Int J Clin Exp Med 2020;13(9):6859-6867
www.ijcem.com /ISSN:1940-5901/IJCEM0114500

Original Article

Psychological intervention for patients with high-risk pregnancy can improve their self-management ability and pregnancy outcome

Xiaoyan Xiu[1,2], Juan Lin[3], Yingying Lin[4], Lihua Lin[4], Jianfang Zhu[5], Xiuqing Wei[3], Xuehong Pan[1], Jianying Yan[3]

[1]Department of Health Education, Fujian Maternity and Child Health Hospital, Affiliated Hospital of Fujian Medical University, Fuzhou 350001, Fujian Province, People's Republic of China; [2]Fujian Key Laboratory of Women and Children's Critical Diseases Research [Fujian Maternity and Child Health Hospital (Fujian Women and Children's Hospital)], Fuzhou 350001, Fujian Province, People's Republic of China; [3]Department of Obstetrics, Fujian Maternity and Child Health Hospital, Affiliated Hospital of Fujian Medical University, Fuzhou 350001, Fujian Province, People's Republic of China; Departments of [4]Healthcare, [5]Pathology, Fujian Provincial Maternity and Children's Hospital, Affiliated Hospital of Fujian Medical University, Fuzhou 350001, Fujian Province, People's Republic of China

Received May 18, 2020; Accepted June 23, 2020; Epub September 15, 2020; Published September 30, 2020

Abstract: Objective: To explore the effect of psychological intervention on self-management ability and pregnancy outcome of high-risk pregnancy patients. Methods: Altogether 165 cases of high-risk pregnancy patients treated in Fujian Maternity and Child Health Hospital, Affiliated Hospital of Fujian Medical University from February 2018 to July 2019 were selected as the research participants, of which 81 cases were given routine intervention as the regular group, and other 84 cases were given psychological intervention as the research group. Trait anxiety inventory (T-AI) score, state anxiety inventory (S-AI) score, and edinburgh postnatal depression scale (EPDS) were applied to evaluate the anxiety and depression of patients. Pittsburgh sleep quality index (PSQI) was used to evaluate sleep quality. The exercise of self-care agency scale (ESCA) was used to evaluate self-care ability, pregnancy outcomes and complications of the two groups. Quality of life short form 36 questionnaire (SF-36) was used to evaluate the post-partum quality of life, and self-made intervention satisfaction questionnaire was used to evaluate intervention satisfaction. Results: After intervention, the T-AI score, S-AI score, EPDS score and PSQI score of patients in the research group were lower than those in the regular group. ESCA scores of patients in the research group were significantly higher than those in the regular group. The total adverse pregnancy outcomes and total complications in the research group were significantly lower than those in the regular group. The SF-36 scores of patients in the research group were higher than those in the regular group. The intervention satisfaction of patients in the research group was higher than that in the regular group. Conclusion: Psychological intervention for patients with high-risk pregnancy can improve the pregnancy outcome of patients, reduce the occurrence of postpartum complications, promote the sleep quality of patients, and improve the self-management ability and quality of life of patients.

Keywords: High-risk pregnancy, psychological intervention, self-management, pregnancy outcome

Introduction

High risk pregnancy refers to the occurrence of some pathological factors during pregnancy, which damage the life and health of mothers and infants, and cause dystocia in severe cases. Compared with normal pregnant women, the maternal mortality rate of high risk pregnancy is relatively high, which is an important cause of perinatal morbidity and mortality [1], and nearly 1 million pregnant women suffer from high-risk pregnancy every year. Complications, late pregnancy and unsafe drugs are all the pathogenic factors leading to high-risk pregnancy [2]. Some studies have shown that pregnant women who are included in high-risk pregnancy need to be given key monitoring to reduce perinatal complications and mortality [3]. Therefore, early monitoring and intervention are effective measures to improve patients' health and reduce maternal perinatal and neonatal mortality [4].

