

EFFECTS OF HEALTH EDUCATION BASED ON OMAHA SYSTEM ON ANXIETY, DEPRESSION AND SELF-MANAGEMENT ABILITY OF PRIMIPARA

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SUMMARY

Background: Primiparas are prone to tension, anxiety, depression and other emotions due to their lack of experience related to delivery and fear of the unknown during pregnancy. Meanwhile, their self-management ability decreases because of their failure to immediately adapt to the transformation of their roles in a short time. A nursing model was constructed in this study based on the combination of the Omaha System with PBL health education to examine the effect of this model on the anxiety, depression, quality of life and self-management ability of primiparas.

Subjects and methods: From January to December 2020, 170 primiparas were recruited as volunteers in this study by means of voluntary registration. They were randomly divided into the observation group and the control group, with 85 members in each group. The intervention lasted 6 weeks. SDS, SAS, WHOQOL-BREF scale and ESCA scale were used to compare the scores of the two groups before and after the intervention.

Results: (1) After the intervention, the changes of the observation group in self-management ability and its four dimensions are higher than those of the control group, with the differences being statistically significant ($P < 0.05$). (2) After the intervention, the changes of the observation group in quality of life and its four dimensions are higher than those of the control group, with the differences being statistically significant ($P < 0.05$). (3) The changes of the observation group in anxiety and depression are higher than those of the control group. Specifically, the change of the observation group in anxiety before and after the intervention is 6.40 ± 5.61 , in comparison with 2.67 ± 3.71 in the control group; the change of the observation group in depression before and after the intervention is 9.07 ± 8.42 , in comparison with 3.19 ± 7.06 in the control group.

Conclusion: the new nursing method proposed in this study effectively improves the self-management ability and quality of life of primiparas, significantly reduces their anxiety and depression, has a high application value in obstetric nursing and also provides a new idea for the implementation of scientific and efficient nursing for primiparas.

Key words: The Omaha System - health education – primiparas - anxiety and depression

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INTRODUCTION

Pregnancy is a special physiological stage throughout a woman's life. During this period, the woman would experience significant physiological changes and psychological stress, probably thereby suffering physical and psychological harm (Coll et al. 2017) and subsequently having emotional problems such as anxiety and depression (Melo & Arzeno 2016). Noticeably, depression is the most common mental illness arising from pregnancy (Ayele et al. 2016). It has been found that nearly 20-30% of pregnant women suffer from depression (Mossie et al. 2017). Female depression mostly occurs during pregnancy and postpartum, especially postpartum. Postpartum depression refers to a mix of a series of depressive symptoms in a pregnant woman during the stage of puerperium. Its clinical manifestations include downbeat mood, reduced interest, poor appetite, tension and paranoia. Some pregnant women with serious symptoms may even commit suicide and infanticide (Lu et al. 2020). Obviously, postpartum depression not only undermines

the physical and mental health of pregnant women, but also poses a great threat to their infants and families. As revealed in a research, postpartum depression has an incidence rate of 10-20%, generally occurring within the first 2 weeks postpartum and gradually worsening in the 4th-6th weeks postpartum (Woody et al. 2017). Those patients whose postpartum depression lasts 6 months or longer account for 25-50% of the total number of patients with postpartum depression (Ye et al. 2016). Apart from depression, anxiety is also one of the most universal adverse psychological reactions in pregnant women. Relevant statistical data shows that the incidence of anxiety in pregnant women is 20-60% (Shi et al. 2019). Depression and anxiety symptoms always coexist (Sartorius et al. 1996) and boost each other over time (McElroy et al. 2018). Anxiety during pregnancy predicts the occurrence of postpartum depression, while prenatal depression also predicts the incidence of postpartum anxiety (Skouteris et al. 2009). Compared with multiparae, primiparas have no experience related to delivery, are afraid of the unknown during pregnancy, and are prone to tension,

anxiety, depression and other negative emotions (Nakamura et al. 2020). Their postpartum self-efficacy is extremely low because they generally fail to immediately adapt to their new role within a short time. Meanwhile, the decrease of their self-efficacy may also lead to a decline in their self-management ability. According to relevant reports, those with suicidal tendency account for 3.8% of all the patients with postpartum depression, of which 1.1% belong to the group with high risk of suicide. Hence, it is particularly important to choose feasible and efficient nursing measures to minimize or eliminate postpartum depression (Zhao & Jing 2019).

