Impact of COVID-19 on perinatal mental health among pregnant mothers infected with COVID-19, during the first wave of the epidemic in Jordan

Jehan Hamadneh a,*, Shereen Hamadneh b, Mohammed ALBashtawy c, Abdullah Alkhalawdeh d, Mahmoud Bashtawi e, Mohammad Alshloul f, Ahmad Rayang g, Asem Abdalrahim h

a Department of Obstetrics and Gynecology, Faculty of Medicine, Jordan University of Science and Technology, Irbid, Jordan
b Department of Maternal and Child Health, Princess Salma Faculty of Nursing, Al Al-Bayt University, Mafraq, Jordan
c Department of Community and Mental Health, Princess Salma Faculty of Nursing, Al Al-Bayt University, Mafraq, Jordan
d Community and Mental Health Department, Princess Salma Faculty of Nursing, Al Al-Bayt University, Mafraq, Jordan
e Department of Neuroscience, Faculty of Medicine, Jordan University of Science and Technology, Jordan
f Faculty of Nursing, Zarqa University, Zarqa, Jordan
g Faculty of Nursing, Zarqa University, Zarqa, Jordan
h Department of Community and Mental Health, Princess Salma Faculty of Nursing, Al Al-Bayt University, Jordan

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ABSTRACT

Background: Data concerning the impact of Coronavirus disease (COVID-19) infection on the mental health of pregnant women are still limited. The study explored baseline information regarding the impact of COVID-19 on mental health in the perinatal period, among mothers infected with COVID-19, during the first wave of the epidemic in Jordan. The current study aimed to examine the anxiety levels of pregnant women infected with coronavirus over the COVID-19 pandemic.

Methods: A cross-sectional study was conducted during the period from March to December 2021, using an online survey that addressed key issues related to the role of COVID-19 infection in developing anxiety among pregnant women using the Edinburgh Postnatal Depression Scale (EPDS). The study population was pregnant women with laboratory-confirmed COVID-19 infection, and who agreed to participate in the study (n = 530).

Results: The results indicated that one-third of the women had contracted coronavirus infection in each trimester. Most had no pregnancy complications (78.0%), 42.0% had no symptoms of coronavirus infection, 10.0% were hospitalized and 2.0% were admitted to the Intensive Care Unit (ICU). Approximately half declared that they did not receive support from the medical staff, although 71.0% had very good support from their families. Nearly a quarter of respondents stopped smiling while infected, 19% did not want to have any entertainment, and one-third had sleep problems. Moreover, more than half of the pregnant women were feeling anxiety (58.0%) and fear (59.0%). The prevalence of depression and anxiety was 67%. The EPDS scores were statistically significant and associated with being a smoker, method of delivery, getting COVID-19, experiencing COVID-19 symptoms, and being admitted to a hospital or ICU.

Conclusions: This study highlights that healthcare providers and family members should pay more attention to maternal mental health during a pandemic. Fear and anxiety among pregnant women need to be taken into account more during the period of international crises, taking into account the mental health of the pregnant woman when developing health plans, developing health programs, and providing diagnostic and therapeutic management in the maternal care departments.

1. Introduction

The new COVID-19 virus, which appeared in 2019, quickly spread around the world and created a huge public health problem [1]. Pregnancy is a time when women may experience psychological distress brought on by fear and uncertainty of the outcomes for both themselves and their babies. This can be explained by immunological and physiological changes during this period [2]. Symptoms of anxiety and
depression in pregnancy are associated with an increased risk of preterm birth [3], postpartum depression, and behavioral difficulties in children, and usually affect 10–25% of pregnant women [4].

Coronavirus is a neuro-invasive virus that triggers acute immune reactions such as cytokine storms and hyper inflammation affecting the central nervous system and leading to immediate and long-term consequences for cognitive and neuropsychological functions [5]. Therefore, the pathophysiology of coronavirus infection in pregnancy, along with basic psychological fear, may exacerbate psychological distress and mood alterations [2]. Since COVID-19 is a new disease with limited information available, it may have adverse psychological effects on pregnant women, leading to adverse perinatal outcomes, and affecting the long-term health of the child [6].