Some studies have shown that most parturients have anxiety and depression due to their fear of childbirth, which will affect the delivery results and cause serious complications. This kind of fear is usually caused by the lack of the maternal knowledge, so the explanation and psychological intervention can help the puerpera overcome the fear [5]. According to the research, psychological education intervention before delivery can reduce the fear of delivery, and the choices of caesarean section are significantly reduced [6]. Clinical research has shown that conventional health education lacks the attention of psychological needs of patients and their families, and the education methods are too formal to fully interfere with patients' cognition of diseases [7]. Psychological intervention is a kind of planned and purposeful intervention for patients, including disease assessment, health education, information provision and psychological counseling, and the patient's condition is adjusted and improved through the patient's psychological state [8]. Moreover, some studies have shown that psychological intervention and patient listening to the patients' feelings can help the parturient to release their inner depression and anxiety and keep the parturient in a good psychological state [9]. For example, in studies by Matvienko-Sikar and Dockray et al., psychological intervention for pregnant women can improve their mental and physical health during pregnancy, reduce the prenatal pressure, and improve the maternal and infant outcomes [10].

At present, there are few researches on psychological intervention for patients with high-risk pregnancy. We therefore gave psychological intervention to patients with high-risk pregnancy in the whole process from the diagnosis of high-risk pregnant women to the end of childbirth, and explored the influence of this intervention mode on patients' psychological health, self-management ability, and pregnancy outcome. The study aimed to provide a feasible intervention measure for high-risk pregnant patients during the delivery process.

Material and methods

General information

Altogether 165 cases of high-risk pregnancy patients treated in Fujian Maternity and Child Health Hospital, Affiliated Hospital of Fujian Medical University from February 2018 to July 2019 were selected as the research participants, of which 81 cases were given routine intervention as the regular group, and another 84 cases were given psychological intervention as the research group. The patients in the regular group were aged 26-35 years, and the average age was 30.75±5.04 years. The patients in the research group were aged 25-33 years, with an average age of 29.47±4.86 years. The study was approved by the Ethics Committee of Fujian Maternity and Child Health Hospital, Affiliated Hospital of Fujian Medical University. The patients and their guardians have signed a fully informed consent form. Inclusion criteria: the patients were diagnosed based on the diagnostic criteria for high-risk pregnancy [11]; the amniotic fluid of the patients was normal; patients with singleton pregnancy; abnormal conditions such as fetal distress did not occur during monitoring. Exclusion criteria: patients withdraw from the experiment midway; patients with multiple pregnancy; patients complicated with malignant tumor or serious organ dysfunction, scar pregnancy, and infectious diseases; patients did not sign the informed consent form; patients with heart disease, and patients lost to follow. The inclusion criteria were applicable to the research group and the regular group.

Intervention method

Routine intervention was given to the regular group: traditional health education was given to the patients. During the period from the patient's admission to hospital to the end of pregnancy and discharge from hospital, health education was organized for the patient during the pregnancy test (manual publicity and lectures were applied) to make the patients understand the disease.

Psychological intervention was given to the research group: (1) Psychological assessment: after the patient was diagnosed in Fujian Maternity and Child Health Hospital, Affiliated Hospital of Fujian Medical University, a good doctor-patient relationship was established to gain the trust of the patient. An in-depth communication was conducted and the stuff should carefully listen to the problems considered in the patient's heart with a smile. Once the patients know that they are in high-risk pregnancy, they will feel helpless and afraid, and start to worry about whether they can have a

successful pregnancy, the development of the fetus, and whether the pregnancy is successful. Therefore, we needed to invite patients and their families to communicate, and carry out targeted and strengthened psychological counseling for patients. (2) Psychological counseling: To prevent patients from wrong cognition of certain high-risk factors, we needed to emphasize the follow-up of patients. In addition, the clinical characteristics of the disease, clinical treatment plan, delivery precautions, and drug safety were explained to patients, so the patients could correctly understand their own conditions in all aspects. It was also necessary to introduce the successful survival cases of similar diseases to the patients, encourage the patients to face the diseases with optimistic and positive attitude, alleviate the anxiety of the patients, and invite the patients' families to participate in psychological intervention together, pay attention to the patients together, support and encourage the patients, give psychological communication to the patients, share the pressure brought by high-risk pregnancy, pay attention to the psychological changes of the patients at all times, and give psychological counseling in time. (3) Introduction of follow-up and testing items: Before the patients received various examinations on pregnancy, the purpose of the examination should be explained to the patients, so that the patients and their family members could actively cooperate with the examination. The patients and their family members should be informed as soon as possible after the results came out, and the testing results should be informed so as to eliminate the doubts of the patients and enable the patients to actively cooperate with the treatment. (4) Admission intervention: the patients were given a good hospitalization environment, the number of visits was controlled to avoid aggravating patients' anxiety, and more communication with patients was carried out to strengthen the patients' confidence in hospital treatment and delivery. The detailed explanation of the operation process was applied to patients who need cesarean section and their families. Matters needing attention were informed to patients before, during and after operation, and the guidance on postoperative diet and newborn feeding was given to patients. For patients with severe stress and prenatal anxiety, targeted psychological counseling and sleep guidance were given to allow patients to undergo surgery on the basis of adequate psychological and physiological preparation.

