the responses of "no," "light," "medium," "heavy," and "serious." The total score is calculated as the sum of the scores of all 90 items. The total symptom score (i.e., the total average score) is the total score divided by 90. The number of positive items refers to those that scored 1-4 points, and the patients have a possibility of being positive if the total score is more than 160 points, more than 43 items are positive, or the score of any factor is greater than two points.

Memorial University of Newfoundland Scale of Happiness (MUNSH)

The MUNSH, which was developed by Kozma [12], consists of 24 items, of which five items reflect Positive Affect (PA) and five items reflect negative affect (NA), and seven items reflect Positive Experience (PE) and seven items reflect Negative Experience (NE). In total, happiness=PA-NA+PE-NE. The scores range from -24 to +24 points. In order to facilitate the calculation, the score is often added to one constant 24; as such, the scoring range is from 0 to 48 points. The PA includes happiness, gladness, and the feeling that life is meaningful, whereas NA includes anxiety, depression, sadness, loneliness, boredom, discomfort, and so on, but does not include severe affective disorder or neurosis. The PE and NE refer to those factors that easily elicit positive and negative emotional experiences in people. Each item is a sentence describing an emotion or experience, and the subject is required to answer "yes" or "no" based on recent life experiences. The MUNSH has high reliability and validity, and its internal consistency is good.

Intervention content

A total of 200 infertile women who planned to undergo IVF were recruited and randomly divided into Groups I and C. Group C received routine treatment and nursing for IVF, whereas Group I was further provided with a positive psychological intervention. The psychological intervention's processes and measures were developed by psychological experts according to the specific circumstances of the individual infertile patients. Three nurses, who were qualified with a certificate of psychiatric counselling specialist in the department of reproductive genetics, were also assigned to the psychological intervention for Group I, and the patients with hysteroscopic adjuvant treatment received the positive psychological intervention from the nurses from the operating room department. The intervention model involved group counselling, and included five parts: self-understanding, describing the future ideal self, describing gratitude events and developing intimate relationships with loved ones, helping others and participating in meaningful work, and describing happy events and regaining confidence and hope. The specific group counselling program is shown in Table 1.

Intervention methods

The patients in Group I received the intervention for 8 weeks, for 1 h once per week. The SCL-90 and MUNSH were administered to both groups before and after the intervention to compare the differences in mental health and subjective happiness between the two groups, and the difference in the pregnancy outcome between the two groups was compared. The questionnaire survey used a unified guide, and all of the questionnaires were issued and recovered on the spot. The subjects were voluntarily surveyed and were able to complete the questionnaire independently. In order to improve the adherence and continuity of Group I, the patients were given a material reward for persevering with their participation in the intervention.

Statistical analysis

The Microsoft Excel software (Microsoft, Redmond, WA, USA) was used to establish a database for all of the data. All of the data were analysed using SPSS 17.0 (SPSS Inc., Chicago, IL, USA), and the t-test and χ^2-test were performed. The level of P<0.05 was accepted as statistically significant for the differences in the data.

Table 1. *Positive psychological intervention program.*

Time (weeks)	Content	Situation	Specific intervention program	Purposes
1	Self-understanding	Lectures and discussions	Educating group cognitive knowledge, guiding self-psychological barriers, encouraging the patients to express their feelings of infertility through written or oral way.	To guide the patients to a more comprehensive understanding of self and establish positive concept about themselves
2	Describing the future ideal self	Activities and Discussions	Writing exercise, requiring the patients to describe their ideal state of the future, ideal home, and ideal self. This writing exercise is conducted once a week for four consecutive weeks; the first time was performed in group, and the other three were at home, and their tasks were examined in each group counselling class	
3-4	Describing gratitude events and developing intimate relationships with loved ones	Activities and Discussions	Encouraging the patients' gratitude behavior, requiring them to use beautiful language to describe the feeling when gratitude feelings occur, and five gratitude events were described each time; Encouraging the patients to maintain good communication with their loved ones, express each other's inner thoughts, maximum develop their intimate relationships. The event will be held once a week for three consecutive weeks, the first time was performed in group, and the other two were at home, and their tasks were examined in each group counseling class.	To enhance the patients' gratitude emotions, increase feeling between the patients and their relatives so that they can get more social support to overcome difficulties.
5-6	Helping others and participating in meaningful work	Activities and Discussions	Asking the patients to describe their helping event in one week, encouraging the patients to help others in their daily lives, so that the patients can rise from the gratitude stage to the stage of taking initiative to help others, and actively seek and participate in meaningful work; encouraging the patients to think about self-worth and life significance.	To improve the patients' interpersonal relationships, enhance their positive emotions and subjective happiness
7-8	Describing happy events and regaining confidence and hope	Activities and Discussions	Asking the patients to describe a happy event within a week, guiding them to recall happy events in a depressed mood, summarizing the future ideal self previously described and recording gratitude events; teaching couples to access information, accept the existence of uncertainty of the treatment outcomes, set up correct expectations to reproductive technology, and establish correct concept of fertility.	To set up the patients' faith and hope to the treatment and life.

