




Does the COVID-19 pandemic have an impact on fears and concerns among pregnant women?

Czy pandemia COVID-19 ma wpływ na poczucie strachu i obawy u kobiet będących w ciąży?

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ABSTRACT

INTRODUCTION: Anxiety and depressive symptoms are common during pregnancy. The occurrence of the COVID-19 virus pandemic is a unique stressor that affected the psychological course of delivery. The aim of the work is to evaluate the impact of the COVID-19 pandemic on the course of pregnancy and childbirth among the Polish population.

MATERIAL AND METHODS: The study group consisted of 2186 women. A questionnaire survey was conducted between November 2020 and December 2020 via the Internet. The inclusion criterion was pregnancy and childbirth during the COVID-19 pandemic. The authors' questions, with a five-point Likert scale, were used to assess concern and discomfort.

RESULTS: Women hospitalized during pregnancy had more pregnancy-related fears and concerns (mean 30.9 vs 29.6; $p = 0.007$). A similar relationship was found for women who had a cesarean section (30.6 vs 29.5; $p = 0.006$) or were hospitalized > 7 days (31.8 vs 29.7; $p = 0.012$). A statistically significant weak correlation was found between the mean scores of the concern questions and the number of hospitalizations during pregnancy (Pearson correlation coefficient $r = 0.1654$; $p < 0.000$).

CONCLUSIONS: This study found alarmingly high levels of anxiety in pregnant women during the COVID-19 pandemic, which may have long-term implications for their children.

KEYWORDS

COVID-19, pregnancy, childbirth, anxiety, stress

Received: 07.01.2024

Revised: 16.08.2024

Accepted: 16.08.2024

Published online: 26.11.2024

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Publisher: Medical University of Silesia, Katowice, Poland



STRESZCZENIE

WPROWADZENIE: Objawy lękowe i depresyjne są powszechnymi objawami w okresie ciąży. Wystąpienie pandemii wirusa COVID-19 jest wyjątkowym stresorem, który wpłynął na psychologiczny aspekt przebiegu porodu. Celem pracy jest ocena wpływu pandemii COVID-19 na przebieg ciąży i porodu w populacji polskiej.

MATERIAŁ I METODY: Grupę badawczą stanowiło 2186 kobiet. Badanie ankietowe zostało przeprowadzone w okresie od listopada 2020 r. do grudnia 2020 r. za pośrednictwem Internetu. Kryterium włączenia do badania były ciąża i poród w okresie pandemii COVID-19. Do oceny stopnia poziomu strachu i obaw wykorzystano pytania stworzone przez autorów z zastosowaniem pięciostopniowej skali Likerta.

WYNIKI: U kobiet hospitalizowanych w czasie ciąży występował większy poziom strachu i obaw związanych z ciążą (średnia 30,9 vs 29,6; $p = 0,007$). Podobną zależność stwierdzono w przypadku kobiet, u których wykonano cesarskie cięcie (30,6 vs 29,5; $p = 0,006$) lub które były hospitalizowane > 7 dni (31,8 vs 29,7; $p = 0,012$). Stwierdzono również istotną statystycznie, choć słabą korelację pomiędzy średnimi wynikami pytań dotyczących obaw a liczbą hospitalizacji w czasie ciąży (współczynnik korelacji Pearsona $r = 0,1654$; $p < 0,000$).

WNIOSKI: Badanie wykazało alarmująco wysoki poziom lęku u kobiet w ciąży podczas pandemii COVID-19, co może mieć długoterminowe konsekwencje dla ich dzieci.

SŁOWA KLUCZOWE

COVID-19, ciąża, poród, lęk, stres

INTRODUCTION

In March 11, 2020 the World Health Organization (WHO) officially declared the novel coronavirus (COVID-19) outbreak as a global pandemic [1]. Many countries, including Poland, implemented restrictions that limited health care access to focus on the treatment of COVID-19 patients and prevent further infections. During the COVID-19 pandemic, access to basic medical care was more difficult and restricted than before [2]. Moreover, the association of COVID-19 with higher depression and anxiety rates among societies was proven, as well as association with post-traumatic stress disorder (PTSD) and suicidal behaviors [3,4]. Anxiety is a common feeling of fear and uncertainty that arises during stressful situations [5]. Due to the epidemiological situation, many pregnant women had to change their place of delivery, because some of the hospitals were transformed into specialized, infectious disease hospitals [6]. To limit personal contact, many changes were applied – the numbers of visitors were restricted and also some visits were performed by means of telemedicine resources [7].