Observation index

Patients were divided into T1 (no intervention within 1 week after the first diagnosis of high risk pregnancy), T2 (36 weeks after intervention), T3 (48 hours after delivery), and T4 (1 month after delivery).

(1) The State-Trait Anxiety Scale (T-AI, S-AI) [12] was applied, with the scoring standard ranging from 20 to 80 points. The total score of the two groups of patients in different time periods before and after intervention was counted. The high score was closely related to the high anxiety level of the patients.

(2) Edinburgh postnatal depression scale (EPDS) [13] was applied, with 10 items and each item of 0-1-2-3, and the score ranged 0-30 points. The total score of the two groups of patients in different time periods before and after intervention was counted. The score ≥13 points after statistics indicated that the patients suffered from postpartum depression.

(3) Pittsburgh sleep quality index (PSQI) [14] was applied. It included 5 others' evaluations and 19 self-evaluations, with a total score of 21 points. The high score after evaluation was closely related to the low sleep quality of the patient.

(4) Exercise of self-care agency scale (ESCA) [15] with 4 different fields and 43 items was applied. The total score after evaluation was 172 points. The high score after self-evaluation was closely related to the high self-care ability.

(5) The pregnancy outcomes and complications of the two groups were recorded.

(6) Quality of life (SF-36) score [16] was divided into 8 dimensions, with a total score of 100 points. The high score was closely related to the high quality of life after childbirth.

(7) Patients were given a self-made satisfaction questionnaire, with a total score of 100 points. The high score was closely related to the high patient's satisfaction with the service.

Statistical method

SPSS22.0 (Beijing Easybio Technology Co., Ltd., China) was used for statistical analysis. Graph-

Table 1. Comparison of general data between two groups of patients [n (%)] (x±sd)

Classification	Research group (n=84)	Regular group (n=81)	t/χ^2 value	*P* value
Age (years)	29.47±4.86	30.75±5.04	1.661	0.099
BMI (kg/m^2)	20.45±1.57	20.75±1.35	1.314	0.191
Abdominal circumference (cm)	100.45±6.32	101.65±6.34	1.217	0.225
Gestational week (weeks)	24.56±1.54	24.42±1.75	0.546	0.586
Residence			1.027	0.311
Rural	45 (53.57)	37 (45.68)		
Urban	39 (46.43)	44 (54.32)		
Diet preference			1.407	0.236
Light	41 (48.81)	47 (58.02)		
Spicy	43 (51.19)	34 (41.98)		
Systolic pressure (mmHg)	115.23±8.21	115.45±8.34	0.171	0.864
Diastolic pressure (mmHg)	74.12±6.34	75.24±6.49	1.121	0.263
History of hypertension			0.179	0.673
Yes	38 (45.24)	34 (41.98)		
No	46 (54.76)	47 (58.02)		
Drinking history			0.460	0.498
Yes	35 (41.67)	38 (46.91)		
No	49 (58.33)	43 (53.09)		
Smoking history			0.289	0.590
Yes	39 (46.43)	41 (50.62)		
No	45 (53.57)	40 (49.38)		
Disease type			0.755	0.686
Pregnancy induced hypertension syndrome	32 (38.10)	36 (44.44)		
Gestational diabetes mellitus	31 (36.90)	28 (34.57)		
Intrahepatic cholestasis of pregnancy	21 (25.00)	17 (20.99)		

Pad Prism 7 was used to visualize the data in graphs. The counting data were expressed by [n (%)] and compared by chi-square test. When the theoretical frequency was less than 5, chi-square test for continuity correction was used. The measuring data were expressed by mean ± standard deviation (x±sd) and compared by independent-sample t test. The comparison before and after the group adopted paired t test, and the observation and comparison at multiple time points adopted repeated measurement variance analysis. When P<0.05, the difference had statistical significance.

Result

General information

There was no significant difference between the research group and the regular group in general clinical baseline data such as age, body mass index, abdominal circumference, gestational week, residence, dietary preference, systolic blood pressure, diastolic blood pressure, hypertension history, drinking history, smoking history, and disease type (P>0.05). See **Table 1**.

