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CLINICAL ARTICLE

Obstetrics

Alteration in the psychologic status and family environment of pregnant women before and during the COVID-19 pandemic

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Abstract

Objective: To compare mental distress and COVID-19-related family environment changes among pregnant women before and during the pandemic.

Methods: In a survey-based study in Lishui City, Zhejiang, China, pregnant women were recruited before (March–December, 2019; n = 2657) and during (January–August, 2020; n = 689) the COVID-19 pandemic. They completed the Symptom Check List-90 Revised (SCL90-R) questionnaire and Pittsburgh Sleep Quality Index (PSQI), and were asked about their families via the Family Environment Scale (FES).

Results: Higher SCL90-R scores of somatization (P = 0.003), depression (P = 0.043), anxiety (P = 0.041), hostility (P = 0.009), and others (P = 0.025) were reported by women during the COVID-19 pandemic. Sleep disorder also occurred more frequently among pregnant women during the pandemic (P = 0.002). Social environmental characteristics of families showed impaired family cohesion, and increased levels of conflict and independence during the pandemic (all P < 0.05). The FES score for family cohesion was negatively related with obsessive–compulsive, depression, anxiety, and hostility symptoms, whereas that for conflict was positively related with these symptoms (all P < 0.001).

Conclusion: The mental health, sleep, and family environment of pregnant women was impaired during the COVID-19 pandemic. Potential protective factors including increased social support might help to mitigate long-lasting negative consequences.

KEYWORDS
anxiety, COVID-19, depression, family environment, mental health, pregnancy, sleep disorder

1 | INTRODUCTION

Since first confirmed in December 2019 in Wuhan, China, the SARS-CoV-2 coronavirus (COVID-19) has spread rapidly throughout the world. As of August 30, 2020, it has infected more than 20 million individuals globally, leading to death, shortage of medical resources, unemployment, economic distress, and a marked change in daily life.

Individuals have found themselves suddenly reduced to the 'survival' level of Maslow's hierarchy of needs.[1] They have been isolated from family and friends, and social connections have been disrupted over long periods. Many people have been laid off work and small businesses have been severely affected, resulting in financial hardship. Therefore, it is important to realize that the COVID-19 pandemic is not only an epidemiologic, but also a psychologic crisis. The psychologic and social consequences caused by the virus may be equally destructive as the infection itself.

As compared with men, women tend to show higher symptoms of anxiety and depression during disease outbreaks.[2,3] In particular,

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pregnant women are prone to mood swings due to the influence of hormone levels during pregnancy. During this vulnerable time, perinatal mood and anxiety disorders have become the most common psychologic distress, which may negatively affect both mother and fetus.[4] Although most evidence to date indicates that there is no danger of COVID-19 transmission to the fetus,[5] there remains limited information on the potential effects of the virus on pregnant women and fetus.

It has been reported, however, that psychologic, cultural, and environmental stressors encountered during pregnancy may be harmful to pregnancy, and maternal and child health, and recent research shows that prenatal stress may have consequences across generations.[6] The supportive effect of a good family environment can buffer the impact of pregnancy stress, and reduce the impact of prenatal anxiety and depression symptoms on the stress response system of the mother and newborn.[7] Similarly, accumulated evidence shows that negative family relationships may cause stress, affect mental health, and even cause physical symptoms. Therefore, the mental health and daily family environment of pregnant women during an epidemic require more attention.

Given the potential for negative sequelae in terms of psychologic state, health, and offspring, the primary aim of the current study was to explore psychologic distress and mental symptoms related to COVID-19 among pregnant women during the pandemic. Secondary aims were to examine the connections between sleep disorders and the pandemic, in addition to changes in the family environment of pregnant women related to the crisis.

2 | MATERIALS AND METHODS

2.1 | Study design and participants

In an online survey-based study, pregnant women in Lishui City, Zhejiang, China, were recruited via social media or during a hospital visit between March 1, 2019, and August 30, 2020. The Ethics Committee of Lishui Maternal and Child Health Care Hospital approved all data collection. All study women gave consent to participation.