At present, most nurses in China have to engage in busy nursing work due to the serious shortage of front-line clinical nurses. Due to the absence of a scientific nursing thinking model of applying nursing procedures in clinical work under this context, clinical nurses, in the process of implementing nursing procedures, cannot make appropriate nursing diagnosis in response to the problems appearing in patients. As a simplified nursing procedure, the Omaha System puts forward nursing problems according to the symptoms and signs of patients, and then provides a guide through the intervention system for nurses to formulate nursing measures. In this way, it can help nurses make correct nursing diagnosis, highly enhancing the pertinence of the nursing plan and the accuracy of the nursing measures implemented. The Omaha System (OS) is on the list of the 12 nursing standardization languages recognized by the American Nurses Association (ANA), and consist of three parts, including the problem classification system, the intervention classification system and the effect evaluation system (Maxim et al. 2014). It can comprehensively evaluate patients' condition and nursing intervention, quantifies nursing problems and intervention effects, and thus effectively guides clinical nursing practice. In a study where the Omaha System was applied to 41 hospitalized patients with chronic obstructive pulmonary disease, a total of 268 nursing problems were found, with each patient having 6.54 nursing problems on average. These results indicate that in the process of nursing hospitalized patients with chronic obstructive pulmonary disease, the application of the Omaha System contributes to the discovery of multiple complex nursing problems other than those related to the respiratory system, gives operation guidelines for nurses to master the occurrence law of nursing problems during hospitalization, and also establishes the foundation for providing patients with satisfactory high-quality nursing (Xiao 2018). Beňová et al. used the Omaha System in patients with chronic gastrointestinal diseases to intervene in them from four aspects, including environment, psychology, physiology, and health. After comparing the initial results to the final results, there was significant improvement in the knowledge and health condition regarding individual problems.

Accordingly, the Omaha System can effectively improve the health status of patients with chronic diseases and play a positive role both in the continuous improvement of nursing quality and the supervision of clinical work (Beňová et al. 2016). It was claimed that the Omaha System can record the implementation details of clinical intervention, including what happened, when and where it happened, the cause of its occurrence, and all aspects of patients, so that researchers can quickly identify the complex nursing problems of patients (Martin et al. 2011). Although the Omaha System has been partially adopted in the field of nursing in China, Chinese nursing workers have neither widely recognized and utilized relevant research findings nor frequently engaged in practical applications, which is not conducive to the development of nursing work and the progress of the nursing discipline. Therefore, it is of great significance to apply the Omaha System to primiparas during their pregnancy.

Health education aims to establish correct health concepts in patients. When it comes to obstetric nursing, the widely used health education methods are oral education, classroom intended for pregnant women, and personalized health education. However, the single model of health education and rich contents of health education usually prevent pregnant women from remembering or taking the initiative. This type of unidirectional and non-targeted knowledge transfer does not reinforce the compliance of pregnant women, so that it is not conducive to postpartum rehabilitation (Wang 2019). PBL health education (PBL: Problem-Based Learning) is a heuristic education model oriented to diseases, targeting patients, guided by nurses, and constructed with all learning contents conveyed in the form of problems. Specifically, PBL health education is advantageously featured with high pertinence, full consideration of the real needs and individualized interests of patients in terms of content and form, mobilization of patients' awareness to take active participation and elimination of patients' psychological resistance (Su 2016). Although it has been shown in previous studies that PBL health education has a certain effect on the negative psychology of primiparas, little academic attention has been paid to implementation of PBL health education for primiparas based on the Omaha nursing model.

Therefore, PBL pregnancy health education was applied based on the Omaha System in this study, with the focus on problem-solving and the mobilization of patients' active participation. Medical workers were asked to provide targeted relevant knowledge and skill support for primiparas. The objective is to investigate the impact of this new health education model on the depression, anxiety and self-management ability primiparas, in order to provide a new perspective for obstetric nursing health education and offer useful reference for the nursing of other diseases.