During pregnancy, women's bodies are affected by significant physiological and hormonal adjustments [8,9]. The adaptations of the pregnant women's organism to pregnancy increase the risk of viral infection and chances for complications resulting from respiratory diseases. The most significant changes that can affect the pregnant women's organism are an increased heart rate, increased oxygen consumption, decreased lung capacity and immunological adaptations [10,11]. The physiological shift of the lymphocytes dominating form from Th1 cells to Th2 increases the susceptibility of the mother's organism to viruses and intracellular pathogens in general [12]. Furthermore, it is commonly known that every

infection that affects organisms leads to an increase in catecholamines and glucocorticoids, which are stress hormones that cause the feeling of stress [13].

Also, pregnancy is a state of increased coagulation and thrombin production, and a COVID-19 infection itself increases thromboembolism risk [14]. Studies suggest that those factors combined are responsible for the higher prevalence of thromboembolic events, and low molecular weight heparin prophylaxis is recommended [15]. Epidemiological data show that pregnant women's mortality and morbidity are significantly higher compared to the general population [16].

There are no significant differences between pregnant women and nonpregnant women in the field of clinical symptoms [17]. Some studies report that pregnant women are in a group of those at a higher risk of intensive care unit admission and requiring invasive ventilation [18].

According to studies, additional stress during pregnancy could cause preterm labors, pregnancy induced hypertension and in severe cases even PTSD [19]. Under normal conditions, up to one-third of pregnant women experience anxiety during pregnancy. Unfortunately, it is a risk factor of preterm labor, low birth weight and also postpartum depression [20]. Moreover, the children of mothers experiencing untreated mental health problems in pregnancy are in the risk group of cognitive, emotional and behavioral problems in the future [21]. Some factors like the state of unemployment, complications in previous pregnancies, preterm birth risk or abortion, influence the risk of anxiety by enhancing it [22]. Stressful life events affecting pregnant women during pregnancy could later lead to postpartum depression as well [23]. When it comes to protective factors, social support experienced by pregnant women and physical activity during pregnancy have been confirmed to decrease the influence of anxiety and depression [24,25]. Also, the fear of being infected with COVID-19 impacts the



pregnancy related quality of life by decreasing it [26]. The essential aspects that pregnant women are concerned about were: possibly increased chances of COVID-19 infection during pregnancy, potential transmission and the impact on the fetus in addition to the potential risk of complications caused by the transmission [27].

The aim of the study was to evaluate the impact of the COVID-19 pandemic on pregnancy and childbirth among the population of Poland. The influence of the pandemic on pregnant women's stress and anxiety was also evaluated. The previously mentioned aspects were analyzed according to their correlation with hospitalizations, the change of place for labor, caesarean sections and other factors.

MATERIAL AND METHODS

The survey was conducted from 25 of November 2020 to 31 of December 2020. 2186 Polish women aged between 18 to 43 with a median age of 29 years, participated in the study. The participants were asked to fill in an anonymous online questionnaire posted on social media, especially on sites and groups associating pregnant women. The questions included in it were addressed to women who were pregnant and gave birth during the COVID-19 pandemic in Poland.

At the beginning, the participants were asked to answer eight questions regarding basic information such as: age, area of residence, degree, marital status, number of pregnancies, number of child births and difficulties with becoming pregnant. The next section containing eleven questions, was focused on pregnancy during the COVID-19 pandemic; the participants were especially asked about: the week they went into labor, if it was a natural or cesarean section birth, pregnancy complications, diseases during pregnancy,

hospitalizations, intake of dietary supplements, SARS-CoV-2 testing, routine prenatal visits and childbirth school attendance. The two following sections with nineteen questions concerned childbirth and postpartum with a five-point Likert scale, were used to evaluate the fears and inconveniences related to the circumstances, but also factors that could enhance or alleviate anxiety.

