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Full length article

Correlation between depressive symptoms and sexual dysfunction in postpartum women during the COVID-19 pandemic

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\textbf{ABSTRACT}

\textbf{Objective:} To evaluate the relation between sexual function and depressive symptoms in puerperal women during the pandemic period.

\textit{Study design:} Prospective cohort with 125 women evaluated in the immediate postpartum period (before the pandemic - T1) in Hospital de Clinicas de Porto Alegre, 3 months (pandemic onset - T2) and 6 months (pandemic peak – T3) after birth by email and WhatsApp. The Female Sexual Function Index (FSFI) and the Edinburgh Postnatal Depression Scale (EPDS) were applied.

\textbf{Results:} Fifty puerperal women participated in the three periods of the study. The median age was 25 years. There was an inverse correlation between the FSFI and EPDS values at T2 (p < 0.001) and T3 (p < 0.001), demonstrating that the worsening sexual response was secondary to the higher prevalence of depressive symptoms in the puerperium in the COVID-19 pandemic. There was an increase in EPDS scores in the three periods: at T1, the EPDS scores were 5.0 (2.0 – 9.0), increasing to 7.0 (4.0 – 14.0) at T2 and 6.5 (3.0 – 13.0) at T3 (p = 0.004). There was no difference between the FSFI index at the three evaluated times.

\textbf{Conclusions:} Puerperal women are a susceptible subgroup for sexual dysfunction and depressive symptoms, which are correlated to each other and worsen in periods of stress, therefore, it is mandatory to investigate depressive symptoms in puerperal women with sexual complaints, especially during the COVID-19 pandemic.

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\section*{Introduction}

Female sexual health is impacted by major disasters [1]. Studies performed after earthquakes and hurricanes have shown a significant reduction in the frequency of sexual intercourse, satisfaction with sexual life, the desire for a new pregnancy and in contraception [2,3].

In December 2019, the virus that causes COVID-19, SARS-Cov-2, was identified in China, responsible for the development of influenza syndrome and severe acute respiratory syndrome, which can lead to important morbidity and mortality in humans [4]. Since then, the rates of new infections with the virus, hospital admissions and deaths from the disease have grown exponentially around the world and in March 2020 pandemic status was declared by the World Health Organization [5]. Up to October 2020, Brazil had 5,055,888 cases and 149,639 deaths caused by the disease, becoming the global epicenter of the pandemic in July 2020 [6]. The largest number of cases in the southern region of Brazil occurred between June and August 2020.

Female sexual dysfunction is a prevalenlty and poorly diagnosed health problem [7,8]. It encompasses the dysfunction of desire, arousal, lubrication, orgasm, satisfaction and pain, with negative effects on the quality of life of affected women. Pregnancy and puerperium are considered vital crises for women and modify the female sexual response. There are data showing a reduction of up to 64 % in interest in sexual activity after childbirth. The return to sexual activity occurs on average four months after birth, with a variation from one month to two years [9].

Studies [10,11] have shown a reduction in sexual frequency and a significant fall in Female Sexual Function Index (FSFI) scores in adult women during the pandemic period. Therefore, the importance of assessing female sexual health in one of the

\url{https://doi.org/10.1016/j.ejogrb.2020.12.039}

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countries most affected by COVID-19 has become evident, especially at a vulnerable period regarding sexual dysfunction, such as the puerperium.

To date, there has been no study comparing FSFI and EPDS scores prior to the COVID-19 pandemic, during its early state and during the peak of disease in postpartum women. The present study evaluated female sexual function and depressive symptoms in the immediate puerperium and up to 6 months after birth, during COVID-19 pandemic, and aimed to correlate these scores.

**Materials and methods**

Prospective cohort study analyzing sexuality and depression in 125 women admitted for delivery at Hospital de Clínicas de Porto Alegre from November 2019 to March 2020. The participants were evaluated at three time points: 48 h of puerperium (before the first case of COVID-19 in Brazil), 3 months after birth (during the beginning of the pandemic in the south of the country) and 6 months after birth (the peak number of COVID-19 cases in southern Brazil). The questionnaires were self-reported. At T2 and T3, an online questionnaire was sent through e-mail and/or WhatsApp to reevaluate the participants. At T2, 79 patients answered the questionnaire and at T3, 50 patients answered the questionnaire, according to Fig. 1.

Women 18 years of age or older admitted for childbirth, with 37 weeks of gestation or more, who gave birth to a live fetus during the evaluated period were included. Women diagnosed psychiatric disorders or abstinence on illicit drugs and puerperal women hospitalized in an intensive care center were excluded. Only patients who met the eligibility criteria and answered to questionnaires at all three evaluation times were considered.