SUBJECTS AND METHODS

Participants

170 primiparas from Yan'an Hospital of Kunming City, The Second People's Hospital Of Yunnan Province, Yunnan Province, China were included as the participants of this study by means of voluntary registration from January to December 2020. Inclusion criteria:

- those aged below 35 years old;
- primiparas;
- those who began to seek consultation and examination in this hospital after 3 months of pregnancy;
- those with normal results of pelvic measurement and fetal position examination;
- those who planned to deliver in this hospital;
- those who were informed of the study and willing to sign the informed consent of the study;
- the study met relevant standards approved by the ethics committee.

Exclusion criteria:

- those with multiple pregnancy;
- those with severe hearing, vision or communication impairment;
- those with intellectual or mental diseases;
- those with severe physical diseases;
- those with severe pregnancy complications;
- those suffered depression and anxiety in the first 3 months of pregnancy as a result of other major life events.

The participants were randomly divided into the control group and the observation group, with 85 members in each group. As shown in Table 1, there is no significant difference between the two groups in age, gestational weeks, relationship with family member, education level and family economic level ($P>0.05$), which means that they are comparable. Before this study, the purpose, main operation methods and precautions of this study were explained to all the participants and their guardians. All the scales were filled in anonymously. This study has been reviewed and approved by the medical ethics committee of the hospital, with the informed consent from the participants and their families.

Methods

The control group was given routine intervention and health education: during hospitalization, the participants were given routine intervention such as admission introduction, ward environment, pregnancy health care and monitoring, provided with the pregnancy knowledge manual uniformly compiled by the hospital, exposed to health education pregnancy knowledge through ward bulletin board and video broadcast, and given necessary psychological support. In addition to accepting

the same routine intervention and health education available in the control group, the observation group was given pregnancy nursing based on the combination of the Omaha System nursing model and PBL health education. The intervention lasted 6 weeks. The specific methods are as follows:

Problem classification system

After the primipara was admitted to the hospital, she was asked to give information about her delivery, mood, parenting and family situation. A detailed evaluation of her nursing problems was conducted according to the problem classification table in the Omaha System nursing model, to summarize the current problems of the primipara from four aspects: health, physiology, psychology and environment. In view of the summarized problems, relevant nursing improvement measures were searched, selected, and sorted out to formulate an overall nursing intervention scheme.

Intervention system

It could be divided into cognitive intervention, psychological intervention and family & social support.

- *Cognitive intervention*: A Wechat group or QQ group was established for primiparas, where knowledge regarding self-care and emotional disorders during pregnancy was regularly delivered every day, to inform them of the important role of positive mood during pregnancy in postpartum rehabilitation. In addition to the sharing of some short videos and image materials about skills and precautions in postpartum care and neonatal feeding in the QQ group, timely responses were given to relevant questions raised by each primipara. These efforts were expected to enrich their understanding of postpartum emotional disorders, improve their ability of self-care and neonatal feeding, enable them to calmly solve many problems encountered in postpartum life, and help them maintain peace of mind.
- *Psychological intervention*: efforts were made to identify the psychological state of primiparas through online chat, perceive their anxiety, depression and other negative emotions in time, understand the causes of their negative emotions, use positive wordings to comfort them, encourage them to talk about their unhappiness or confusion, give appropriate suggestions according to the causes of their negative emotions, and guide them to relieve negative emotions through listening to soothing music, taking a deep breath or reading favorite books.
- *Family & social support*: Nursing workers were required to effectively convey the harm of negative mood in primiparas to their husband, parents and other family members, emphasize the importance of family and social support for the mood of primiparas, and ask their family members to do a good job in relevant cooperation and bring primiparas positive psychological support through spending more time to accompany and care them in daily life, sharing the

responsibility of newborn feeding, and taking the initiative to deal with family affairs, so that primiparas can have a harmonious and loving family environment. In addition, primiparas were also guided to have more communication with other primiparas in the same period, talk to each other, release psychological their pressure, exchange parenting experience, and seek a sense of group belonging and external identity.