The level of anxiety and depression in pregnant women during the coronavirus pandemic is substantially elevated compared to similar pre-pandemic pregnancy cohorts [7, 8]. In previous studies, 32–37% of pregnant women reported clinically relevant symptoms of depression and 22–57% reported clinically relevant symptoms of anxiety [4, 6, 9]. Moreover, the responding measures to a pandemic such as isolation, baby-mother separation due to quarantine [9], and social distancing affect people's lifestyles and cause a high level of psychological stress [10]. However, data concerning the impact of COVID-19 infection on the neuropsychological function of pregnant women are still limited [11].

The study explored baseline information regarding the impact of COVID-19 on mental health in the perinatal period, among mothers infected with COVID-19, during the first wave of the epidemic in Jordan. Therefore, the current study aimed to examine the prevalence of depression and anxiety levels among pregnant women with COVID-19. In addition, to explore the relationship between depression and anxiety associated with COVID-19 and other demographic, sociological, social support and obstetric aspects.

2. Methods

2.1. Study design and population

A descriptive cross-sectional study was conducted in Jordan during the period from March to December 2021 using an online survey among pregnant women who confirmed positive case of COVID-19 infection during their pregnancy in the period of study. The questionnaire was distributed online due to preventive actions implemented by the state, which limited personal interaction between people under the Jordan government’s defense law. The survey included four sets of questions, collected information about 1) Demographical data, such as age, nationality, place of residence, educational level, family monthly income, and employment status. 2) Data on health and medical history such as chronic diseases, family health history, obstetrics and gynecology health history, such as; gravidity, parity, gestational age for current pregnancy and current pregnancy complications. 3) Data on history of COVID-19 infection (gestational age at the time of infection, symptoms, hospitalization, admission to the intensive care unit (ICU), medication requests). 4) The last set was a list of 10-question test for the Edinburgh Postnatal Depression Scale (EPDS) for pregnancy anxiety indicators (support during infection, laughter, entertainment, self-blame, anxiety, fear, sleep problems, sadness, crying, and desire to harm oneself). The Arabic version, developed by the Royal College of Psychiatrists and published in the British Journal of Psychiatry [12].

Sampling; Because of the scarcity and lack of previous research, the tendency was to take all the responses without setting a specific number to target. So that a convenience sampling strategy was used as, it was the most appropriate and achievable. The study was conducted among pregnant women with COVID-19 infection in Jordan and 530 responses were received. Most responses were from Irbid city as it was the area of starting spreading of the pandemic, so the confirmed cases of COVID-19 were residences mainly in Irbid city. The second city with distribution of the COVID-19 was the capital city of Amman. The rest number of responses from all other Jordanian cities (12 cities).

2.2. Edinburgh Postnatal Depression Scale (EPDS)

The most prevalent complication of childbirth is postpartum depression [13]. The 10-question test, Edinburgh Postnatal Depression Scale [12] (EPDS) is a useful and effective tool for detecting people who are at risk of “perinatal” depression. The EPDS is a simple screening technique that has proven to be successful. Mothers with a score of 13 or higher are more likely to suffer from mild to severe depression.

Responses are assigned a value of 0, 1, 2, or 3 based on the severity of the symptom. Items indicated with an asterisk (*) are scored backwards (i.e., 3, 2, 1, and 0). The overall score is calculated by adding the scores for each of the ten items. A rating of 0 indicates that the experience did not affect the mother’s depression, whereas a rating of 3 indicates that the incident distressed the mother and produced significant depression.

