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Risk Factors for Postpartum Depression During COVID-19

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Abstract: Many social problems have been highlighted by COVID-19. The perinatal mental health of pregnant women is closely related to the newborn's health and the stability and harmony of family. However, there are few studies on postpartum depression in China. In this study, single-factor analysis and multivariate logistics regression analysis will be used to explore the high-risk factors of postpartum depression in COVID-19.From October 2020 to February 2021, the basic information of 388 puerperas from two cities in central and Northwest China, Xinxiang and Xi'an, were collected, including occupation, age, education, religious belief, nationality, partner companion time during pregnancy, major life-influenced events in the past six months, cognition of COVID-19, and gender and health of the newborn. Edinburgh Postpartum Depression Scale (EPDS) was used for psychological evaluation. SPSS 13.0 was used for univariate and multivariate logistic regression analysis.According to the Edinburgh Depression Scale, 45 cases were classified into the depression group (score ≥ 13), and 343 cases were classified into the normal group (score < 13).The statistical results of general and clinical data showed that there was no significant correlation between occupation, nationality, weekly accompanying time, or age and postpartum depression (P > 0.05). In logistic multivariate regression analysis, the risk of postpartum depression in pregnant women with neonatal diseases was about 2.23 times higher than that of healthy pregnant women (OR = 2.233). When pregnant women believed that COVID-19 had a negative impact on the health of their newborns, their risk of postpartum depression was 3.31 times higher than that of perinatal women who did not(OR=3.314). This study explored the risk factors of postpartum depression in COVID-19, hoping to provide a method for prevention and treatment.

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1. Introduction

At the end of 2019, there was a serious outbreak worldwide – COVID-19 pandemic. New Coronavirus, which caused the epidemic, appeared in human history for the first time [1]. Research from Marcela Almeida, a professor from the United States, shows that women are more susceptible to pandemic-related stressors affect during COVID-19, especially those who are pregnant, postnatal, aborted or experiencing intimate partner violence[2]. However, in China, there were less reports on mental health of women during COVID-19. Therefore, the author will explore the risk factors of postpartum depression among perinatal women during the epidemic period in China.

Postpartum depression refers to the obvious depressive symptoms or typical depressive episodes in puerperal period. It belongs to puerperal mental syndrome with postpartum restlessness and postpartum psychosis [3]. In recent years, with the increasing attention to postpartum depression, it is found that it is a global public health problem[4]. In addition, the incidence rate of postpartum depression may be much higher than the previously cited 10%-15% . The incidence rate of postpartum depression even reached 23% in the 522-sample size study conducted by Dennis [5]. There is evidence that all countries face the challenge of postpartum depression, but low- and middle-income countries face the greatest burden.

Prof. Bener, Department of Medical Statistics and Epidemiology, Hamad Medical Corporation, Hamad General Hospital, Qatar, used SPSS software to analyze 1659 subjects. The results showed that 35% of young mothers, 68% of highly educated mothers and 52% of employed mothers had postpartum depression. Prof. Bener and his colleges concluded that the emotional risk factors for postpartum anxiety included young mothers with better education and employment [6]. Unfortunately, according to Tahotoa, Simavli, Feijo and others' studies, only six postpartum anxiety interventions have been proven to be effective, including father education, music therapy during delivery, mother massage, cognitive behavioral therapy and oxytocin therapy [7]. In addition, there were not enough studies on postpartum depression in China.

In view of the investigation status of postpartum depression, the author hoped to observe the incidence of postpartum depression in China through some cases in central and North China. In addition, the author hopes to further explore the risk factors of postpartum depression, so as to provide more solutions for its treatment, which is increasingly common.

2. Method

2.1. Research Objects

Using the method of cluster sampling, 388 pregnant women who delivered in the First Affiliated Hospital of Xi'an Medical College, Xi'an Jiaotong University, and Xinxiang Central Hospital of Henan Province from October 2020 to February 2021 were selected as the research objects. Inclusion criteria: full term pregnancy, normal delivery; age $\geqslant$ 20 years old; complete general and clinical data; voluntary participation in this study. Exclusion criteria: mental disorders; mental retardation; major organic diseases; taking antidepressants or receiving other antidepressant treatment.