Evaluation system

Nursing workers evaluated the effectiveness of the implemented intervention scheme every week through online video call and telephone follow-up, find out deficiencies, adjust the intervention methods and perfect the nursing scheme.

The intervention lasted 6 weeks. In particular, questionnaire survey was used to investigate the problems of primiparas and their corresponding needs respectively before the intervention and in the third week of the intervention. Then, related problems were evaluated and summarized to finally form a comprehensive and detailed PBL question database. Nursing workers carried out PBL health education in class in response to the collected problems, about 1h each time. Targeted health education was delivered in combination with the evaluated differences of primiparas in their personality, acceptance ability and needs. During the implementation of nursing measures in this study, nursing workers actively communicated with primiparas to trace their mastery of health knowledge, carried out key education when necessary, and organized family members to learn together till primiparas grasped relevant knowledge, timely encouraged primiparas to take active participation and mobilized their initiative as much as possible. Effects were measured through the following scales, including Self-rating Anxiety Scale (SAS) (Zung 1971) and Self-rating Depression Scale (SDS) (Zung 1965) used to analyze the mental health status of all patients before the intervention (during enrollment) and after the intervention (before delivery), Evaluation of Self-care Ability (ESCA) (Kearney & Fleischer 1979, Wang et al. 2014) Scale used to evaluate and compare the self-management ability of patients, and WHOQOL-BREF Scale (Wang & Wang 2013) used to evaluate the quality of life of patients.

Measuring Tools

Self-rating Anxiety Scale (SAS) (Zung 1971)

The patients were asked to have a self-rating of their anxiety before and after the intervention according to the SAS rating standard. This scale compiled by Zung has been widely used in the clinical diagnosis and treatment of diseases such as diseases in the nervous system, and has turned out to have high reliability and validity. The scale contains 20 items, with each item being scored at 4 levels. 1 point means no or occasional; 2 points means sometimes; 3 points means frequent; 4

points means always. The final score is the sum of the scores of the 20 items multiplied by 1.25. A higher score suggests that the symptoms are more serious. The score < 50 points represent no anxiety; 50-59 represents mild anxiety; 60-69 represents moderate anxiety; the score >69 points represents severe anxiety.

Self-rating Depression Scale (SDS) (Zung 1965)

The patients were asked to have a self-rating of their depression before and after the intervention according to the SDS rating standard. The rating method is the same as that of SAS. The final score is the sum of the scores of the 20 items multiplied by 1.25. A higher score suggests that the symptoms are more serious. The score < 50 points represent no depression; 50-59 represents mild depression; 60-69 represents moderate depression; the score > 69 points represents severe depression.

WHOQOL-BREF Scale (Wang & Wang 2013)

It is one of the effective simplified forms used to conduct clinical evaluation of patients' quality of life, with high reliability and validity. This scale can evaluate pregnant women from various aspects, including psychological state, physiological state, environment and social relations, with each aspect being converted into a percentage. A higher score suggests that the patient has better quality of life.

Evaluation of Self-care Ability (ESCA) Scale

ESCA was designed and developed by American scholars Kearney and Fleischer (Kearney & Fleischer 1979) in 1979 according to Orem's Self-care Theory. The scale contains 43 items in four dimensions, namely, self-care skills, self-care responsibility, self-concept and health knowledge level. Thereafter, Wang et al. (Wang et al. 2014) tested the reliability and validity of the scale and concluded that the Chinese version of ESCA has good reliability and validity since its Cranach's α coefficient is 0.88 and its test-retest reliability is 0.62. This scale was adopted herein to value the self-care ability of the patients before and after the six-week intervention. The scale has 43 items in total in four dimensions: self-concept, health knowledge level, self-care responsibility and self-care skills. It has a total score of 172, with each item scored from 0 and 4. A higher score indicates that the self-care ability is higher.