The target sample was pregnant women with laboratory-confirmed coronavirus infection, who agreed to participate in the study (n = 530). A positive result on the real-time reverse-transcriptase-polymerase-chain-reaction assay of nasal and pharyngeal swab specimens was defined as a confirmed case of COVID-19.

The exclusion criteria for the study were the absence of pregnancy, women not infected with coronavirus, and those who had declined to participate.

Data for this study was collected via an online survey of pregnant women who met the inclusion criteria. The data were entered into a unified computer database and analyzed by our team.

2.3. Theoretical framework

The Pender’s Health Promotion Model (HPM) was considered as a theoretical framework for this study. The HPM determines a person’s age, gender, level of education, social support, skills, knowledge, personality, and characteristics as key determinants of health-promoting behaviors. This theoretical framework proposes that individuals are more likely to connect, continue, and engage in health-promoting behaviors when other people support their behaviors [14]. Moreover, healthcare providers such as physicians and nurses are crucial sources of interpersonal influence that can support, improve maternal knowledge and pay more attention to maternal mental health during a pandemic, and support those infected during this period to reduce the prevalence of depression and anxiety levels.

2.3.1. Statistical analysis

Statistical analysis was performed using SPSS Version 25. The character of data distribution was evaluated with the W-criterion of Shapiro-Wilk. Various algorithms of statistical analysis were used depending on the type of distribution of the feature. The relationship between the key demographic variables and the implications of coronavirus infection was examined using the Spearman rank correlation test. Absolute and relative indicators (95% confidence interval) were used to represent the quantitative characteristics.

2.4. Ethical considerations

The Institutional Research Board (IRB) at Jordan University of Science and Technology (the University Review Committee for Human Research) has approved this study. Participation was voluntary, and participants could withdraw at any time; signing the consent form indicated agreement to participate in the study. The consent form excluded the possibility of unjustified deception, undue influence, or intimidation, and was signed only after prospective subjects were adequately informed. Their decision to participate or not would not affect the doctor-patient relationship or any other benefits to which they were entitled.
Personal information about subjects will never be disclosed, and the data collected will remain confidential.

3. Results

A total of 530 pregnant women participated in this study. The results in Table 1 show that a majority (60.9%) were in the group aged 26–35, followed by those under 25. Approximately 90.9% of the women were Jordanians. Almost half (45.8%) live in Irbid in the north of Jordan, 14.5% in the capital city, Amman, and the remaining 39.6% in other cities. The majority of women were university degree holders (77.5%). Approximately one-third (36.6%) were employed and more than half (55.1%) had a monthly income of more than 500 Jordanian dinars (JDs) (equal to USD720). 7.2% of respondents were active smokers. 53.2%) had a monthly income of more than 500 Jordanian dinars (JDs)

Over a quarter of the women were nulliparous (27.6%), while 46.0% had more than three children. More than half of respondents (55.1%) were in the last trimester of pregnancy, 28.7% in the second trimester and 16.2% in the first. Approximately, 13.8% of the women had chronic diseases such as heart disease (0.6%), hypertension (2.9%), diabetes (2.3%), respiratory system diseases (2.3%), or thyroid dysfunction (3.2%); however, all of these were under treatment. The current study revealed that about one-third of the women contracted coronavirus infection in each trimester: 32.8%, 28.7%, and 38.5% in the first, second, and third trimesters, respectively. Most had no pregnancy complications (78.7%), while 5.7% had gestational hypertension, 6.4% gestational diabetes, 7.4% had a placental abruption, 2.8% spontaneous miscarriage, 1.5% preterm birth, and 1.3% intrauterine fetal death.

