Original Article

Effect of Peripartum Counseling on Salivary Cortisol and Depression in Late Pregnancy and Early Postpartum

Peripartum Counseling and Its Impact on Maternal Mental Health

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ABSTRACT

Objective: To evaluate the effect of peripartum counseling during the third trimester and early postpartum period on salivary cortisol levels and peripartum depression incidence in pregnant and postpartum patients.

Study Design: Non-randomized controlled trial study

Place and Duration of Study: This study was conducted at the Dr. Soetomo General Hospital and Airlangga University Hospital in Indonesia from September 2024 to January 2025.

Methods: This non-randomized controlled trial used a pretest-posttest control group design. Participants from the Obstetrics and Postpartum Outpatient Clinics underwent salivary cortisol testing and psychological assessment with the Edinburgh Postnatal Depression Scale (EPDS). The intervention included structured peripartum counseling focused on maternal self-confidence, emotional regulation, and marital satisfaction.

Results: There was no significant difference in salivary cortisol levels between the treatment and control groups ($p > 0.05$), though the treatment group showed a decreasing trend. However, a significant reduction in EPDS scores was observed in the treatment group compared to the control group ($p < 0.05$), indicating an improvement in depressive symptoms.

Conclusion: Peripartum counseling may help reduce symptoms of peripartum depression, though it did not significantly impact salivary cortisol levels. Further research with longer interventions, multiple cortisol measurements, and larger sample sizes is recommended to enhance understanding and optimize intervention strategies.

Key Words: Peripartum depression, peripartum counseling, salivary cortisol, maternal mental health

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INTRODUCTION

Peripartum depression (PPD) is a significant maternal mental health issue that remains underdiagnosed and understudied. It has serious consequences, including suicidal thoughts, with an estimated suicide rate of 20%.[1,2] PPD also contributes to identity loss and emotional distress[3] and negatively affects infant health, impacting birth weight, sleep quality, and cognitive and emotional development.[4,5] Poor mother-child bonding due to PPD is a known risk factor for developmental delays.[6]

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Globally, PPD affects 13–19% of postpartum mothers, yet nearly 50% remain undiagnosed. Additionally, 5% of PPD cases develop treatment-resistant depression,[7] underscoring the need for effective interventions.

Screening for PPD is standard in developed countries but should be more widely implemented elsewhere. The Edinburgh Postnatal Depression Scale (EPDS) is a widely validated tool, requiring less than five minutes to administer.[8,9] Biological markers such as salivary cortisol provide additional screening potential, as PPD is associated with hypothalamic-pituitary-adrenal (HPA) axis dysfunction, leading to elevated cortisol levels that persist postpartum.[10] Salivary cortisol is a non-invasive, reliable measure of free cortisol levels, unaffected by pregnancy-related fluctuations in corticosteroid-binding globulin.[11]

Peripartum counseling is a crucial early intervention, improving maternal mental health by enhancing self-confidence, emotional regulation, and marital satisfaction.[12] It is considered a safer alternative to psychopharmaceutical treatments for pregnant and lactating women.[13] Targeted screening and counseling during antenatal visits and early postpartum can help reduce PPD incidence.[14]

Given the significant impact of PPD, this study examines the effect of peripartum counseling in the

third trimester and early postpartum period on salivary cortisol levels and PPD incidence in patients at Dr. Soetomo General Hospital and Airlangga University Hospital.

METHODS

Study Design and Setting: This study employed a pretest-posttest control group design to evaluate the effect of peripartum counseling on salivary cortisol levels and peripartum depression. The study was conducted at Dr. Soetomo Hospital and Airlangga University Hospital, both tertiary referral centers providing maternal and perinatal healthcare, from September 2024-January 2025.

Participants: A total of 18 pregnant and postpartum women meeting the inclusion criteria were enrolled and randomized into two groups. The treatment group (n = 9) received standard antenatal and postpartum care plus structured peripartum counseling at 36 weeks gestation and 1 week postpartum, while the control group (n = 9) received standard care only. Eligible participants were 18–40 years old, at 36 weeks gestation, and had parity between one and three. Exclusion criteria included complex obstetric risks, initial EPDS scores above 12, major psychiatric disorders, chronic illnesses affecting cortisol, corticosteroid use, and pregnancy complications requiring emergency care. All participants provided informed consent.