Statistical Analysis

The data were analyzed with SPSS19.0 statistical software. The quantitative data in line with normal distribution were expressed as mean \pm standard deviation. The comparison between two groups of data was conducted using independent sample t-test (comparison between groups) or paired t-test (comparison before and after intervention). The qualitative data were expressed as number of cases. The comparison between two groups of ordered classified data was conducted using Wilcoxon rank sum test, with $P < 0.05$ being statistically significant.

RESULTS

Demographic data

170 participants (volunteers) were included in the study and randomly divided into the control group and the observation group, with 85 members in each group. A total of 164 participants finally completed the intervention and follow-up, including 81 in the observation group (4 lost in follow-up) and 83 in the control group (2 lost in follow-up). As shown in Table 1, there is no significant difference between the two groups in age, gestational weeks, relationship with family members, education level and family economic level ($P>0.05$), indicating that they are comparable.

Comparison between the two groups in change in self-management ability before and after intervention

It can be seen from table 2 that there is no significant difference between the observation group and the control group in self-management ability and its four dimensions before the intervention ($P>0.05$). After the intervention, there are increases in both groups, with the differences with the levels before the intervention being statistically significant ($P<0.001$). From the changes of the two groups before and after the intervention, the changes of the observation group in self-management ability and its four dimensions are greater than those of the control group, with the differences being statistically significant ($P<0.05$), suggesting better intervention effects on the observation group than the control group.

Comparison between the two groups in change in quality of life before and after intervention

It can be seen from table 3 that there is no significant difference between the observation group and the control group in quality of life and its four dimensions before the intervention ($P>0.05$). After the intervention, there are increases in both groups, with the differences with the levels before the intervention being statistically significant ($P<0.001$). From the changes of the two groups before and after the intervention, the changes of the observation group in quality of life and its four dimensions are greater than those of the control group, with the differences being statistically significant ($P<0.05$), suggesting better intervention effects on the observation group than the control group.

Comparison between the two groups in changes in anxiety and depression before and after intervention

It can be seen from table 4 that there is no significant difference between the observation group and the control group in anxiety and depression before the intervention ($P>0.05$). After the intervention, there are decreases in the anxiety and depression scores of both groups, with the differences with the levels before the intervention being statistically significant ($P<0.001$). From the changes of the two groups before and after the intervention, the changes of the observation group in anxiety and depression scores are greater than those of the control group, with the differences being statistically significant ($P<0.05$), suggesting better intervention effects on the observation group than the control group.

Table 1. Comparison of demographic data between the observation group and the control group

	Observation group (n=81)	Control group (n=83)	Statistical value	P
Age	27.10±3.62	26.92±4.42	t=0.290	0.772
Gestational weeks				
28 weeks	22	27	Z=0.969	0.333
29 weeks	25	27		
30 weeks	34	29		
Relationship with family members				
Very good	19	23	Z=0.698	0.485
Good	23	25		
General	20	17		
Bad	12	11		
Very bad	7	7		
Education level				
Junior school or below	12	13	Z=0.333	0.739
High or technical school	14	12		
technical college	19	17		
Undergraduate	23	28		
Master degree or above	13	13		
Family economic level				
Very good	18	19	Z=0.372	0.710
Good	20	25		
General	23	19		
Bad	14	12		
Very bad	6	8		

Table 2. Comparison between the two groups in change in self-management ability before and after intervention

Index Group	Before intervention	After intervention	Difference before and after intervention	P value of inter-group comparison
Health knowledge level				
Experimental group (n=83)	31.7±7.56	42.9±8.01	11.2±3.4	<0.001
Control group (n=83)	31.81±6.35	38.77±7.37	6.96±3.88	<0.001
t	0.095	3.436	7.427	
P	0.924	0.001	<0.001	
Self responsibility				
Experimental group (n=83)	18.35±5.61	24.17±5.94	5.83±2.44	<0.001
Control group (n=83)	18.01±5.26	21.45±5.46	3.43±1.42	<0.001
t	0.393	3.062	7.698	
P	0.695	0.003	<0.001	
Self-nursing skills				
Experimental group (n=83)	28.52±7.78	37.64±7.94	9.12±3.58	<0.001
Control group (n=83)	27.9±8.75	30.76±8.76	2.86±2.57	<0.001
t	0.475	5.269	12.895	
P	0.635	<0.001	<0.001	
Self-concept				
Experimental group (n=83)	18.79±7.67	26.53±6.92	7.74±3.5	<0.001
Control group (n=83)	18.99±9.1	21.81±8.65	2.82±2.56	<0.001
t	0.150	3.857	10.294	
P	0.881	<0.001	<0.001	