Less than half of the pregnant women (42.4%) had no symptoms of coronavirus infection, –while 11.3% experienced sore throat, 11.3% breathing difficulties, 8.9% fever, 4.3% cough, and 1.5% pneumonia. Approximately 10.0% of the participants were hospitalized, 7.0% spending up to 14 days in hospital, and 3.0% spent 14 days or more. Approximately 21.0% of women were admitted to ICU, 1.3% of them for less than ten days, and 0.8% ten days or more. In addition, 17.2% of the women required medication (see Table 2). The study investigated the different support provided for pregnant women while they were infected with the virus. Approximately half (45.3%) declared that they did not receive any support from the medical staff, while just 11.7% highlighted that support from the staff was very good. However, the opposite results were observed for family support: 71.3% of women declared that received very good support from their family, while only 3.0% did not get it at all.

The current study revealed that infected participants experienced some unusual emotions, reactions, and feelings. Approximately a quarter (24.7%) declared they stopped smiling while infected, 19.6% did not want any entertainment, 50.9% said they were crying more often while having the disease, 32.6% were feeling sad more often than usual, and 34.1% had sleep problems. Our study showed that more than half the pregnant women were feeling anxiety– (58.7%) and fear (59.2%). Approximately one-third blamed themselves (38.7%) and 7.0% expressed a desire to harm themselves (see Table 3). A total of 530 maternal participants enrolled in this study accepted to participate and filled out the study questionnaire for children. 355 of them evaluated had clinical depression symptoms

| Table 1. Demographic characteristics of the study sample. |
| Characteristics | n | % |
| Maternal age | <25 years old | 110 | 20.7 |
| | 26–35 years old | 323 | 60.9 |
| | ≥35 years | 97 | 18.3 |
| Nationality | Jordanian | 482 | 90.9 |
| | Others | 48 | 9.1 |
| Residence place | Amman (capital city) | 77 | 14.5 |
| | Irbid | 243 | 45.8 |
| | Other cities | 210 | 39.6 |
| Educational level | Below secondary school | 32 | 6.0 |
| | Secondary school | 87 | 16.4 |
| | University or postgraduate | 411 | 77.5 |
| Parity | Nulliparity | 157 | 27.6 |
| | 1-3 | 129 | 24.3 |
| | ≥3 | 244 | 46.0 |
| Gestational age | First trimester | 86 | 16.2 |
| | Second trimester | 152 | 28.7 |
| | Third trimester | 292 | 55.1 |
| Monthly income, Jordanian dinars | <300 JDs | 135 | 25.5 |
| | 301-500 JDs | 113 | 21.3 |
| | >500 JDs | 282 | 53.2 |
| Maternal employment status | Yes | 194 | 36.6 |
| | No | 336 | 63.4 |
| Maternal smoking status | Active smoker | 38 | 7.2 |
| | Not active smoker | 492 | 92.8 |
| Chronic diseases | Yes | 73 | 13.8 |
| | No | 457 | 86.2 |
| Type of Chronic diseases | Heart diseases | 3 | 0.6 |
| | Diabetes Mellitus | 12 | 2.3 |
| | Respiratory system diseases | 12 | 2.3 |
| | Hypertension | 15 | 2.8 |
| | Thyroid dysfunction | 17 | 3.2 |
| | Others | 14 | 2.6 |

| Table 2. Characteristics of coronavirus infection and complications. |
| Characteristics | N | % |
| Pregnancy complications | None | 417 | 78.7 |
| | Gestational hypertension | 30 | 5.7 |
| | Gestational diabetes | 34 | 6.4 |
| | Placenta abruption | 39 | 7.4 |
| | Placenta previa | 5 | 0.9 |
| | Spontaneous miscarriage | 15 | 2.8 |
| | Preterm birth | 8 | 1.5 |
| | Fetal death | 7 | 1.3 |
| | Others | 39 | 7.4 |
| Gestational age at the moment of infection | 1st trimester | 174 | 32.8 |
| | 2nd trimester | 152 | 28.7 |
| | 3rd trimester | 204 | 38.5 |
| The main symptoms | None | 225 | 42.4 |
| | Pneumonia | 8 | 1.5 |
| | Sore throat | 60 | 11.3 |
| | Fever | 47 | 8.9 |
| | Cough | 23 | 4.3 |
| | Breathing difficulty | 60 | 11.3 |
| | Others | 107 | 20.2 |
| Hospital stay | No | 477 | 90.0 |
| | Yes | 53 | 10.0 |
| | <14 days | 37 | 7.0 |
| | ≥14 days | 16 | 3.0 |
| ICU admission | No | 519 | 97.9 |
| | Yes | 11 | 2.1 |
| | <10 days | 7 | 1.3 |
| | ≥10 days | 4 | 0.8 |
| Requesting medication | No | 439 | 82.8 |
| | Yes | 91 | 17.8 |
and anxiety (EPDS scores ≥13). The prevalence of anxiety and depression in the present study was 67%.