The first cohort of participants was recruited between March 1 and December 31, 2019, before the COVID-19 pandemic. The second cohort was recruited during the pandemic from January 1 to August 31, 2020. The inclusion criteria were age at least 18 years, able to read and write Chinese, having a confirmed pregnancy at less than 38 gestational weeks, and able to make an informed decision.

2.2 | Scales and measurement

Sociodemographic variables and pregnancy information were obtained during the study. All participants in both cohorts completed the Symptom Checklist-90 Revised (SCL90-R),[3] Pittsburgh Sleep Quality Index (PSQI),[8] and Family Environment Scale (FES)[9] questionnaires online.

The SCL90-R is used to evaluate various psychologic problems and symptoms of psychopathology. It is a 90-item self-rating inventory with 10 clinical scales, 7 of which were applied in the present study: somatization, interpersonal sensitiveness, obsessive-compulsive behavior, hostility, anxiety, depression, and 'others' (e.g., foraging status and sleep). Items are rated on a 5-point Likert scale from 0 (not at all) to 4 (extremely likely). A subscale score of 2 or higher indicates a potential psychologic issue.[3]

The PSQI is used to measure sleep quality and help distinguish between those with poor sleep and those with good sleep.[8] It is a 24-item self-reporting measure of general sleep quality in the preceding 1-month period. Each item is rated from 0 (no difficulty) to 3 (severe difficulty), resulting in a total score for each scale. The score ranges from 0 to 21, and a score higher than 5 is considered a serious sleep disorder.

The FES is a measure of a respondent's perceptions of their family life, and has been extensively used in different clinical samples.[9] It comprises 10 subscales in 3 dimensions: family relationship, personal growth, and system maintenance. Four subscales, cohesion, expressiveness, conflict, and independence, were measured in the current study.

2.3 | Statistical analysis

All analyses were conducted by using SPSS version 24.0 (IBM Corp., Armonk, NY, USA). Before analysis, the accuracy and consistency of the survey data were manually checked and invalid records were removed. Descriptive statistics were used to report demographic and main research variables. Mental health symptoms were reported as continuous variables. The independent *t* test was used to compare means between the two groups. Pearson correlation coefficient was used to evaluate the association between variables. A *P* value of less than 0.05 was considered statistically significant.

3 | RESULTS

3.1 | Sociodemographic characteristics

The cohort recruited before the COVID-19 pandemic comprised 2800 pregnant women, whereas that recruited during the pandemic comprised 700 women. Of these 3500 participants, 154 records

TABLE 1 Age and gestational age of the study women[a]

Characteristic	Before pandemic (n = 2657)	During pandemic (n = 689)	*t*	*P* value
Maternal age, years	28.94 ± 6.4	29.03 ± 4.9	−0.426	0.670
Gestational age, weeks	16.24 ± 5.0	16.10 ± 5.0	0.581	0.561

[a]Values are given as mean ± SD or median (percentage).

TABLE 2 Mental health status and sleep quality before and during the COVID-19 pandemic

SCL-90-R and PSQI items	Before pandemic (n = 2657)[a]	During pandemic (n = 689)[a]	*t*	P value
Somatization	1.39 ± 0.34	1.43 ± 0.36	−2.981	0.003
Obsessive compulsive	1.41 ± 0.37	1.43 ± 0.39	−1.144	0.253
Interpersonal sensitivity	1.30 ± 0.37	1.32 ± 0.41	−1.159	0.247
Depression	1.31 ± 0.36	1.54 ± 0.47	−2.556	0.030
Anxiety	1.26 ± 0.33	1.45 ± 0.37	−2.116	0.041
Hostility	1.28 ± 0.39	1.34 ± 0.50	−2.657	0.008
Foraging status	1.39 ± 0.38	1.43 ± 0.41	−2.267	0.023
Sleep disorder	5.98 ± 2.79	6.35 ± 2.93	−3.005	0.002

Abbreviations: PSQI, Pittsburgh Sleep Quality Index; SCL90-R, Symptom Check List Revised questionnaire.
[a]Values are given as mean ± SD.

were invalid because the respondents did not provide consent, did not complete the full survey, or provided an invalid expiration date. Thus, data were assessed from 2657 (94.9%) and 689 (98.4%) women in the first and second cohorts, respectively. Neither the women nor their families were infected with the virus at the time of the study.