All of the questions containing a Likert scale had five points ranging from one to five where the participants were asked to choose how strong the level of stress, influence or anxiety they had experienced, where number one was strong disagreement and number five strong agreement. The Likert scale was used because of its wide popularity in medical studies and uncomplicated construction, which allows participants to express their feelings properly. Its great advantage is also the convenience for researchers to evaluate further outcomes [28,29].

Subsequently, all of the collected data were analyzed by the Statistica 10 program. The Mann-Whitney U test was used to evaluate the data. The means and standard deviations were calculated. The Pearson correlation coefficient was employed to measure linear correlations. A p-value achieving less than 0.05 was accepted as statistically significant. The average Likert score was calculated as the mean of sums of the outcomes in the Likert scale.

RESULTS

Participants

2186 women participated in the study (Table I). The median age of the women in the study was 29. All the women in the study were pregnant and gave birth during the COVID-19 pandemic.

Table I. Main characteristics of examined population

Data	Living in urban area	University degree	Married	Difficulties getting pregnant	Gave birth only once
Yes	1650 (75.5%)	1742 (79.7%)	1713 (78.4%)	546 (25.0%)	1653 (75.6%)
No	536 (24.5%)	444 (20.3%)	473 (21.6%)	1640 (75.0%)	533 (24.4%)

Course of the last pregnancy

Of all the subjects, 2060 (94.2%) delivered their babies after the 32nd week of pregnancy, of which 876 (40.1%) by cesarean section.

666 women (27.7%) were hospitalized. According to the collected data, 1080 (49.4%) of the pregnant women were supplemented with folic acid and 636 (29.1%) with iron supplements.

831 pregnant women (38.0%) talked to their gynecologist about the COVID-19 situation – 629 (28.8%) were reassured and 202 (9.2%) still had concerns and fears. In addition, these patients had more pandemic-related fears (33.5 vs 27.8; $p = 0.000$). All the mentioned data is presented in Figure 1.

Of all the women participating in the study, 615 (28.1%) had a routine antenatal appointment cancelled due to the pandemic-related situations.



Prenatal visit cancellation was identified as a factor that statistically increased the average Likert score fear level (31.4 vs 29.4; $p = 0.000$).

297 women (13.6%) made a change in the hospital where the delivery took place. Among these women, there was a higher level of anxiety as measured by the Likert scale compared to the group in which the place of birth did not change (32.3 vs 29.6; $p = 0.000$).

Every hospitalization that occurred during the course of pregnancy negatively influenced the pregnant women, which was observed in increased Likert score fear levels (30.9 vs 29.6; $p = 0.007$). A similar relationship was found in the women who underwent a caesarean section (30.6 vs 29.5; $p = 0.006$).

Most women were hospitalized for 2–7 days; only 206 (9.6%) of them required hospitalization longer than 7 days. These patients had statistically significantly more COVID-19 pandemic concerns compared to the non-hospitalized pregnant patients (31.8 vs 29.7; $p = 0.011$).

Hospitalization of less than 2 days resulted in pregnant women presenting lower mean Likert scale fear scores than in the group that was hospitalized longer (28.4 vs 30.4; $p = 0.001$). Among the participating women, 236 considered home labor. In that group, the average Likert score fear levels were significantly higher compared to the rest of participants (34.9 vs 29.3; $p = 0.000$).

The most common illnesses suffered by women during pregnancy were: anemia – 405 women (18.5%), urinary system infections – 354 women (16.2%), gestational diabetes – 312 women (14.3%) and elevated blood pressure – 283 women (12.9%).

The occurrence of urinary system infections in pregnant women significantly increased the severity of anxiety about the course of the pregnancy and possible complications compared to the group of women without infections during pregnancy (31.5 vs 29.5; $p = 0.001$).

1024 women (46.8%) attended childbirth school in person or online.