The participants signed a free and informed consent form and the researchers signed the Terms of Commitment to Use Medical Records Data. The project was approved by Plataforma Brasil (CAAE 19542819.2.0000.5327) and by the Research Ethics Committee of the Hospital de Clínicas de Porto Alegre. The present study follows the checklist proposed by STROBE.

>Sexual function was assessed using the Female Sexual Function Index (12) and the Edinburgh Postnatal Depression Scale (13) was applied to assess the risk of postpartum depression. Sociodemographic and gestational data were extracted from the electronic medical records.

The primary outcome was the correlation between the FSFI and EPDS in puerperal women at the three time points of the study. The secondary outcome was the variation in FSFI and EPDS scores.

This study was designed, approved and initiated before the beginning of the pandemic in Brazil, but follow-up occurred after the onset of the pandemic in the country. Thus, to ensure the veracity of non-significant differences, statistical power was calculated. The sample size required was calculated using WinPepi version 11.65 and considered pre- and post-pandemic FSFI scores published in a study by Yuksel and Oz in 2020; for a significance level of 95% and loss of 20%, it would be necessary to study 38 women.

The quantitative variables were evaluated as median and quartiles (25–75). Spearman’s correlation was used for the correlation between FSFI and EPDS scores and age and FSFI. Friedman’s test was performed to evaluate the variation in FSFI scores, FSFI domains and EPDS at the three time points. To evaluate the depression score, a categorical variable (positive or negative depression) was created. Depression scores greater than or equal to 10 were considered positive depression and Cochran’s Q test was applied to assess the prevalence of positive scores between the three time points.

**Results**

The 50 women who participated in the three phases of the research were considered for analysis. The median age of the patients evaluated was 25 years. Most participants were single and lived with their partner. Regarding schooling, 72.9% of women had 11 or more years of schooling, which corresponds to having completed at least high school.

Table 1 shows the sociodemographic characteristics of the participants.

In the analysis correlating sexual function and depression, there was a moderate inverse correlation between FSFI values and EPDS scores at T2 (r = -0.594; p < 0.001) as shown in Fig. 2 and a strong inverse correlation at T3 (r = -0.608; p < 0.001) as seen in Fig. 3, demonstrating that the worsening in sexual response is secondary to the higher prevalence of depressive symptoms in the puerperium.

A total FSFI equal to or less than 26.55 was considered to indicate sexual dysfunction. At T1, the median total FSFI score was 25.1 (SD 18.8–30.8); at T2, the median was 21.7 (SD 15.3–28.5); at T3, the median FSFI score was 22.9 (SD 12.2–29.7).

![Fig. 1. Inclusion and follow-up.](image-url)
In T1, pre-pandemic period, 60% of evaluated women had FSFI scores below 26.55. There was no difference in sexual dysfunction at T2 and T3 (at the beginning and at the peak of the pandemic, respectively) (Table 2).

Regarding the FSFI domains, there was a difference in lubrication scores between the three time points, i.e. 4.7 (2.4–6.0) at T1, 4.1 (1.8–5.4) at T2 and 4.4 (2.4–6.0) at T3 (p < 0.049). For the other domains (desire, arousal, satisfaction, orgasm and pain), there was no difference in the values between T1 and T2 and between T1 and T3 (Table 2).

A difference was found in the EPDS evaluated at the three time points of the study, with an increase in the values, demonstrating a worsening of depressive symptoms after delivery. According to the data presented in Table 2, at T1 the EPDS score was 5.0 (2.0–9.0), increasing to 7.0 (4.0–14.0) at T2 and 6.5 (3.0–13.0) at T3 (p = 0.004).

Table 1
Sociodemographic characteristics of 50 women assessed in the pre-pandemic and during pandemic period.

| Characteristic                  | Women (n = 50) (n, n%) |
|--------------------------------|------------------------|
| Age (years)                    | 25.0 (23.0–32.0)       |
| Marriage status                |                        |
| Unmarried                      | 32 (64.0)              |
| Married                        | 18 (36.0)              |
| Lives with partner (n = 48)    |                        |
| Yes                            | 40 (83.3)              |
| No                             | 8 (16.7)               |
| Education (years) (n = 48)     |                        |
| < 11 years                     | 13 (27.1)              |
| 11 years                       | 35 (72.9)              |
| Employed (n = 49)              |                        |
| Yes                            | 20 (40.8)              |
| No                             | 29 (59.2)              |
| Monthly family income (n = 47) |                        |
| <= US$ 570                     | 37 (78.7)              |
| > US$ 570                      | 10 (21.3)              |
| Number of children             | 2.0 (1.0–2.0)          |
| Delivery                       |                        |
| Vaginal                        | 30 (60.0)              |
| Elective C-section             | 14 (28.0)              |
| C-section during labor         | 6 (12.0)               |

Quantitative variables are presented in medians and quartiles (25–75) and qualitative variables in absolute (n) and relative (n%) values.