Table 3. Comparison between the two groups in change in quality of life before and after intervention

Index Group	Before intervention	After intervention	Difference before and after intervention	P value of inter-group comparison
Psychological state				
Experimental group (n=83)	56.49±7.99	66.15±8.42	9.65±2.52	<0.001
Control group (n=83)	56.08±8.37	62.17±8.46	6.08±2.63	<0.001
t	0.320	3.019	8.866	
P	0.749	0.003	<0.001	
Physiological state				
Experimental group (n=83)	50.54±8.12	60.25±7.83	9.70±4.01	<0.001
Control group (n=83)	50.02±8.13	55.34±8.18	5.31±5.01	<0.001
t	0.409	3.926	6.183	
P	0.683	<0.001	<0.001	
Environment				
Experimental group (n=83)	51.89±8.31	61.36±8.41	9.47±2.89	<0.001
Control group (n=83)	50.96±8.39	56.28±8.32	5.31±2.58	<0.001
t	0.709	3.888	9.720	
P	0.479	<0.001	<0.001	
Social relations				
Experimental group (n=83)	61.17±8.23	75.22±8.2	14.12±2.72	<0.001
Control group (n=83)	61.19±8.45	68.01±8.38	6.82±2.62	<0.001
t	0.015	5.552	17.514	
P	0.988	<0.001	<0.001	

Table 4. Comparison between the two groups in changes in anxiety and depression before and after intervention

Index Group	Before intervention	After intervention	Difference before and after intervention	P value of inter-group comparison
Anxiety				
Experimental group (n=83)	58.90±8.37	52.51±9.91	6.40±5.61	<0.001
Control group (n=83)	59.08±8.02	56.41±8.79	2.67±3.71	<0.001
t	0.143	2.671	5.021	
P	0.886	0.008	<0.001	
Depression				
Experimental group (n=83)	58.90±8.37	52.51±9.91	6.40±5.61	<0.001
Control group (n=83)	59.08±8.02	56.41±8.79	2.67±3.71	<0.001
t	0.143	2.671	5.021	
P	0.886	0.008	<0.001	

DISCUSSION

In recent years, the increasing incidence of postpartum depression and anxiety has a great adverse impact on pregnant women's physical and mental health, neonatal development, families and even society (Lu et al. 2020). Hence, it is pressing to monitor and prevent postpartum anxiety and depression. Although pregnancy and delivery are a natural biological process, it is actually a stress event for pregnant women, especially primiparas. Due to lack of delivery-related experience, primiparas are more likely to adopt negative coping styles to face this stress event (Li et al. 2021). It has been demonstrated that negative coping styles such as self-blame, evasion and giving up are not conducive to the treatment of health problems in primiparas, and their negative and pessimistic attitude towards the future easily leads to the occurrence of negative emotions such as anxiety and depression (Seda & Erker 2021). Therefore, it is of great significance to choose effective nursing measures to alleviate the anxiety and depression of primiparas and improve their self-care ability and quality of life.

According to the results of this study, there is no significant difference between the observation group and the control group in anxiety and depression before the intervention. After a period of intervention, there are significant decreases in the anxiety and depression levels of the two groups, but the changes of the observation group in anxiety and depression scores are significantly greater than those of the control group. This result indicates that compared with routine pregnancy health education, PBL pregnancy health education based on the Omaha System adopted in this study has better intervention effects on the anxiety and depression of primiparas. This result is consistent with the previous research result that PBL pregnancy health education can effectively reduce postpartum depression and anxiety (Qiu et al. 2017).