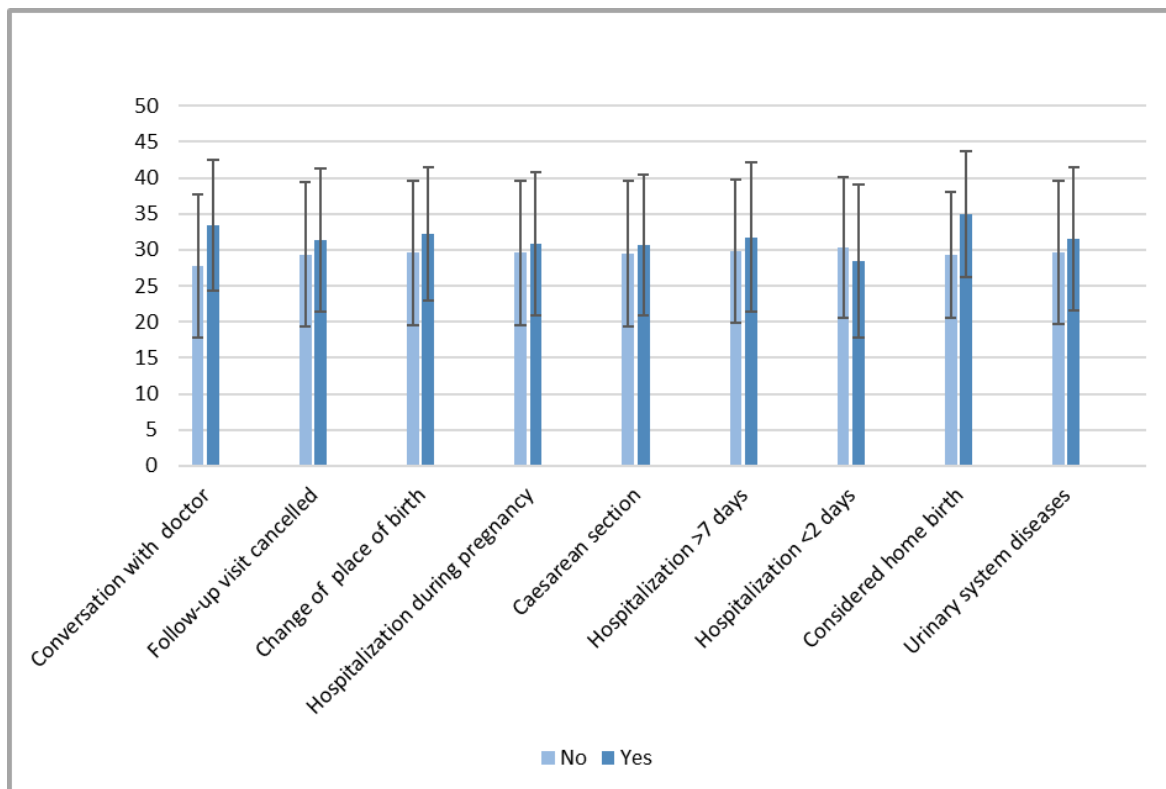


Fig. 1. Average Likert score related to fears and concerns according to every stressor (standard deviations were calculated for every case individually).

Testing for SARS-CoV-2 virus

481 (22.00%) of the pregnant women were tested for COVID-19 and received negative outcomes. Three times more of those that participated in the study (75.8%) were never tested for COVID-19 infection

during pregnancy and labor, 49 (2.2%) women were positive.

A statistically significant, weak correlation was found between the mean score of questions about concerns and the number of hospitalizations during pregnancy ($r = 0.1654$; $p < 0.000$; Figure 2).