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2.2. Research Methods

- Questionnaires about general information were compiled on the basis of a large number of literatures. The main contents include age, occupation, education, religious belief, marital status, family average annual income, delivery mode, neonatal gender, neonatal health status, feeding pattern, companion time, parity, pregnancy, cognition of COVID-19 and so on.
- There are 10 items in the Edinburgh Postpartum Depression Scale, which are anxiety, fear, self-blame, sadness, crying, insomnia, self-injury, interest, mood, and coping ability. The score of each item ranges from 0 to 3, with a full score of 30. The total score ≥ 13 indicates that the subjects have depressive disorder, and the higher the score is, the more serious the degree of depression is. The questionnaire was shown in appendix.
- After clarifying the purpose and method of this study, the data collection investigators informed them of the matters needing attention, and adopted unified guidelines in the process of data collection. The data of 400 eligible subjects were collected. The patients filled in the questionnaire by themselves. The questionnaires were collected and checked within 20 minutes. The invalid questionnaires were eliminated, and a total of 388 valid questionnaires were collected. Data were collected within 7 days after delivery.

2.3. Statistical Analysis

The collected data were recorded in Excel, and SPSS 13.0 was used for data management and data processing. The counting data are expressed as percentages. X-Test, a descriptive analysis method, was used for single factor analysis. The variables with statistical significance in the results of univariate analysis were included in the multivariate analysis, and the logistic regression model was used in the multivariate analysis; hypothesis test level: $\alpha = 0.05$.

3. Results

3.1. Univariate Analysis of Postpartum Depression

Among the 388 subjects, those with a total score of 13 or more in the Edinburgh Postnatal Depression Scale were considered to have postpartum depression. Among the 388 puerperas, 45 puerperas with postpartum depression were assigned to the depression group, and the remaining 343 puerperas were assigned to the normal group. The statistical results of general and clinical data showed that there was no significant correlation between occupation, nationality, weekly accompany time, or age and postpartum depression ($P > 0.05$). Puerperal depression was significantly different in those mothers who had different delivery modes and times of gestation, different health conditions of newborns, different maternal effects on the health status concerning COVID-19, and significant maternal life events in the past six months ($P < 0.05$). Statistical results showed that the positive rates of the following five indicators in the depression group were much higher than those in the normal group, including the proportion of vaginal delivery, neonatal diseases, pregnancy times greater than 3 times, the impact of major life events and the influence of COVID-19 on the health of newborns. The difference was statistically significant ($P<0.05$), as shown in Table 1.

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Table 1: Univariate analysis of postpartum depression.

factor	case	depression group（n=45）	control group（n=343）	value P
occupation				0.121
NO	168	23（48.9）	112（32.7）	
YES	320	22（51.1）	231（67.3）	
nationality				1.223
The Han nationality	479	45（100）	336（98.0）	
ethnic minorities	9	0（0）	7（2.0）	
Weekly company time				2.234
short	255	31（68.9）	174（50.6）	
long	233	14（31.1）	169（49.4）	
pregnancy times				0.041
1	272	25（55.6）	191（55.8）	
2	148	13（28.9）	105（30.5）	
≥3	68	7（15.5）	47（13.8）	
parity				2.689
1	326	24（53.3）	234（68.2）	
2	132	13（28.9）	92（26.8）	
≥3	30	8（17.8）	17（5.0）	
pregnancy complications				1.225
NO	474	43（95.6）	334（97.3）	
YES	14	2（4.4）	9（2.7）	
mode of delivery				0.042
vaginal delivery	275	30（66.7）	190（55.3）	
cesarean section	213	15（33.3）	153（44.7）	
mode of feeding				2.569
breastfeeding	448	37（82.2）	318（92.8）	
artificial feeding	40	8（17.8）	25（7.2）	
gender of newborn				2.369
boy	244	20（44.4）	174（50.6）	
girl	244	25（55.6）	169（49.4）	
health status of newborn				0.009
healthy	258	40（88.8）	323（94.2）	
sick	230	5（11.2）	20（5.8）	
major life events in the past six months				0.001
NO	421	21（46.7）	310（90.3）	