Comparison of T-AI and S-AI scores before and after psychological intervention between two groups of patients

The T-AI and S-AI scores of T1 before psychological intervention were not different between the two groups (P>0.05). We found that the T-AI and S-AI scores of T2, T3 and T4 after psychological intervention were significantly decreased, and the T-AI and S-AI scores in different time periods after psychological intervention in the research group were lower than those in the regular group (P<0.05). See **Figure 1**.

Comparison of EPDS scores between two groups of patients before and after psychological intervention

There was no difference in the EPDS scores of the two groups in T1 before psychological inter-

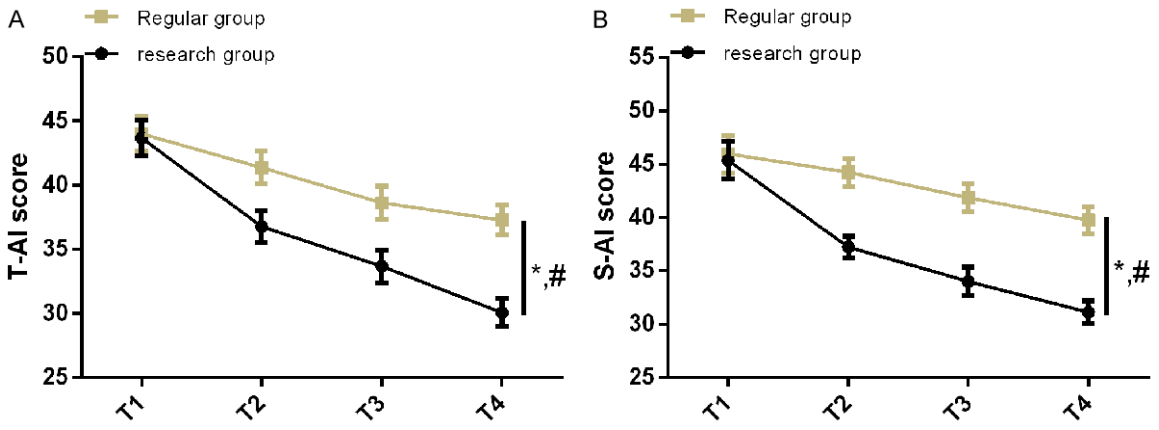

Figure 1. Comparison of T-AI and S-AI scores before and after psychological intervention between the two groups. A: There was no significant difference in T-AI scores between the two groups before the intervention. After the intervention, the T-AI scores of T2, T3 and T4 in the research group were significantly lower than those in the regular group. B: There was no significant difference in S-AI scores between the two groups before the intervention. After the intervention, the T-AI scores of T2, T3 and T4 in the research group were significantly lower than those in the regular group. Note: * compared with before intervention, P<0.05; # compared with the regular group after intervention, P<0.05.

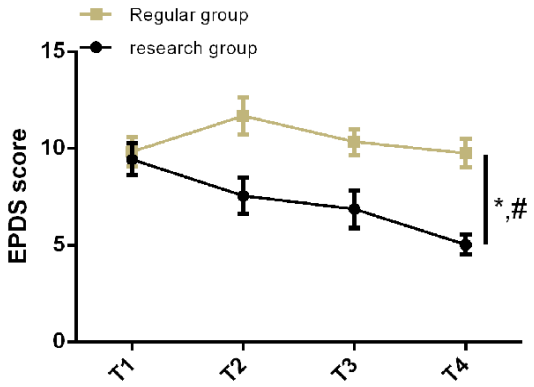

Figure 2. Comparison of EPDS scores between the two groups before and after psychological intervention. There was no significant difference in T-AI scores between the two groups before the intervention. After the intervention, the T-AI scores of T2, T3 and T4 in the research group were significantly lower than those in the regular group. Note: * compared with before intervention, P<0.05; # compared with the regular group after intervention, P<0.05.

vention (P>0.05). Statistical analysis of the EPDS scores of the two groups after psychological intervention showed that the EPDS scores of T2, T3 and T4 in the research group were significantly decreased and lower than those before psychological intervention (P< 0.05), while the EPDS scores of T2, T3 and T4 in the regular group were significantly increased and then decreased (P<0.05) and those in the regular group were significantly higher than those in the research group (P<0.05). See **Figure 2**.