Results

Analysis and comparison of the subjects' mental health

It can be seen from Table 2 that there were no significant differences in the total score of the SCL-90, total mean score, number of positive items, or other factors between the two groups before the intervention (P>0.05). After the positive psychological intervention, the total score of the SCL-90 (127.69 ± 31.88), total mean score (1.44 ± 0.37), number of positive items (22.77 ± 15.39), interpersonal sensitivity (1.56 ± 0.58), depression (1.49 ± 0.49), and anxiety (1.39 ± 0.35) in Group I were statistically significantly lower than those of Group C (139.79 ± 30.38, 1.59 ± 7.19, 28.14 ± 14.78, 1.73 ± 0.34, 1.71 ± 0.38, and 1.60 ± 0.49 respectively) (P<0.05).

Table 2. *Analysis and comparison of SCL-90 between the two groups before and after the intervention ($\bar{x}$ ± s).*

Item	Before			After		
	I (n=100)	C (n=100)	t	I (n=100)	C (n=100)	t
Total score	143.33 ± 21.29	142.59 ± 23.67	0.417	127.69 ± 31.88	139.79 ± 30.38	4.221**
Total mean score	1.67 ± 0.28	1.65 ± 0.29	0.703	1.44 ± 0.37	1.59 ± 7.19	4.898**
Number of positive items	30.49 ± 13.47	30.88 ± 15.26	0.411	22.77 ± 15.39	28.14 ± 14.78	2.632*
Somatization	1.65 ± 0.32	1.66 ± 0.29	0.452	1.48 ± 0.37	1.51 ± 0.24	0.852
Compulsion	1.44 ± 0.38	1.43 ± 0.39	0.503	1.35 ± 0.43	1.33 ± 0.52	0.711
Interpersonal sensitivity	1.77 ± 0.88	1.75 ± 0.31	0.722	1.56 ± 0.58	1.73 ± 0.34	5.315**
Depression	1.98 ± 0.41	1.99 ± 0.37	0.462	1.49 ± 0.49	1.71 ± 0.38	7.233**
Anxiety	1.78 ± 0.42	1.79 ± 0.29	0.459	1.39 ± 0.35	1.60 ± 0.49	7.152**
Hostility	1.56 ± 0.37	1.54 ± 0.31	0.721	1.51 ± 0.42	1.52 ± 0.34	0.413

Horror	1.27 ± 0.34	1.25 ± 0.12	0.734	1.25 ± 0.44	1.26 ± 0.32	0.433
Paranoia	1.44 ± 0.34	1.43 ± 0.28	0.516	1.43 ± 0.31	1.44 ± 0.22	0.425
Psychoticism	1.16 ± 0.27	1.15 ± 0.35	0.453	1.12 ± 0.35	1.13 ± 0.31	0.488
Others	1.61 ± 0.31	1.63 ± 0.37	0.713	1.51 ± 0.27	1.50 ± 0.36	0.412

Note: *P<0.05, **P<0.01.

Analysis and comparison of the subjects' happiness

Table 3 shows that there were no significant differences between the two groups in the total happiness score, PA, NA, PE, or NE before the intervention (P>0.05). After the intervention, the total happiness score (37.21 ± 3.76), PA (5.99 ± 3.22), and PE (8.91 ± 2.32) in Group I were statistically significantly higher than in Group C (25.48 ± 4.85, 3.65 ± 2.37, and 5.81 ± 2.25 respectively) (P<0.01), whereas the NA (1.20 ± 2.41) and NE (3.09 ± 2.42) were statistically significant lower than in Group C (5.01 ± 2.38 and 4.10 ± 2.44 respectively) (P<0.01).

