

Oxytocin Levels and Their Impact on Postpartum Mental Health

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Abstract

Background: Postpartum depression is a significant mental health challenge, particularly among vulnerable women. Mothers experiencing mood or anxiety disorders may display less favourable interactions with their infants. Oxytocin, a hormone crucial in childbirth, breastfeeding, and maternal-infant bonding, is also thought to influence postpartum depression. This neuropeptide is associated with enhanced maternal interactions and could provide antidepressant and anxiolytic effects, particularly in mothers with mood disorders.

Objective: This study aims to assess oxytocin levels in postpartum women on the first and third days after delivery and evaluate their mental health.

Methods: The study employed a correlation design to investigate the relationship between oxytocin levels and postpartum mental health on days 1 and 3 following childbirth. Oxytocin levels were measured using the ELISA method, while postpartum mental health was assessed using the Edinburgh Postnatal Depression Scale (EPDS). The study included postpartum mothers who underwent cesarean delivery and had no health complications.

Results: Findings indicated a significant difference in oxytocin levels between days 1 and 3 ($p = 0.005$). However, no significant variation was found in maternal mental health across these days ($p = 0.775$). The analysis revealed a strong correlation between oxytocin levels and EPDS scores on day 1, while no significant correlation was observed on day 3.

Conclusion: Differences in oxytocin levels between postpartum days 1 and 3 were noted, though EPDS scores did not significantly change. A correlation was observed between oxytocin levels and EPDS scores on day 1, but not on day 3.

Keywords: Postpartum, Maternal Mental Health, Oxytocin, Depression, EPDS

Introduction

Maternal mental health significantly impacts both mothers and newborns. Early screening during pregnancy and postpartum can facilitate the timely identification and management of perinatal mental health disorders [1]. Despite recommendations from multiple health organizations advocating for universal screening, actual screening rates remain low, often lacking the use of validated assessment tools.

Mental health issues during pregnancy and postpartum can affect physical activity, nutrition, and sleep, thereby influencing both maternal mood and child development. Proper interventions can help mitigate these effects [2,3].

The postpartum period offers a unique opportunity for healthcare providers, including nursing practitioners, to assess both parents' well-being and facilitate early intervention [4,5]. Studies suggest that postpartum

depression affects approximately 10% of mothers, significantly impacting both maternal and infant health. Hormonal factors, particularly oxytocin levels, may play a crucial role in postpartum depression [6,7].

Materials and Methods

Study Design: This research utilized a cross-sectional approach. The independent variable was oxytocin levels in postpartum mothers, measured on days 1 and 3 following delivery. The dependent variable was postpartum mental health, assessed on both days.

Participants: The study included 30 postpartum mothers, all of whom had cesarean deliveries and no health complications.

Data Collection: Data was gathered in hospital and clinic settings by trained healthcare professionals. Postpartum mothers meeting the inclusion criteria underwent venous blood sampling on days 1 and 3 for oxytocin level assessment using the ELISA method. EPDS scores were obtained through a structured questionnaire completed by the mothers before blood collection. The EPDS questionnaire consists of 10 items measuring symptoms experienced over the past week, with responses scored from 0 to 3.

Data Analysis: Statistical tests were used to compare oxytocin levels between days 1 and 3 and to assess associations with EPDS scores.

The present study received ethical clearance from the Institutional Ethics Committee of Meenakshi Nursing College, Kanchipuram (Ref No: MNC/IEC/2023/27486). A detailed Participant Information Sheet was provided to all participants, and written informed consent was obtained prior to their enrollment in the study.

Results

Table 1: Comparison of Oxytocin Levels on Days 1 and 3

Day	Average Oxytocin Level (pg/ml)	p-value
1	607.87	0.00
3	820.87	

The study found significant variations in oxytocin levels between days 1 and 3. On day 1, the average oxytocin level was 607.87 pg/ml, whereas on day 3, it increased to 820.87 pg/ml. The statistical analysis indicated a significant difference ($p = 0.005$), suggesting a physiological shift during the postpartum period.