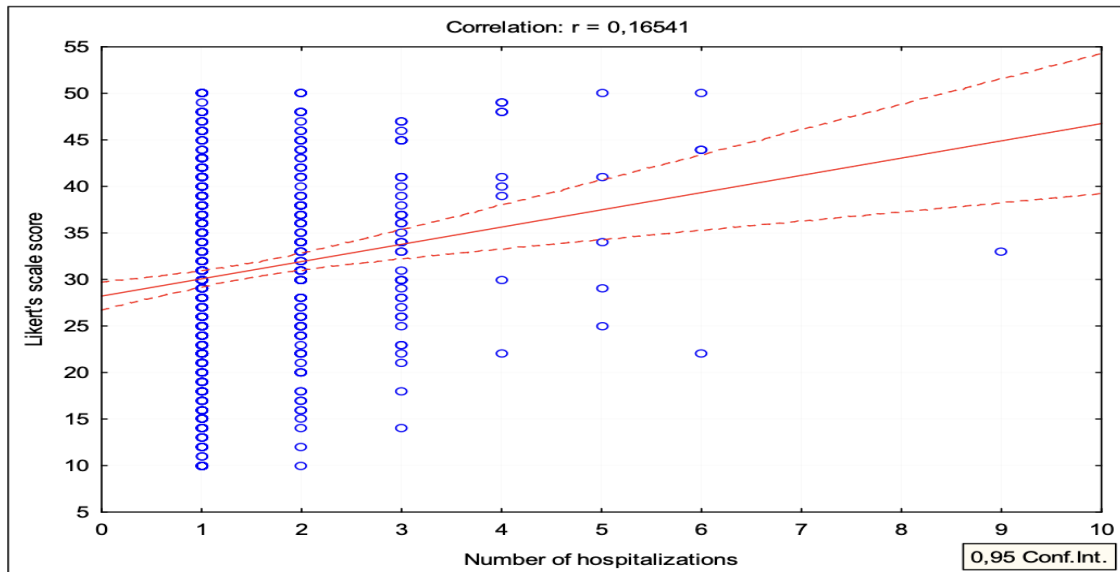


Fig. 2. Correlation of mean Likert scale outcome with number of hospitalizations.

DISCUSSION

Recent research revealed that COVID-19 was a reason for fear, stress and anxiety in pregnant women [30,31]. Moreover, the fear of COVID-19 can influence one's psychological well-being and their ability to deal with uncertainty [32]. In the presented study, the authors aimed to evaluate and analyze the influence of the pandemic on pregnant women that gave birth during COVID-19 pandemic in Poland. This research especially focused on the levels of fears and concerns related to the circumstances under which the participants found themselves because of the viral pandemic situation. The impact of the pandemic on human mental health has been already examined and established – an increase in the number of stressors and mental health disorders was noted [33]. According to the studies, anxiety and fear caused by the COVID-19 pandemic are related to the pregnant women's mental health and might seriously lower their quality of life [26,34].

During this research it was established that in the women that had conversations with their doctor about the COVID-19 pandemic and its impact on everything that is related to pregnancy and labor, the average Likert score of the questions about fears and concerns was higher compared to the population that did not have that kind of conversation. That is the opposite to some other reports in which the greater the knowledge about COVID-19, the more positive is their attitude to it [35]. The authors hypothesize that in some cases having a conversation with the gynecologist about COVID-19 during which not all concerns were explained may have a worse outcome on fear levels than not having that conversation at all. That was presented in the Theuring et al. [36] study, where the stress levels in women with

less general knowledge about COVID-19 were lower compared to the better-informed group. However, that does not mean that gynecologists should not initiate a conversation about COVID-19 with their pregnant patients. Clearing every concern that arises during the course of pregnancy is important responsibility that every clinician should provide for their patient.

Another stressing factor for pregnant women was a change in the place for delivery from the previously planned to a new one, which was caused by the transformations of some hospitals to COVID-19 treatment focused hospitals. Probably switching the place of the planned birth gave rise to an increased sense of fear and anxiety because of the general "fear of the unknown" and lack of control over which hospital they planned to give birth [37,38]. Similarly, the cancellation of previously scheduled antenatal visits was identified as an event that increases feelings of fear. It is compatible with other research regarding the Polish population, where the cancellation or postponement of prenatal gynecological visits correlates with higher stress levels [39].

Caesarean sections are usually performed when natural birth cannot take place, whether it is planned or not, it is a stressful experience for delivering women. It was proven that undergoing C-sections increases the risk of anxiety and depression [40,41]. It corresponds to the findings of the present study, where the performance of a C-section influenced fear levels in the group of women that underwent it. It is noteworthy that among the women delivering in the pandemic time, the number of requested C-sections grew compared to the non-pandemic time, as well as in the group of infected women giving birth [42,43].

According to the presented findings, a prolonged hospital stay may increase the feeling of fear and



elevate the average Likert score in the responses from women that experienced it. Women who stayed in the hospital ward for less than two days were significantly less concerned than others that had a prolonged hospital stay. In reference, the participants that had their hospital stay prolonged for more than seven days responded with a higher Likert score than the other group with a shorter hospitalization. It is consistent with other studies, suggesting that maternal postpartum stress levels are associated with the length of hospital stay [44].