Table 3. *Analysis and comparison of happiness between the two groups.*

	Before			After		
Item	**I (n=100)**	**C (n=100)**	**t**	**I (n=100)**	**C (n=100)**	**t**
Total happiness	25.56 ± 7.78	24.77 ± 8.21	1.346	37.21 ± 3.76	25.48 ± 4.85	6.133**
PA	3.66 ± 3.12	3.59 ± 2.77	0.522	5.99 ± 3.22	3.65 ± 2.37	9.743**
NA	5.45 ± 2.82	5.41 ± 3.12	0.385	1.20 ± 2.41	5.01 ± 2.38	13.889**
PE	5.75 ± 3.16	5.89 ± 3.62	0.413	8.91 ± 2.32	5.81 ± 2.25	11.637**
NE	4.78 ± 2.65	4.84 ± 2.77	0.456	3.09 ± 2.42	4.10 ± 2.44	7.512**

Note: **P<0.01

Table 4. *Analysis and comparison of pregnancy outcome between the two groups.*

Group	Pregnancy	Non pregnancy
I (n=84)	55 (65.5)	29 (34.5)
C (n=82)	41 (50)	41 (50)
χ^2	4.075	
P	<0.05	

Analysis and comparison of the pregnancy outcome

It can be seen from Table 4 that the clinical pregnancy rate in Group I (65.5%) was statistically significantly higher than in Group C (50%) after the intervention (P<0.05).

Discussion

The results demonstrate that this positive mental intervention model can improve the mental health and happiness of the patients, and improve the clinical pregnancy rate. In addition, the positive psychological intervention is superior to traditional psychological intervention methods, the latter of which normally adopt comprehensive psychological intervention methods, such as improving the treatment environment, strengthening the information for assisted reproductive technology-related knowledge, protecting privacy, establishing a good doctor-patient relationship, maintaining effective communication with the patients, and so on. The traditional comprehensive psychological intervention has some positive effects on improving negative emotions in infertile patients, such as anxiety and depression, but the effects are not obvious for improving the patients' subjective happiness. Positive psychology is concerned with human happiness, strength, and best performance, and its central idea is to stimulate the individual's initiative in order to form a positive quality of life and to promote people's adaptability in life. Its contents enhance the patients' strength, increase their pleasure and happiness, and so on, rather than merely alleviating such negative psychology as depression and anxiety [13-15].

The results of this study show that the positive psychological intervention model can improve interpersonal relationships, depression, anxiety, and the mental health of the patients. In addition, the findings indicate that the positive psychological intervention significantly improves their subjective happiness, which is basically consistent with other clinical research [16-18]. In this study, the methods used in the positive psychological intervention included group counselling, through which the patients enhanced their positive emotions, which then promoted their mental health and achieved the purpose of enhancing subjective happiness. A good group counselling environment can enhance the effects of the group counselling.

During the process of a positive psychological intervention, nurses should establish a good nurse-patient relationship with the patients, respect and understand them, and stimulate and encourage their enthusiasm to communicate with each other so as to improve the effectiveness of the group counselling and mutually transmit useful information; thus being conducive to reconstructing the patients' rational cognition and encouraging their PE [19,20].

This study's findings also show that the positive psychological intervention model can improve the pregnancy outcome of Group I, and improve the clinical pregnancy rate. As one kind of psychological intervention, a positive psychological intervention can effectively improve the quality of life of the patients, strengthen their faith in life, and help them to be willing to accept their illness. Therefore, the treatment compliance of patients is greatly improved, which plays a role in the adjuvant treatment of diseases [21-23].

In summary, compared with traditional psychological intervention methods, this positive psychology intervention is more effective for improving the patients' level of mental health and happiness. Therefore, it is worthy of promotion and application in clinical nursing work. However, as this study did not follow up the long-term effects on the patients, further in-depth studies are required.

Conflicts of Interest

The authors declare no conflict of interest.

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