3.1. Relationship between key demographic variables and COVID-19 implications

The current study found a positive, statistically significant correlation between EPDS scores and being a smoker, method of delivery, getting COVID-19, experiencing COVID-19 symptoms, and being admitted to a hospital or ICU. On the other hand, no statistically significant correlation was found between EPDS scores and age, educational level, number of children, chronic illness, monthly income, having a job, having prenatal complications, or gestational age at the time of delivery. Table 4 lists the correlations between key demographic variables and EPDS in detail.

4. Discussion

Most of the recent studies on COVID-19 in pregnancy have focused on the physical effects of maternal infection and the possibility of vertical transmission to the fetus. However, maternal mental wellbeing is not the least factor in successful perinatal outcomes, and there is no doubt that pregnant women experience a greater level of anxiety and depression during the pandemic, especially being infected [7, 8]. The concerns about themselves and their babies, families, about behavioral measures include social isolation, remote working, difficulties in transportation between facilities, the need to organize a new system for childcare, and stockpiling [9, 10].

Additionally, higher symptoms of anxiety may be associated with more concern about not receiving the necessary prenatal care and the lack of support during the COVID-19 infection [8, 15]. At the same time, higher levels of social support and physical activity are associated with a lower level of psychological symptoms in pregnant women [4, 16]. Our study revealed different levels of support for pregnant women infected with the coronavirus. Approximately half declared that they received no support from the medical staff, and only 11.7% that support from the staff was very good. However, the opposite results were observed for family support: 71.3% received very good support from their families, while only 3.0% did not get it at all.

The current study revealed that infected pregnant women experienced some unusual emotions, reactions, and feelings, with up to 50.0% feeling depressed (stopped smiling, did not take part in entertainment, were crying, and were feeling sad). Additionally, one-third of respondents had sleep problems. A previous study conducted in the USA showed that insomnia occurred in 49% of pregnant patients [17]. This is strongly associated with symptoms of anxiety and depression and may include the random or late time of going to bed, difficulties in falling asleep, short duration, and poor quality of sleep [18]. A systematic review of research into mental disorders in coronavirus-infected patients revealed that during the illness common symptoms included depressed mood (33.0%) and insomnia (42.0%) [10]. Therefore, we can see that our results were approximately similar, and infected pregnant women did not have a higher level of emotional change than the population in general.

Our study showed that approximately 60.0% of pregnant women felt anxiety and fear. Previous studies also showed that 50–75% of pregnant women reported a significantly higher level of anxiety than usual [10, 19, 20]. However, systematic reviews revealed that anxiety in patients infected with coronavirus occurs in about 35.0% of cases [10], and in pregnant non-infected women approximately in 30–34% of cases [21, 22]. Thus, our study confirms that anxiety in pregnant women infected with coronavirus is much more common than in the general population, as well as more than in pregnant women pre-epidemic [8, 23, 24], or in pregnant non-infected women [15, 21]. Approximately one-third of respondents blamed themselves, while 7.0% expressed a desire to harm themselves. Additionally, Wu and colleagues showed that the level of anxiety and depression increased compared to the pre-pandemic level, including the thoughts of self-harm, which occurred in approximately 3.0% of pregnant women [8].