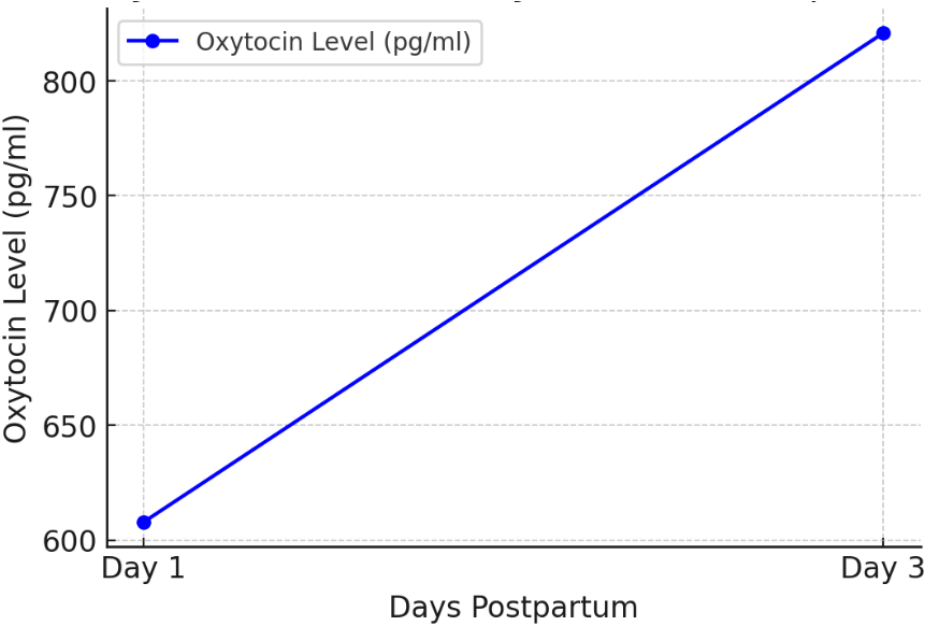


Figure 1: Oxytocin Level Variation Between Day 1 and Day 3

Oxytocin plays a vital role in maternal adaptation post-delivery, influencing emotional responses, stress management, and breastfeeding. Its levels can also be affected by the mode of delivery, with oxytocin infusion during cesarean section increasing hormone levels in maternal serum.