The type of delivery did not determine a difference in the prevalence of sexual dysfunction at any of the time points evaluated using the Yates continuity correction (T1 p = 0.377, T2 p = 0.857 and T3 p = 0.307).

Discussion

During the period of the COVID-19 pandemic, changes in mood and sexuality are expected since the population has its daily activities restricted or suspended. In Rio Grande do Sul, the Brazilian state where this study was conducted, the imposition of social isolation for the entire population began in March 2020. Besides that, the population studied here is especially vulnerable to sexual dysfunction and depression, because it is a phase of great change: motherhood, breastfeeding, new family dynamics, concern for the newborn and recovery after childbirth.

Regarding the correlation analysis between the total FSFI values and scores of the EPDS, it was evident in the present study that there was a moderate inverse correlation between FSFI and EPDS values at T2 and a strong inverse correlation at T3. This concept makes it essential to consider the application of both scales.
(FSFI and EPDS) whenever there is a complaint of changes in sexual life during the puerperium.

Most study participants already had sexual dysfunction in the first evaluation. The prevalence of sexual dysfunction increased to 64 % women at T2 and T3. This rate is in accordance with the international literature, where 50–70% of sexual dysfunction is recorded in the third trimester of pregnancy [14]. In a previous study conducted by our group [15], a prevalence of sexual dysfunction of 51 % was found in pregnant women in the third trimester, similar to that found here.

Sexual dysfunction in the third trimester of pregnancy is related to fear of hurting the fetus, triggering problems during pregnancy, low self-esteem and relationship problems [14], demonstrating the predisposition of these women to sexual dysfunction. Perhaps in a comparison between the second trimester (when the uterine volume is still small) and the puerperium, these differences could be more evident, similarly to that identified in a previous study [16], which demonstrated a reduction in the total FSFI value when comparing non-pregnant women and pregnant women (FSFI 22.7 vs. 18.9, respectively).

Some publications on sexuality in women during the pandemic are already available, but, so far, this study is the first to compare puerperal women in the pre-pandemic period and at two points during the pandemic period, also looking at the presence of depression. Schiavi et al. [11] demonstrated in a cohort of women of reproductive age significant decrease in total FSFI values (29.2 ± 1.9 vs. 19.2 ± 3.3 p < 0.001) and in the domains on orgasm (4.8 ± 0.9 vs. 3.6 ± 1.1 p < 0.001) and satisfaction (5.9 ± 1.3 vs. 4.2 ± 1.4 p < 0.001) comparing before and during the COVID-19 pandemic. These authors, however, did not collect data on depression and, therefore, the effect of mood symptoms (a potential bias) on sexuality cannot be assessed.

It is important to highlight the high rate of sexual dysfunction at T3. This evaluation reflects the moment of the peak of the pandemic, where there was a recommendation for social isolation and dissemination of the risks of developing the disease, which may cause concern about intimate contact with a partner. Social isolation may have significantly contributed to higher rates of sexual dysfunction, together with the difficulties inherent to the puerperium. A recent study [17] conducted in non-pregnant adult women demonstrated that social isolation during the COVID-19 pandemic interfered with sexuality, resulting in a 40 % decrease in sexual activity.

When we individually evaluated the domains of sexual function (desire, arousal, satisfaction, lubrication, orgasm and pain), there was a difference in the three time points evaluated for the lubrication domain. In this way, it becomes prudent to look at factors that can negatively impact vaginal lubrication. Hypoestrogenism associated with puerperium and breastfeeding may result in atrophy of the vaginal squamous epithelium, reductions in glandular secretions and capillary fragility, resulting in fissures, discomfort and pain during sexual intercourse.

Regarding the results of the EPDS, the studied population had a significant increase in total scores. There was an increase in the rate of women considered at increased risk for depression (EPDS ≥ 10) between T1 and T2 and between T1 and T3, from 24 % to 40 % at the two follow-up time points (p = 0.062). The increase in the EPDS values presented in this study is corroborated by an analysis performed in Italy by Zanardo et al. (10), comparing the application of EPDS in women during the pandemic with a control group investigated in 2019 (8.5 ± 4.6 vs. 6.34 ± 4.1; P < 0.001).

There is no irrefutable scientific evidence that the route of delivery is an independent factor in the worsening of sexual function in the puerperium. Saydam et al. [18] demonstrated similar rates of sexual dysfunction for delivery routes: 70.8 % for vaginal deliveries and 64.9 % for cesarean sections considering sexual dysfunction as a FSFI score equal to or lower than 26.55. This study also did not show a significant difference in the rates of sexual dysfunction between vaginal delivery and cesarean section considering the same cutoff point at the three evaluation time points.