The median (range) age of the whole sample was 28 years (18–45 years) (SD, 4.9 years) and the gestational age was 16 weeks (4–38 weeks) (SD, 6.14 weeks). The median age of the pre-Covid-19 cohort was 28 years (18–45 years) (SD, 6.4 years) and the gestational age was 16 weeks (4–38 weeks) (SD, 5.1 weeks), whereas those of the Covid-19 group were 28 years (18–45 years) (SD, 4.9 years) and 16 weeks (6–37 weeks) (SD, 5.0 weeks), respectively. Thus, the median maternal age and gestational week were the same in the two groups (Table 1).

3.2 | Mental health before and during the COVID-19 pandemic

The women in the COVID-19 cohort had significantly higher scores for somatization (P = 0.003), depression (P = 0.040), anxiety (P = 0.041), hostility (P = 0.008), and others (P = 0.023) scales as compared with the pre-COVID-19 group. There were no significant differences in obsessive-compulsive behavior or interpersonal sensitivity between the pregnant women before and during the COVID-19 pandemic (Table 2). The incidence of depressive symptoms in the cohort after the outbreak of COVID-19 was 13.5% (n = 93) as compared with 10.2% (n = 271) in the population before the pandemic. The incidence of anxiety symptoms was 16.2% (n = 112) among women during the pandemic, as compared with 11.5% (n = 306) among those before the outbreak.

TABLE 3 Family environment patterns in the study women's family before and during the COVID-19 pandemic

FES item	Before pandemic (n = 2657)	During pandemic (n = 689)	*t*	*P* value
Cohesion	7.62 ± 1.95	7.41 ± 2.24	2.256	0.024
Expressiveness	5.91 ± 2.01	5.83 ± 2.09	0.887	0.375
Conflict	1.89 ± 1.66	2.06 ± 1.78	−2.379	0.017
Independence	5.65 ± 1.37	5.76 ± 1.32	−1.961	0.045

Abbreviation: FES, Family Environment Scale.

3.3 | Sleep disorders during the COVID-19 pandemic

According to the results, 1837 (69.1%) women reported sleep disorders in the pre-pandemic group, and 513 (74.5%) women reported sleep problems in the pandemic group. The average PSQI score was significantly higher among pregnant women recruited during the COVID-19 pandemic than among those recruited before the pandemic (6.35 vs. 5.98, P = 0.002) (Table 2).

3.4 | Family support status before and during the crisis

The mean FES scores during the COVID-19 pandemic were significantly different from the pre-COVID-19 scores in 3 of the 4 FES subscales (Table 3). The scores for cohesion (P = 0.024), conflict (P = 0.017), and independence (P = 0.045) in families were much lower during the pandemic. Only the score for the expressiveness subscale did not differ between the two groups. The scores for family cohesion were negatively related with obsessive-compulsive behavior, depression, anxiety, and hostility symptoms, whereas those for conflict were positively related with these symptoms (Table 4).