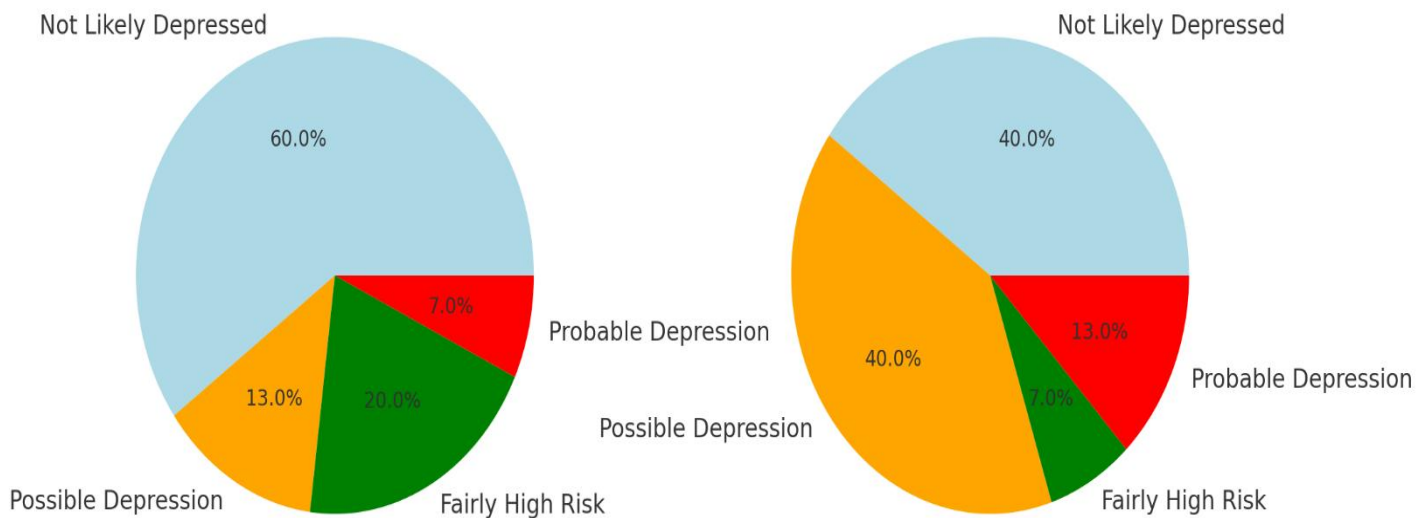


Figure 2: & 3: Postpartum Mental Health Distribution Day 1 & 3

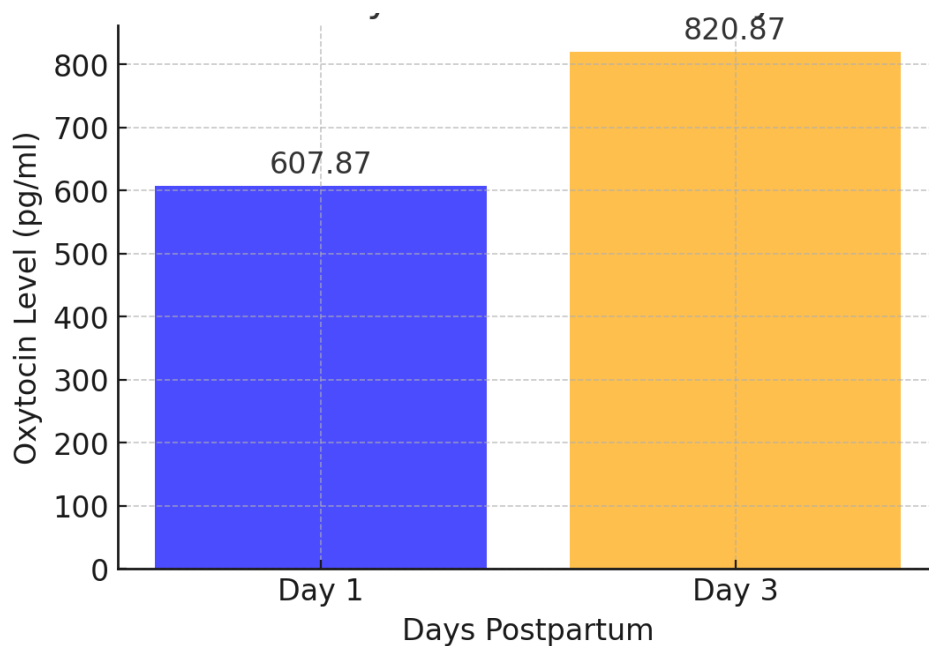


Figure 4: Oxytocin levels on day 1 and day 3

Postpartum Mental Health Based on EPDS Scores

The study assessed maternal mental health using the EPDS on days 1 and 3 postpartum. The frequency distribution of responses revealed that most mothers were categorized as “not likely depressed” on day 1, whereas a higher proportion moved into the “possible depression” category by day 3. However, statistical

analysis indicated no significant difference between EPDS scores on both days ($p = 0.775$).

Discussion

The findings of the present study align with existing literature suggesting a complex role of oxytocin in postpartum mental health. Massey et al. [14] reported that higher oxytocin levels were associated with greater severity of postpartum depressive symptoms among women with a prior history of depression, indicating that oxytocin's effects may be modulated by individual psychological vulnerability. Similarly, Bell et al. [7] highlighted that although oxytocin plays a role in stress regulation and maternal bonding, its influence on postpartum depression varies depending on personal, biological, and contextual factors.

In contrast, a systematic review by Thul et al. [11] concluded that there is no consistent or uniform relationship between oxytocin levels and postpartum depression. The variability in findings across studies underscores the complexity of oxytocin's involvement in mood regulation during the postpartum period. Some evidence suggests that endogenous oxytocin may exert protective effects, whereas exposure to synthetic oxytocin during labor has been associated with an increased risk of postpartum depressive symptoms in certain populations, as discussed by Bell et al. [7], Farewell et al. [8], and Buckley et al. [6].

Environmental and psychosocial stressors also appear to play a critical role in postpartum mental health. Chrzan-Dętkoś et al. [9] demonstrated that external factors, including stress related to the COVID-19 pandemic, had a greater impact on postpartum mental well-being than oxytocin levels alone. These findings are consistent with observations by Yan et al. [2] and ACOG Committee Opinion et al. [10], which emphasized the importance of contextual and environmental influences in the development of postpartum depression.

While the present study identified a significant correlation between oxytocin levels and EPDS scores on postpartum day 1, the absence of a similar association on day 3 suggests that additional biological, psychological, and social factors may predominate beyond the immediate postpartum period. This temporal variation supports conclusions drawn by Cardaillac et al. [13] and Zhu et al. [12], who emphasized that postpartum depression is a multifactorial condition and cannot be explained by oxytocin dynamics alone.

Overall, these findings reinforce the need for a comprehensive and individualized approach to postpartum mental health assessment. Screening tools such as the EPDS, validated by Cox et al. [5] and Long et al. [1], remain essential for early identification of at-risk women. Future research should focus on integrating hormonal, psychological, and environmental variables to develop personalized intervention strategies aimed at improving maternal mental health outcomes in the postpartum period.

Conclusion

This study identified significant changes in oxytocin levels between postpartum days 1 and 3. However, EPDS scores remained relatively stable across these days. A notable correlation between oxytocin levels and EPDS scores was observed on day 1 but not on day 3. These findings underscore the complexity of hormonal influences on postpartum mental health and highlight the need for further investigation into oxytocin's role in maternal well-being.

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Conflict of Interest: None declared.

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