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YES	67	24（53.3）	33（9.7）	
chronic diseases				0.889
NO	448	39（86.7）	317（92.3）	
YES	40	6（13.3）	26（7.7）	
age				1.252
≤30	14	28（62.2）	201（58.5）	
>30	201	17（37.8）	142（41.5）	
education level				2.548
below bachelor degree	112	14（31.1）	76（22.1）	
bachelor degree or above	376	31（68.8）	267（77.9）	
marital status				2.239
not married*	17	4（8.9）	9（2.5）	
married	460	40（88.9）	325（94.8）	
unknown	11	1（2.2）	9（2.5）	
family income				1.045
low	109	14（31.1）	73（21.4）	
medium	349	29（64.4）	248（72.2）	
high	30	2（4.4）	22（6.3）	
effect of COVID-19 on neonatal health				0.001
never worried	184	8（17.8）	147（43.0）	
worried	304	37（82.2）	196（39.6）	

*Note: not married persons include unmarried persons, separated persons and divorced persons.

Table 2: Assignment of variables with statistical significance in univariate analysis.

Variable name	influencing factors	variable assignment
X1	effect of COVID-19 on neonatal health	never worried=0；worried=1
X2	major life events in the past six months	NO=0；YES=1
X3	health status of newborn	healthy=0；sick=1
X4	mode of delivery	vaginal delivery=0；cesarean section=1
X5	pregnancy times	1=0；2=1；≥3=2
Y	postpartum depression	NO=0；YES=1

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Table 3: Logistic multivariate analysis of postpartum depression.

variable	B	SE	Waldχ2	P	OR	95%CI	
Constant term	-1.118	1.432	0.610	0.435			
mode of delivery							
vaginal delivery					1		
cesarean section	1.357	0.726	3.489	0.062	3.883	0.935	16.124
health status of newborn							
healthy					1		
sick	3.669	1.223	8.994	0.003	2.233	1.018	5.406
major life events in the past six months							
NO					1		
YES	2.460	0.614	16.027	0.000	1.185	0.506	4.047
pregnancy times							
1					1		
2	0.012	0.321	5.282	0.225	0.365	0.234	1.038
≥3	-0.566	0.365	2.406	0.121	0.568	0.278	1.161
effect of COVID-19 on neonatal health							
never worried					1		
worried	5.117	1.433	8.075	0.004	3.314	2.226	10.328

3.2. Multivariate Analysis of Postpartum Depression

The factors related to postpartum depression in univariate analysis were set as positive variables and assigned values (see Table 2 for the specific assignment method), which were included in logistic multivariate regression analysis. The influencing factors of delivery mode, gestational age, neonatal health, health status during COVID-19 and major life events in recent six months were screened out. According to the statistical values in Table 3, the risk of postpartum depression of pregnant women with neonatal diseases was about 2.23 times higher than that of healthy pregnant women (OR = 2.233). When pregnant women believed that COVID-19 had a negative impact on the health of their newborns, their risk of postpartum depression was 3.31 times higher than that of perinatal women who did not(OR=3.314). Besides, in the past six months, pregnant women with major life events are more likely to suffer from postpartum depression than those without., as shown in Table 3.

4. Discussion

As is well-known, postpartum depression is a common psychological disease for pregnant women.The COVID-19 pandemic has made the situation even worse than before.On account of the increasing barriers between people under the social survival pressure of COVID-19, it is an enormous challenge to maintain emotional stability of pregnant women by using existing support systems .

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On the basis of the results that we derived using the Chinese version of Edinburgh Postnatal Depression Scale and a questionnaire, during pandemics, the risk of maternal depression after birth is 3.31 times higher when pregnant women believed that COVID-19 had a negative impact on the health of their newborns. (OR=3.314).This finding suggest that the management of pregnancy and delivery is an issue that needs to be addressed in an epidemic environment. Health status of newborn is a key factor also mentioned in the study published by Mirzadeh and Khedmat[8],who also stressed the necessity of psychological support for pregnant women during this crisis, especially when they experience a major event during the perinatal period.This is consistent with our logistic regression analysis that found a statistically significant association between the effects of COVID-19 on neonatal health and postpartum depression（$P<0.05$).