The correlation between the number of hospitalizations and the average Likert score about concerns were described. Women hospitalized more times were more likely to estimate their level of fear and concerns as higher. It might be caused by additional stress levels connected to each subsequent hospitalization. Each stay in the hospital is a factor that affects a patient's mental health and causes increased stress levels, mostly because of fear and uncertainty of the outcome [45].

It is also consistent with the findings of this study, where any hospitalization that occurred during the course of pregnancy, was identified as a stressing factor that increases the average Likert score, which is a consequence of the experience of fear and anxiety. Pregnant women linked every hospitalization with an increased risk of complications or infection [46].

Women affected by a urinary system infection during the time of childbearing were found to have elevated levels of fears and concerns according to the presented study. It was reported in the Liu et al. [47] study that urinary system infections are associated with a higher risk of postpartum depression, which is caused by affecting mental stress. That higher level of stress causing concerns seems to be justified, because it indeed enhances the risk of preterm delivery [48].

During the COVID-19 pandemic, the interest in home birth and the number of women that decided to switch the place of planned labor from a hospital ward to home conditions increased [49]. According to data from the USA, the interest in the possible option of home birth grew right after the beginning of the COVID-19 pandemic, were officially confirmed [50]. This is the opposite to the data from previous years when pregnant women preferred to give birth in the hospital than in their home, driven by a greater fear of home labors [51]. Nevertheless, the discussed study presents that considering home birth was a factor that enhanced the feeling of fear among the surveyed population of pregnant women, probably because of the stress and anxiety due to a possible infection and its consequences during hospitalization.

Patients experiencing difficulties becoming pregnant are in a group of risk when it comes to depression and have increased chances of feeling anxiety because of that [52]. Also, groups of patients suffering from diabetes and from anemia feel anxiety and fear more frequently than healthy groups in non-COVID-19 conditions [53,54]. Folic acid supplementation may, however, act as a protective factor against perinatal depressive symptoms [55].

A limitation of the presented study is the fact, that it refers to the first months of the global COVID-19 pandemic, thus it describes the situation when specified guidelines were not prepared by gynecological societies and anti-COVID procedures were being freshly implemented in the health care system. The authors believe that another follow-up study could be performed in the future to assess the fears and concerns among pregnant women in Poland now, when they have access to the more precise data, describing the impact of COVID-19 on the fetus and pregnancy. Also, a huge aspect that is now implemented in the health care system, but was not accessible when the authors were conducting the presented study is the availability of vaccines against COVID-19.

CONCLUSIONS

The stress caused by a possible COVID-19 infection and other non-infectious but health system implications are negative factors that influence pregnant women. There are numerous studies that have investigated the impact of COVID-19 on the pregnancy and the potential complications, however, it will take many years to fully establish the possible consequences. The average Likert score has been proven to correlate with higher fear levels in the case of women who are affected by additional stressful events like prolonged hospitalizations, cancelled prenatal visits or caesarean section.

The findings of the presented study might be used to identify units that are more exposed to higher stress, anxiety, fear and concern levels because of the pandemic related circumstances and to apply necessary psychological support when it is needed.

Funding

Not applicable.

Conflicts of interest

Authors declare no conflict of interest.



Author's contribution

Study design – M. Zabochnicki, A. Wikarek, K. Pędryś, T. Wikarek, M. Lemm, K. Nowosielski

Data collection – M. Zabochnicki, A. Wikarek, K. Pędryś, K. Pokora, M. Skulik, K. Zabochnicki, T. Wikarek, M. Lemm, K. Nowosielski

Data interpretation – M. Zabochnicki, A. Wikarek, K. Pędryś, M. Skulik

Statistical analysis – M. Skulik, M. Zabochnicki

Manuscript preparation – M. Zabochnicki, A. Wikarek, K. Pędryś, K. Pokora, M. Skulik, K. Zabochnicki

Literature research – M. Zabochnicki, A. Wikarek, K. Pędryś, K. Pokora, M. Skulik, K. Zabochnicki

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