ESCA score after psychological intervention in two groups of patients

After psychological intervention, the ESCA score of the research group was significantly higher than that of the regular group (P<0.05). See **Table 2**.

Adverse pregnancy outcomes after psychological intervention in two groups of patients

Statistical comparison of the total adverse pregnancy outcomes of the two groups after psychological intervention showed that the total adverse pregnancy incidence rate of the patients in the research group was significantly lower than that in the regular group (P<0.05). See **Table 3**.

Incidence of complications after pregnancy in two groups of patients

Complications occurred in both groups after pregnancy. The total incidence rate of complications in the research group (7.14%) was significantly lower than that in the regular group (17.28%) (P<0.05). See **Table 4**.

PSQI score before and after psychological intervention in two groups of patients

There was no significant difference in PSQI score between the two groups before psychological intervention (P>0.05). After statistical

Table 2. ESCA score after psychological intervention in two groups of patients (x±sd)

Group	n	Self-care skills	Self-care responsibility	Self-care concept	Health knowledge level
Research group	84	32.34±5.23	16.34±4.12	23.34±5.23	56.34±5.14
Regular group	81	23.12±5.01	14.56±4.06	19.23±5.15	46.31±4.56
t	-	11.560	2.794	5.084	13.240
P	-	<0.001	0.006	<0.001	<0.001

Table 3. Adverse pregnancy outcomes after psychological intervention in two groups of patients [n (%)]

Category	Research group (n=84)	Regular group (n=81)	χ^2	P
Premature birth	2 (2.38)	5 (6.17)	-	-
Fetal macrosomia	1 (1.19)	3 (3.70)	-	-
Low body mass	1 (1.19)	2 (2.47)	-	-
Postpartum hemorrhage	3 (3.57)	5 (6.17)	-	-
Fetal distress	2 (2.38)	4 (4.94)	-	-
Neonatal asphyxia	0 (0.00)	2 (2.47)	-	-
Total	9 (10.71)	21 (25.93)	6.414	0.011

Table 4. Incidence of complications after pregnancy in two groups of patients [n (%)]

Category	Research group (n=84)	Regular group (n=81)	χ^2 value	*P* value
Anemia	1 (1.19)	3 (3.70)	1.101	0.294
Severe hair loss	1 (1.19)	3 (3.70)	1.101	0.294
Wound infection	1 (1.19)	4 (4.94)	1.971	0.160
Constipation	3 (3.57)	2 (2.47)	0.171	0.679
Shock	0 (0.00)	2 (2.47)	2.100	0.147
Total incidence	6 (7.14)	14 (17.28)	3.981	0.046

Table 5. PSQI score before and after psychological intervention in two groups of patients (x±sd)

Group	n	PSQI score	
		Before intervention	After intervention
Research group	84	12.47±2.23	5.87±0.56
Regular group	81	12.49±2.21	8.34±1.01
t	-	0.058	19.520
P	-	0.954	<0.001

psychological intervention, PSQI score was found to be decreased, and PSQI score in the research group was significantly lower than that in the regular group (P<0.05). See **Table 5**.

Comparison of SF-36 score between two groups of patients after psychological intervention

The quality of life of the patients was evaluated by the SF-36 scale. After nursing, the items in the SF-36 scale in the research group were significantly higher than those in the regular group (P<0.05). See **Table 6**.

Comparison of satisfaction of two groups of patients with intervention methods

The total satisfaction of patients in the research group was significantly higher than that in the regular group (P<0.05). See **Table 7**.

Discussion

High-risk pregnancy refers to pregnancy accompanied by factors that increase the risks of maternal and fetal death and morbidity [17]. Morbidity and mortality of parturient and newborn due to high-risk pregnancy are still increasing, which not only threatens the health of parturient and fetus, but also increases the psychological state of depression and anxiety of family members before and after childbirth [18]. Therefore, determination of the psychological status of pregnant women during pregnancy and psychological counseling and other measures can effectively alleviate the illness [19].