Our result is consistent with reports in China which indicated that concerns about the infection of oneself and the child, the health status of the newborn, and the impact of the epidemic on the perinatal period are common risk factors for maternal depression and anxiety ($P<0.01$)[9]. Higher P values of pregnancy times in this study may be explained by two evident differences between other studies and the current one. First, the present data were obtained in the late COVID-19 pandemic， which could cause some recall bias .Although the COVID-19 outbreak in Xi'an and Xinxiang may not be regarded as severe,but the number of imported cases is increasing during the time the study was conducted.When faced with a public health emergency, people are likely to develop negative emotions and avoidance behaviors, resulting in reporting bias[10].

Postpartum depression is a common psychological disease for pregnant women, due to regional differences. The differences of measurement tools and samples make the detection rate of postpartum depression also have some differences. For example, the detection rate of depression was 8.81% in China and 2.98% in Japan. The detection rate of ghq42 in China was significantly higher than that in Japan. The mode of delivery, whether the expectant has a job, whether there is child care or not, and the level of mental distress are the influencing factors of postpartum depression in China and Japan [11]. Among 383 pregnant women, the detection rate of postpartum depression was 11.7%. Stepwise logistic regression analysis revealed that COVID-19 and neonatal morbidity were risk factors for postpartum depression. This result reminds us that when COVID-19 was sweeping over the globe at the end of 2019, we should also pay attention to other social problems caused by the pandemic, such as maternal mental health. In addition, due to the stimulation of physiological changes and hormone levels, puerpera are at high risk of mental diseases. Neonatal illness will cause maternal anxiety, which will also induce postpartum depression.

In addition, studies have shown that the lack of occupation and family company is a risk factor for postpartum depression [12]. Because of the single's social network and the lack of communication with the outside world, unprofessional parturients become the high-risk group of mental sub-health. A good living environment can eliminate the fatigue of puerperas and is conducive to the recovery of health. FU Wen-jun and others showed that the scores of actual intimacy and adaptability in the depression group were significantly lower than those in the non-depression group, and the scores of intimacy dissatisfaction and adaptability dissatisfaction in the depression group were significantly higher than those in the non-depression group, with statistical significance; EPDS in the depression group was significantly negatively correlated with actual intimacy and adaptability [13]. There was a

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significant positive correlation between intimacy dissatisfaction and adaptability dissatisfaction. Family support can effectively alleviate the incidence of postpartum depression.

In order to reduce the incidence of postpartum depression, in addition to routine nursing, effective psychological intervention should be given to pregnant women. Prenatal cognitive and behavioral psychological intervention: let pregnant women establish healthy lifestyles and correct fertility concept, communicate and listen more, answer their questions, and relieve their tension and anxiety. Supportive psychological intervention during and after childbirth: midwives encourage, comfort, and relieve the bad emotions of the puerpera during childbirth, assist the puerpera to change their roles, and communicate more with their families, so that the puerpera can get support from the family and society, the living environment of the puerpera can be improved, and a warm and relaxed family atmosphere will be created [13]. After delivery, professional nurses can guide breastfeeding, and neonatal and maternal care methods. Because no occupation, dissatisfied living conditions and lack of family care are the risk factors of postpartum depression, it is necessary to pay attention to this kind of population and organize reasonable nursing program to reduce the incidence of postpartum depression.

Similar to any other research, the present work is restricted by certain limitations. First, the conditions of the survey were limited, with only a limited face-to-face assessment of participants and a limited sample size. We try to minimize the error by means of multi-factor analysis. Second, due to the lack of a specific scale for COVID-19, we created a simple questionnaire on knowledge of the epidemic and its psychological impact, used in combination with the Chinese version of Edinburgh Postnatal Depression Scale, so there may be a certain amount of information bias.