One of the limitations of this study, common to cohort studies, are losses to follow-up. To this end, we recalculated the sample needed to evaluate the primary outcome (variation in FSFI indices), providing a statistical power of 95 %. Thus, it is possible to state that the absence of a difference in FSFI indexes at the three time points was not due to a lack of power. Due to the pandemic, the follow-up questionnaires, T2 and T3, were applied via e-mail and online, limiting the follow-up in the study to patients who have Internet, email and/or a smartphone. It is also believed that part of the loss was due to the need to care for the newborn, limiting the participant’s free time available for other activities. Moreover, the fact that most participants live with their partner may also have impaired the response to sexuality questionnaires if there was no possibility of doing so in a private environment.

The results of this study emphasize that puerperal women are a susceptible subgroup for sexual dysfunction and depressive symptoms, which are correlated to each other and worsen in periods of stress. In conclusion, it is mandatory to investigate

**Table 2**

|                      | T1 (n = 50)   | T2 (n = 50)   | T3 (n = 50)   | P-value |
|----------------------|--------------|--------------|--------------|---------|
| Depression (n, n%)   | 5.0 (2.0–9.0) | 7.0 (4.0–14.0) | 6.5 (3.0–13.0) | 0.004 * (a) |
| Positive             | 12 (24.0)    | 20 (40.0)    | 20 (40.0)    | 0.002 (b) |
| Negative             | 38 (76.0)    | 30 (60.0)    | 30 (60.0)    |         |
| FSFI                 | 25.1 (18.8–30.8) | 21.7 (15.3–28.5) | 22.9 (12.2–29.7) | 0.322 (a) |
| Sexual dysfunction (n, n %) |                  |              |              |         |
| Yes                  | 50 (60.0)    | 52 (64.0)    | 52 (64.0)    | 0.381 (b) |
| No                   | 20 (40.0)    | 18 (36.0)    | 18 (36.0)    |         |
| Desire               | 3.6 (3.0–4.2) | 3.0 (2.4–3.6) | 3.3 (2.4–4.8) | 0.115 (a) |
| Arousal              | 3.9 (2.7–5.1) | 3.6 (2.1–4.8) | 3.6 (1.8–5.4) | 0.319 (a) |
| Lubrication          | 4.7 (2.4–6.0) | 4.1 (1.8–5.4) | 4.4 (2.4–6.0) | 0.049 * (a) |
| Orgasm               | 4.4 (2.8–5.6) | 3.2 (1.6–4.8) | 4.0 (1.2–5.2) | 0.069 (a) |
| Satisfaction         | 4.6 (2.8–6.0) | 4.4 (2.4–5.6) | 3.6 (2.0–6.0) | 0.126 (a) |
| Pain                 | 4.4 (2.8–5.2) | 4.0 (1.6–5.6) | 4.0 (1.6–6.0) | 0.069 (a) |

In the lines, the values with different overlined letters (a, b) indicate significant differences (p ≤ 0.050) between the times evaluated based on the Dunn-Bonferroni post hoc test.

*Statistical significance considered p ≤ 0.050: (a) Friedman test, (b) Cochran’s Q test, (c) McNemar test.
Depressive symptoms in puerperal women with sexual complaints, especially during the COVID-19 pandemic.

Conclusions

COVID-19 has had a significant impact on the health and quality of life of the population. This study was the first to analyze sexual function and depressive symptoms during the COVID-19 pandemic among puerperal women, which is a subgroup susceptible to changes in sexual activity and mood. The scores regarding depressive symptoms increased during the pandemic and this significantly impacted the sexual function of the evaluated women. We call attention to health professionals so that the care for this population is redoubled, thereby reducing the possibility of depression every time sexual complaints arise and avoiding or mitigating personal and family suffering in the short and long term [12,13].

CRediT authorship contribution statement

Marcela Siliprandi Lorentz: Conceptualization, Methodology, Validation, Investigation, Resources, Data curation, Writing - original draft, Writing - review & editing. Luciana Borges Chagas: Investigation, Data curation, Writing - review & editing. Amanda Vilaverde Perez: Investigation, Data curation, Writing - review & editing. Paulo Antonio da Silva Cassol: Writing - original draft, Writing - review & editing. Janete Vettorazzi: Validation, Writing - review & editing, Supervision. Jaqueline Neves Lubianca: Conceptualization, Methodology, Validation, Resources, Writing - review & editing, Funding acquisition, Supervision.

Declaration of Competing Interest

The authors report no declarations of interest.

Acknowledgments

Proof-Reading: Proof-Reading-Service.com.

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