Previous studies have shown that prenatal anxiety and depression have become major public problems in the world and have caused adverse results to mothers and children [20]. Other studies have shown that high-risk pregnant women with prenatal depression have a very high incidence of postpartum depression. Therefore, it is necessary to screen and intervene the depression of pregnant women before delivery [21]. In this study, we applied psychological intervention for the pregnancy outcome of high-risk pregnant

Table 6. Comparison of SF-36 score after psychological intervention between two groups of patients (x±sd)

Category	Research group (n=84)	Regular group (n=81)	t	P
Physiological function	61.34±5.34	54.23±4.23	9.458	<0.001
Role-physical	64.13±5.68	57.12±4.67	8.642	<0.001
Vitality	65.23±5.87	60.32±4.28	6.121	<0.001
Mental health	58.22±5.03	51.15±4.24	9.745	<0.001
Role-emotional	54.67±5.04	51.54±4.21	4.321	<0.001
Bodily pain	62.34±5.12	59.64±4.03	3.755	0.002
Social functioning	69.34±5.23	63.56±4.78	7.402	<0.001

Table 7. Comparison of satisfaction of two groups of patients with intervention methods [n (%)]

Category	Research group (n=84)	Regular group (n=81)	χ^2	P
Satisfaction	56 (66.67)	25 (30.86)	-	-
Moderately satisfied	23 (27.38)	37 (45.68)	-	-
Dissatisfied	5 (5.95)	19 (23.46)	-	-
Satisfaction (%)	79 (94.05)	62 (76.54)	10.171	0.001

patients. Previous studies have shown that psychological intervention for pregnant women can relieve their anxiety, tension and fear, help them build confidence to get through the pregnancy stage before and after surgery, and reduce the occurrence of complications after pregnancy [22]. This study used T-AI, S-AI and EPDS scores to evaluate the anxiety and depression of the two groups of patients at different time points after diagnosis and psychological intervention. The results showed that the T-AI, S-AI and EPDS scores of the patients in the research group after psychological intervention were significantly lower than those in the regular group at 36 weeks of pregnancy, 48 hours after delivery and 1 month after delivery, indicating that psychological intervention for high-risk pregnant patients after diagnosis could effectively improve the psychological status of patients, find the source of patients' pressure, and reduce the occurrence of depression and anxiety before and after delivery. Other studies have shown that postpartum depression and anxiety will also affect the self-care and adjustment ability of pregnant women, and will also have long-term physiological and behavioral effects on future generations [23]. After observing the ESCA scores of the two groups of patients after intervention, it was found that the scores of self-care skills, self-responsibility, self-concept and health knowledge level of the patients after intervention in the research group were significantly higher than those of the regular group, indicating that psychological intervention could improve the psychological status of the patients, the self-care ability of the patients and the cognition of newborn care.

Studies have shown that poor prognosis in obstetrics and newborns is common in high-risk pregnancy cases, and early detection and intervention of high-risk pregnancy can improve the outcomes of pregnant women and newborns [24]. However, the results of this study showed that the total adverse pregnancy rate of the patients in the research group was significantly lower than that in the regular group, indicating that psychological intervention could improve the patients' cognition of the disease and help the patients cooperate with the treatment guidance of medical staff, thus reducing the outcome of adverse pregnancy. In addition, postpartum complications such as anemia and constipation also occurred in this study. We analyzed the incidence of these complications in the two groups of patients and found that the incidence of complications in the research group was significantly lower than that in the regular group, indicating that psychological intervention could effectively reduce the complications caused by the disease and improve the cognition of the patients to the disease. Studies have shown that lack of sleep during pregnancy is a common phenomenon, which is related to other pregnancy complications [25]. It is also shown that insufficient sleep time and poor sleep quality during pregnancy will increase the risk of adverse pregnancy outcomes for parturients. For example, fetal growth will be limited, and postpartum depression will increase [26]. In the study by Hall et al., psychological state and sleep quality control intervention for parturients could reduce their fear and anxiety of childbirth, thus improving pregnancy outcome [27]. Other studies have shown that improving the sleep quality of pregnant women at an early stage is crucial to the optimal quality of life

related to maternal health in the advanced stage [28].

The results of this study showed that the PSQI score of the patients in the research group after intervention was significantly lower than that in the regular group, which indicated that psychological intervention could reduce the patients' fear of disease, reduce psychological pressure and promote sleep quality. Many studies have shown that the quality of life score is an evaluation of the patient's physical recovery after treatment. However, there is often a great impact on the quality of life of most parturients after delivery [29, 30]. In this study, the quality of life score of patients in the research group after intervention was significantly higher than that in the conventional group, which indicated that psychological intervention could improve the quality of life of patients after delivery. Finally, we compared the satisfaction of the two groups of patients with this intervention and found that the satisfaction score of the patients in the research group after psychological intervention was significantly higher than that in the regular group, indicating that psychological intervention could bring better production experience to the patients.