In this study, the author hopes to provide more interventions for the treatment and prevention of postpartum depression, and arouse more attention to postpartum depression, especially during the global crisis of COVID-19.

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Appendix

Questionnaire

Dear interviewee:

Hello!

We are undergraduates of Xi'an Jiaotong University Medical College and Chongqing Medical University. Congratulations on becoming a prospective mother or a "Baoma" first! For your mental health, we will take you 5-8 minutes to conduct in-depth evaluation of your mental health before and after delivery. Please complete this questionnaire carefully! The questionnaire includes basic situation survey and Edinburgh Postpartum Depression table (EPDS), which can evaluate your mental health status in pregnancy and delivery more comprehensively, and will help our center to comprehensively analyze your physical and mental health status and provide you with more professional health management services!

The questionnaire has passed the approval of the school of public health of Xi'an Jiaotong University and the examination of the ethics committee of the Ministry of medicine of Xi'an Jiaotong University, and fully complies with the requirements of relevant laws and regulations. We guarantee that all information you provide will be strictly confidential and that the information will be used only

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for your personal health management and follow-up research services, which will not be available to any individual or profit-making organization.

Thank you for your understanding and support for our work! I wish you a happy life!

If you have any questions, please call: Tel: +86 18220177215; Tel: +86 17392477595

Basic information

1. Do you have a job?

A.YES B.NO

2. Which nationality are you?

A.The Han nationality B.Others

3. The average time your partner spends with you every week during pregnancy（Company time refers to the time in the same space and there is two-way communication)

A.short (< 21 hours) B.long (>21 hours)

4. How many times are you pregnant this time?

A.The firs B.the second C.the third and more

5. What is your parity？

A.The first B.the second C.the third and more

6. Do you have pregnancy complications?

A.YES B.NO

7. What is your delivery mode?

A.Vaginal delivery B. Cesarean section

8. What is the feeding mode of this fetus?

A.Breastfeeding B.Artificial feeding

9. What is the sex of the newborn?

A.Boy B.Girl C.Both

10. What is the health of the newborn?

A.Sick B.Health

11. Have you experienced major life events that have seriously affected your mood in the past half of the year?（Like the death of relatives, etc.)

A.YES B.NO

12. Do you have chronic diseases?

A.YES B.NO

13. Your age is ___ years old.

14. What is the highest level of education you receive?

A.Undergraduate education below B.Undergraduate education and above

15. what is your current marital status?

A.Married B.Unmarried C.Widowed D.Divorced

16. What is your family's annual income?

A.< 50000 yuan (low) B.50000-100000 yuan (medium) C.>200000 yuan (high)

17. Are you worried about the health problems of newborns due to COVID-19?

A.Never worried B.Worried

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Edinburgh Postpartum Depression Scale（EPDS）

Guidance: please read the following questions carefully and choose the answers that best reflect your recent 7 days.

1.I am happy and I can see the interesting side of things
0= as before, 1= not as much as before, 2= significantly less than before, 3= completely impossible
2. I am optimistic about the future
0= as before, 1= not as much as before, 2= significantly less than before, 3= completely impossible
3. when things go wrong, I blame myself needlessly
0= never so much, 1= rarely, 2= sometimes, 3= most of the time
4. I am anxious or worried for no reason
0= never, 1= occasionally, 2= sometimes, 3= often
5. I fear or panic for no reason
0= never, 1= occasionally, 2= sometimes, 3= often
6. things have developed to a point where I can't handle it
0= never so much, 1= rarely, 2= sometimes, 3= most of the time
7. I am in a bad mood and affect sleep
0= never so much, 1= rarely, 2= sometimes, 3= most of the time
8. I feel sad or sad
0= never so much, 1= rarely, 2= sometimes, 3= most of the time
9. I cry because I am in a bad mood
0= never so much, 1= rarely, 2= sometimes, 3= most of the time
10.I have the idea of hurting myself
0= never so much, 1= rarely, 2= sometimes, 3= most of the time

Signature of investigator
Date