4 | DISCUSSION

Since the outbreak of COVID-19 in late 2019, pregnant women have needed to cope with the impact of this virus, in addition to dealing with the stressors in their daily lives. Studies from different regions have begun to focus specifically on the mental health of pregnant women during the COVID-19 outbreak.[10-15] However, most studies

TABLE 4 Relationship between family environment and symptoms of mental illness

	Cohesion		Conflict		Independence	
Symptom	R^a	*P* value	R^a	*P* value	R^a	*P* value
Somatization	−0.240	<0.001	0.204	<0.001	−0.013	0.456
Depression	−0.413	<0.001	0.307	<0.001	0.002	0.928
Anxiety	−0.303	<0.001	0.228	<0.001	−0.024	0.161
Hostility	−0.342	<0.001	0.326	<0.001	−0.008	0.647

[a]Pearson correlation.

have assessed only data collected during the pandemic. By contrast, the current study has examined and compared psychologic distress among pregnant women before and during the COVID-19 pandemic.

Pregnant women might be at increased risk for severe illness from COVID-19, as well as other adverse consequences such as preterm birth, relative to the non-pregnant population.[16,17] Pregnant women are often prone to anxiety and fear concerning their fetus, and more likely to establish obsessive-compulsive behaviors.[18] To reduce the risk of infection, pregnant women need to avoid close contact with anyone who might be sick and distance themselves from individuals outside their family, and thus they may more frequently show hostility toward outsiders.

In the present study, the incidence of depressive and anxiety symptoms in the cohort recruited during the COVID-19 pandemic were markedly higher than those in the cohort recruited before the virus pandemic, suggesting that the outbreak has significantly led to anxiety and depression among pregnant women and may have a long-term impact on their infants. In a Chinese survey of the general population early in the epidemic (Jan 31 to Feb 2, 2020), 17% of participants reported moderate or severe depression, and 29% reported moderate to severe anxiety.[2] A Canadian study also found a substantially higher incidence of anxiety and depressive symptoms as compared with a similar cohort recruited pre-pandemic: 37% of pregnant women self-reported clinically relevant symptoms of depression, and 57% self-reported clinically relevant symptoms of anxiety during the COVID-19 pandemic.[15] There is no doubt that higher quality prenatal care and increased social support are required to reduce the incidence of symptoms and alleviate the subsequent long-term negative impact of COVID-19.

The stress of COVID-19 is also exacerbating sleep disorders among pregnant women. In a previous study, women who reported more sleep disturbances in late pregnancy were more likely to have clinically significant depressive symptomatology at 2–4 weeks postpartum as compared with those with few sleep disturbances.[19] It has also been observed that poor sleep quality in the first trimester is associated with increased depressive symptoms.[20] Increased sleep disorders may further affect the mental health of pregnant women and cause long-term harm in the future.

Psychologic needs, such as feelings of security, mental balance, and serenity, are an important requirement in pregnancy. The mother's mental health is influenced by her family environment, and compatibility between the woman and her environment is very important. Therefore, it is essential to evaluate if the family environment changes during a pandemic. The present data indicated that family cohesion was impaired, and the levels of conflict and independence were elevated in the cohort recruited during the COVID-19 pandemic. Moreover, correlation analysis revealed that the unusual family environment was associated with mental disorders among pregnant women. Solid programs offering support and assistance for pregnant women and their families are necessary.

The study has some limitations. First, the participants were recruited from a single city, and may not represent the whole population of pregnant women in China. Second, the questionnaires were presented online in Chinese; therefore, it was not possible to collect data from women who were less educated or unable to access the internet.

Despite the limitations, the present data reflect concerns about the mental state of pregnant women faced with the epidemic of COVID-19. They remind us that special attention should be paid to specific subgroups of the population—especially pregnant women—when they have to deal with situations resulting in more depression and anxiety than usual. The findings highlight the fact that pregnant women and their families need more help than ever during the pandemic. It is extremely urgent to develop professional support for these women at this time. Without sufficient support, stress from COVID-19 might have a long-term, multi-generational impact on pregnant couples and their children.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

AUTHOR CONTRIBUTIONS

JZ contributed to data collection. XW contributed to data collection and statistical analysis. XZ was responsible for drafting the manuscript. YW supervised the project, and reviewed and edited the manuscript.

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