Thus, the current study's findings indicated that pregnant women showed a more pronounced increase in depression, anxiety, and negative emotions than non-pregnant women [25]. However, there are data that the levels of anxiety and depression among infected and non-infected pregnant women are similar, suggesting that the pandemic affected the mental health of pregnant women equally irrespective of their COVID status, although only from a low-quality study with a small sample size [26]. There remains a need to appreciate the potential effects of the pandemic on the mental health of vulnerable groups such as pregnant women [8].

The current study found that EPDS scores were associated with being a smoker, method of delivery, getting COVID-19, experiencing COVID-19 symptoms, and being admitted to a hospital or ICU. According to a recent study, women who slept longer, had a higher household income, had a higher level of education, lived in a city, were employed, had a gestation of less than six months, and had a husband who was employed with a higher education had statistically significant lower EPDS scores [27].
This study found no significance for characteristics such as age, educational level, number of children, chronic illness, monthly income, having a work, having prenatal complications, or gestational age at the time of delivery. Similarly, Citu et al. found no significance for characteristics such as age, education level, place of residence and type of birth, number of children, and sex of the infant, or pregnancy complications [28].

In general, this study was conducted in exceptional circumstances, at the beginning of a new pandemic. Where studies have found that the time of crises in countries is very linked to the mental health of the population [29, 30, 31, 32]. The health of the pregnant mother is very important, and her psychological impact contributes to increasing the risks to her health status and safety of fetus [33]. Therefore, the work of these surveys at the time of crises, disasters and wars constitutes a database on which to base our procedures and future research. The level of anxiety increased during the covid-19 crisis [34, 35]. Fear and anxiety among pregnant women need to be taken into account more during the period of international crises, taking into account the mental health of the pregnant woman when developing health plans, developing health programs, providing diagnostic and therapeutic management in the maternal care departments [34, 35]. Given the adverse effects of prenatal anxiety on the health and well-being of mothers and their infants, psychotherapeutic interventions, efforts to relieve pregnant woman stress, and training in adaptive methods of coping with stress are vital to reducing and treating the prevalence of maternal anxiety [36]. Possible consequences during this global crisis need further follow-up.

5. Limitations

The study was cross-sectional, using an online survey and the results are based on a subjective assessment of anxiety among pregnant women. However, we used a metric that is a sensitive tool, and the results can also be used as a starting point for future research. Furthermore, the study used a small sample size, which can be subject to greater sampling variance, which undermines the study's intrinsic and extrinsic validity, and maybe a limitation of generalizability [37].

6. Conclusion

The current study showed that about one-third of the women contracted coronavirus infection in each trimester, and more than half of the pregnant women had symptoms of coronavirus infection. Half of the women declared that they did not receive any support from the medical staff, but they received very good support from their families. Also, the findings revealed that coronavirus-infected pregnant women have a higher level of anxiety, fear, and depression. The demographic variables: being a smoker, method of delivery, getting COVID-19, experiencing COVID-19 symptoms, and being admitted to a hospital or ICU were associated with the mother's depression. Healthcare providers and family members should pay more attention to maternal mental health during a pandemic, and especially supporting those infected during this period. Finally, there is a need for large-sample, high-quality cohort studies to follow up and evaluate over time the consequences on maternal and offsprings’ health during the COVID-19 pandemic. Fear and anxiety in pregnant women should be taken into greater consideration during the period of international crises, taking into account the mental health of the pregnant woman when developing health plans, developing health programs, and providing diagnostic and therapeutic management in maternity care departments.

Declarations

Author contribution statement

Jehan Hamadneh: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Shereen Hamadneh: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Mohammed ALBashtawy: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Abdullah Alkhawaldeh: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Mahmoud Bashwani: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Mohammad Alshoul: Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper.

Ahmad Rayan and Asem Abdalrahim: Conceived and designed the experiments; Wrote the paper.

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Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

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