To sum up, psychological intervention for patients with high-risk pregnancy can improve the pregnancy outcome of patients, reduce the occurrence of postpartum complications, promote the sleep quality of patients, and improve the self-management ability and quality of life of patients. However, there is still room for improvement in this study. For example, we can analyze the risk factors that affect the adverse pregnancy outcomes of high-risk pregnancy patients or the complications of parturients and newborns, which will help nurses to identify the risk factors requiring additional attention. In the future, we will conduct this supplementary research gradually.

Disclosure of conflict of interest

None.

Address correspondence to: Jianying Yan, Department of Obstetrics, Fujian Maternity and Child Health Hospital, Affiliated Hospital of Fujian Medical University, No. 18, Daoshan Road, Gulou District, Fuzhou, Fujian Province, People's Republic of China. Tel: +86-0591-87527674; E-mail: yanjy2019@fjmu.edu.cn

References

[1] da Silva KDL, Fernandes FEM, de Lima Pessoa T, Lima SIVC, Oliveira AG and Martins RR. Prevalence and profile of adverse drug reactions in high-risk pregnancy: a cohort study. BMC Pregnancy Childbirth 2019; 19: 199.

[2] Hajikhani NA PhD candidate, Ozgoli G PhD, Pourebrahim T PhD, Mehrabi Y PhD, Abollmaali K PhD, Mohammadi F PhD and Saei Ghare Naz M PhD candidate. Development and psychometric evaluation of the men's worry about their wives' high risk pregnancy questionnaire. Int J Community Based Nurs Midwifery 2018; 6: 186-196.

[3] Peng YF, Su XH, Han MM, Zhu XY and Li L. Serum uric acid and high-risk pregnancy: an intriguing correlation in advanced pregnant women. Ann Transl Med 2018; 6: 451.

[4] Zhu XH, Tao J, Jiang LY and Zhang ZF. Role of usual healthcare combined with telemedicine in the management of high-risk pregnancy in Hangzhou, China. J Healthc Eng 2019; 2019: 3815857.

[5] Mohamamdirizi S, Mohamadirizi M and Mohamadirizi S. The comparison of fear of childbirth and sense of coherence among low-risk and high-risk pregnancy women. J Educ Health Promot 2018; 7: 143.

[6] Fenwick J, Toohill J, Gamble J, Creedy DK, Buist A, Turkstra E, Sneddon A, Scuffham PA and Ryding EL. Effects of a midwife psycho-education intervention to reduce childbirth fear on women's birth outcomes and postpartum psychological wellbeing. BMC Pregnancy Childbirth 2015; 15: 284.

[7] Dogba MJ, Dossa AR, Breton E and Gandonou-Migan R. Using information and communication technologies to involve patients and the public in health education in rural and remote areas: a scoping review. BMC Health Serv Res 2019; 19: 128.

[8] van der Borg WE, Schipper K and Abma TA. Protocol of a mixed method, randomized controlled study to assess the efficacy of a psychosocial intervention to reduce fatigue in patients with End-Stage Renal Disease (ESRD). BMC Nephrol 2016; 17: 73.

[9] Mohammadi MM and Parandin S. Effect of the combination of Benson's relaxation technique and brief psychoeducational intervention on multidimensional pain and negative psychological symptoms of pregnant women: a randomized controlled trial. J Educ Health Promot 2019; 8: 91.

[10] Matvienko-Sikar K and Dockray S. Effects of a novel positive psychological intervention on prenatal stress and well-being: a pilot randomised controlled trial. Women Birth 2017; 30: e111-e118.