There are mainly the following reasons why the health education model constructed in this study can relieve the anxiety and depression of primiparas in the observation group: on the one hand, PBL health education intervention reduces the fear in primiparas caused by their lack of delivery experience through helping them master relevant knowledge during pregnancy, enhance their sense of self-control and self-efficacy, and thereby improve their sensitivity to positive emotions (Mesurado et al. 2018). On the other hand, PBL health education, which is problem-oriented and patient-centered, provides pregnant women with psychological counseling, eases their psychological burden and alleviates their negative emotions such as anxiety and depression (Zhang et al. 2017). In this study, the existing problems in primiparas were classified and summarized from the four aspects including health, physiology, psychology and environment according to the Omaha System. On this basis, relevant nursing improvement measures were searched, selected and sorted out to formulate a system-

atic nursing intervention scheme. Then, health education intervention was carried out to increase pregnant women's understanding of postpartum emotional disorders and boost their ability of self-care and neonatal feeding. Upon timely identification of their negative emotions, guidance, counseling and mitigation programs were given instantly to effectively prevent genitive emotions in primiparas, help them maintain a happy mood and assist them to calmly deal with postpartum rehabilitation and neonatal feeding. Continuous efforts were made to improve and enrich nursing measures, with the aim to reduce anxiety and depression in primiparas.

Self-management refers to the ability of pregnant women to consciously control and supervise their thoughts and behaviors by relying on their own subjective initiative. This kind of self-monitoring allows pregnant women to maintain their own health and reinforce their adaptability. In this sense, it is a self-monitoring behavior that can improve clinical results and reduce treatment costs (Soleiman et al. 2015). As shown in the results of this study, there is no significant difference between the observation group and the control group in self-management ability before the intervention. After a period of intervention (an unknown specific duration of intervention), there are significant increases in the self-management ability of primiparas in both groups, but the changes of the observation group in self-management ability and its four dimensions are significantly higher than those of the control group. This result suggests that compared with PBL health education, which has been found in some studies to be effective in improving the self-management ability of primiparas, PBL health education based on the Omaha System performs better in improving the self-management ability of primiparas (He & Mu 2019).

According to previous studies, conventional health education is not targeted, but mostly focuses on unilateral knowledge transfer. Primiparas passively accept education, but have no way to solve their own problems and doubts, which is not conducive to health promotion during pregnancy and make it impossible to achieve "patient-centered" education in the process of implementation. Moreover, the rigid model of health education exacerbates the difficulty for patients to understand and cooperate (Yao et al. 2018). The PBL health education model proposed in this study can be "patient-centered" since it is a problem-oriented teaching model. Health education is carried out through medical workers' interaction with primiparas after helping them clarify their own problems, thus alleviating their psychological burden, enhancing their confidence, and increasing their self-management ability (Aydemir & Onan 2015). Secondly, this study was conducted based on the Omaha System. According to some relevant surveys, most primiparas do not know much about their own diseases and treatments. Through the Omaha System, a comprehensive nursing practice and classification system, it is possible to not only instruct primiparas with pregnancy-related knowledge, but also aim to solve their

specific problems in accordance with their actual situation. On the basis of enhancing their sense of participation, primiparas can be guided to actively think about themselves and have the participation of their family members or caregivers. In the whole delivery process, scientific knowledge and practical solutions are provided for primiparas to handle specific problems such as diet, cleaning, puerperal maintenance and newborn feeding. They are encouraged to acquire the ability to solve problems, give full play to their subjective initiative, and then improve their self-management ability. Besides, under this primipara-centered health education model, primiparas may perceive more social support. It has been found in some studies the perception of more social support can effectively improve the self-management ability of primiparas to a certain extent (Li et al. 2015).