[11] Nagar T, Sharma D, Choudhary M, Khoiwal S, Nagar RP and Pandita A. The role of uterine and umbilical arterial doppler in high-risk pregnancy: a prospective observational study from India. Clin Med Insights Reprod Health 2015; 9: 1-5.
[12] Xi L, Cao F, Xiong W, He F and Zhang L. The impact of allergic rhinitis on state-trait anxiety. Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi 2014; 49: 828-831.
[13] Khanlari S, Eastwood J, Barnett B, Naz S and Ogbo FA. Psychosocial and obstetric determinants of women signalling distress during Edinburgh Postnatal Depression Scale (EPDS) screening in Sydney, Australia. BMC Pregnancy Childbirth 2019; 19: 407.
[14] Farah NM, Saw Yee T and Mohd Rasdi HF. Self-reported sleep quality using the malay version of the pittsburgh sleep quality index (PSQI-M) in malaysian adults. Int J Environ Res Public Health 2019; 16: 4750.
[15] Bag E and Mollaoglu M. The evaluation of self-care and self-efficacy in patients undergoing hemodialysis. J Eval Clin Pract 2010; 16: 605-610.
[16] Langley RGB, Reich K, Strand V, Feldman SR, Paul C, Gordon K, Warren RB, Toth D, Nikai E, Zhu B, Goldblum O, Edson-Heredia E, Carlier H, Burge R, Lin CY, Hollister K and Augustin M. Ixekizumab treatment and the impact on SF-36: results from three pivotal phase III randomised controlled trials in patients with moderate-to-severe plaque psoriasis. Qual Life Res 2020; 29: 369-380.
[17] Afrasiabi N, Mohagheghi P, Kalani M, Mohades G and Farahani Z. The effect of high risk pregnancy on duration of neonatal stay in neonatal intensive care unit. Iran J Pediatr 2014; 24: 423-428.
[18] Dollberg DG, Rozenfeld T and Kupfermincz M. Early parental adaptation, prenatal distress, and high-risk pregnancy. J Pediatr Psychol 2016; 41: 915-929.
[19] Tomfohr-Madsen LM, Campbell TS, Giesbrecht GF, Letourneau NL, Carlson LE, Madsen JW and Dimidjian S. Mindfulness-based cognitive therapy for psychological distress in pregnancy: study protocol for a randomized controlled trial. Trials 2016; 17: 498.
[20] Ma X, Wang Y, Hu H, Tao XG, Zhang Y and Shi H. The impact of resilience on prenatal anxiety and depression among pregnant women in Shanghai. J Affect Disord 2019; 250: 57-64.
[21] Zhao Y, Munro-Kramer ML, Shi S, Wang J and Zhao Q. Effects of antenatal depression screening and intervention among Chinese high-risk pregnant women with medically defined complications: a randomized controlled trial. Early Interv Psychiatry 2019; 13: 1090-1098.
[22] Kang CM. Effects of psychological intervention and relevant influence factors on pregnant women undergoing interventional prenatal diagnosis. J Chin Med Assoc 2020; 83: 202-205.
[23] Nephew BC, Carini LM, Sallah S, Cotino C, Alyamani RAS, Pittet F, Bradburn S and Murgatroyd C. Intergenerational accumulation of impairments in maternal behavior following postnatal social stress. Psychoneuroendocrinology 2017; 82: 98-106.
[24] Majella MG, Sarveswaran G, Krishnamoorthy Y, Sivaranjini K, Arikrishnan K and Kumar SG. A longitudinal study on high risk pregnancy and its outcome among antenatal women attending rural primary health centre in Puducherry, South India. J Educ Health Promot 2019; 8: 12.
[25] Hawkins M, Marcus B, Pekow P, Rosal MC, Tucker KL, Spencer RMC and Chasan-Taber L. Physical activity and sleep quality and duration during pregnancy among hispanic women: estudio PARTO. Behav Sleep Med 2019; 17: 804-817.
[26] Xu X, Liu D, Zhang Z, Sharma M and Zhao Y. Sleep duration and quality in pregnant women: a cross-sectional survey in China. Int J Environ Res Public Health 2017; 14: 817.
[27] Hall WA, Stoll K, Hutton EK and Brown H. A prospective study of effects of psychological factors and sleep on obstetric interventions, mode of birth, and neonatal outcomes among low-risk British Columbian women. BMC Pregnancy Childbirth 2012; 12: 78.
[28] Tsai SY, Lee PL, Lin JW and Lee CN. Cross-sectional and longitudinal associations between sleep and health-related quality of life in pregnant women: a prospective observational study. Int J Nurs Stud 2016; 56: 45-53.
[29] van den Bosch AAS, Goossens M, Bonouvrié K, Winkens B, Nijhuis JG, Roumen FJME and Wassen MMLH. Maternal quality of life in routine labor epidural analgesia versus labor analgesia on request: results of a randomized trial. Qual Life Res 2018; 27: 2027-2033.
[30] Saadati F, Sehhatiei Shafaei F and Mirghafourvand M. Sleep quality and its relationship with quality of life among high-risk pregnant women (gestational diabetes and hypertension). J Matern Fetal Neonatal Med 2018; 31: 150-157.