According to the results of this study, there is no significant difference between the observation group and the control group in quality of life before the intervention. After a period of intervention, there are increases in the quality of life of primiparas in both groups, but the changes of the observation group in quality of life and its four dimensions are significantly higher than those of the control group. This indicates that compared with routine pregnancy health education, PBL pregnancy health education based on the Omaha System has a better intervention effect on the quality of life of primiparas. This result is consistent with the previous research result that PBL health education can improve the quality of life of primiparas (Chen et al. 2019, Chen et al. 2020). Noticeably, Chen et al. (2019) intervened in primiparas through PBL health education, finding that their score in social relations, a dimension of quality of life, was 74.24 ± 7.19 . In contrast, this score reached 75.22 ± 8.2 in this study of PBL health based on Omaha System, suggesting a more satisfactory effect than the effect of single PBL health education. The main reasons can be explained from the following aspects: the observation group adopted the nursing model based on the Omaha System. The follow-up of patients was conducted from the four directions, including health behavior, physiology, social psychology and environment. The follow-up results were used to summarize the corresponding problems. Meanwhile, the timely discovery of patients' social and psychological problems and the implementation of targeted nursing measures for patients contributed to the promotion of their rehabilitation and the increase in the score of their social relations. Chen et al. (2020) found that the quality of life of pregnant women accepting routine health education decrease significantly when delivery is approaching. In this study, there is no significant difference in the quality of life of pregnant women accepting health education based on the Omaha System near delivery and at admission. It can be seen that the model constructed in this study can alleviate some physiological or psychological discomfort arising in primiparas before delivery and thereby maintain their quality of life.

Childbirth definitely brings great changes to the life of primiparas. Firstly, primiparas often suffer poor sleep quality, fatigue, discomfort, obesity, insufficient breastfeeding and other manifestations before or after delivery (Otero-Naveiro et al. 2021). Secondly, in the special process of pregnancy and delivery, pregnant women are forced to leave their jobs for a period of time, probably having lower self-efficacy. Thirdly, long-term stay at home and storage of interpersonal communication with the outside world tend to lead to depression, anxiety and other adverse emotions in pregnant women (Phua et al. 2020). Clinical evidence shows that routine nursing focuses on the treatment of patients' diseases and their rehabilitation, and therefore can only meet the physiological and safety needs of patients. However, with the continuous improvement of medical models in recent years, more and more attention has been paid to patients' demand for psychological nursing (Shen et al. 2020). In the process of pregnancy and delivery, the changes of hormones in the body may trigger the incidence of depression and anxiety, resulting in the failure to meet their safety needs. Moreover, due to the particularity of pregnancy, pregnant women need to leave their jobs and even to stay in bed for a period of time, thus making it difficult to meet their interpersonal needs and undermining their self-realization to a certain extent. All these problems faced by primiparas are the drivers of the decline in their quality of life.

PBL pregnancy education was conducted in this study based on the Omaha System to intervene in pregnant women. The detailed contents of this model include full consideration of the actual problems faced by primiparas, comprehensive analysis of the various needs of pregnant women, attention to their physiological needs in the initial stage, followed by gradual assistance to solve their psychological and emotional needs to achieve better nursing effect. Zhang et al. (2018) transfer of correct healthy puerperal maintenance knowledge to pregnant women, and guidance for primiparas to establish a scientific lifestyle and avoid possible problems such as obesity, fatigue and insufficient breastfeeding in real life. On the premise of the building of a favorably trustful doctor-patient relationship, it is also necessary to encourage pregnant women to actively express their needs, correctly vent their negative emotions and seek targeted training such as yoga and music therapy in accordance with their actual needs to alleviate their negative emotions (Rong et al. 2021). While solving the emotional problems of pregnant women, nursing workers would should communicate more with their family members, call on them to pay attention to and accompany their pregnant women, assist their family members to create a safe and loving living environment for pregnant women, keep pregnant woman in a good state of mind, and reduce their psychological pressure. The quality of life of primiparas can thereby be improved when they have their various needs met, perceive more social support and recover the optimal normal physiological and psychological state.

CONCLUSION

PBL pregnancy health education was conducted in this study based on the Omaha System to intervene in 164 primiparas. The results show that this new nursing model can effectively improve the self-management ability and quality of life of primiparas, reduce their anxiety and depression to a large extent, significantly outperform conventional pregnancy health education in nursing, and therefore is highly applicable in obstetric nursing. At the same time, the results of the study also suggest that PBL pregnancy health education based on the Omaha System can help primiparas master more delivery knowledge and improve their overall health level.

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All authors made equal contributions

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