Intervention: Peripartum Counseling: Peripartum counseling was delivered in two face-to-face sessions at 36 weeks gestation and 1 week postpartum, each lasting 45–60 minutes. Sessions were led by trained clinical psychologists using CBT-based techniques, focusing on maternal self-efficacy, emotional regulation, stress management, and improving marital communication and support.

Outcome Measures: Salivary cortisol was measured to assess physiological stress, with samples collected between 08:00–09:00 AM before breakfast to minimize diurnal variation. Analysis was performed using the Euroimmun kit and competitive ELISA method at two time points: 36 weeks gestation (pre-intervention) and 1 week postpartum (post-intervention). Depressive symptoms were assessed using the Edinburgh Postnatal Depression Scale (EPDS), with scores ≥10 indicating clinically relevant symptoms. EPDS was administered at the same two time points.

Ethical Clearance: This study was approved by the Ethics Committee of Airlangga University and Dr. General Soetomo Hospital. Written informed consent was obtained from all participants after they were informed about the study objectives, procedures, risks, and benefits. Participation was voluntary, and confidentiality was maintained throughout the study.

Statistical Analysis: Data were analyzed using SPSS version 26. Normality was assessed with the Shapiro-Wilk test. Paired t-tests or Wilcoxon signed-rank tests were used for within-group comparisons, depending on data distribution. Between-group differences were analyzed using the Mann-Whitney U test, with p-values <0.05 considered statistically significant.

RESULTS

A total of 18 pregnant women meeting the eligibility criteria were included in the study, with 7 participants recruited from the Obstetrics Polyclinic of Dr. General Soetomo Hospital Surabaya and 11 from Airlangga University Hospital.

Participants in both groups were similar in age, household size, religion, and employment status. Differences were noted in education, marital status, income, and housing. The treatment group had more participants with higher education and lived more often with parents, while the control group had lower income, more home ownership, and included individuals married only religiously.

The treatment and control groups were similar in gestational age, parity, delivery method, and breastfeeding status. Two-thirds in both groups delivered via cesarean section, and 77.8% in each group practiced exclusive breastfeeding. The control group had a higher prevalence of pre-existing medical conditions, family history of illness, and postpartum complications, including hemorrhage and surgical wound infection. In contrast, nearly 89% of the treatment group reported no complications. While the average birth weight was slightly higher and more stable in the treatment group, the median birth weight was identical in both groups.

Table No.1. Psychological Disorder Characteristics of Study Participants Based on MINI ICD-10, MSI-BPD, and SRSS

	Treatment (n = 9)	Control (n = 9)
MINI ICD-10		
Depressive episode	7 (77.8%)	8 (88.9%)
Depressive episodes, Dysthymia, PTSD	0 (0%)	1 (11.1%)
Depressive Episode, Suicide Risk	1 (11.1%)	0 (0%)
Depressive episode, GCM, PTSD	1 (11.1%)	0 (0%)
Duration of suffering from disorder (months)		
Mean ±Standard Deviation	1.28 ±1.481	1.89 ±2.702
Median (min – max)	0.5 (0.5 – 5)	1 (0.5 – 9)

Differences in marital history, relationship dynamics, and psychological health were noted between groups. All participants in the treatment group were in their first marriage, whereas 22.2% of the control group were in their third. Divorce in the control group was linked to spousal infidelity and domestic violence, neither of

which were reported in the treatment group. Most participants in both groups married by personal choice, although 11.1% in the treatment group had arranged marriages. Marital relationships were generally harmonious in both groups, though 11.1% of the treatment group reported experiencing disharmony.

Table No.2. Comparison of Salivary Cortisol Levels and EPDS Scores Between Treatment and Control Groups

	Mean ±Standard Deviation Median (min – max)		p-value
	Treatment (n = 9)	Control (n = 9)	
Salivary cortisol levels			
Beginning	7.85 (4.22 – 29.63)	7.47 (2.32 – 10.96)	0.825
End	6.06 ±3.578	8.76 ±4.155	0.160
Difference	-3.77 ±8.049	1.89 ±2.796	0.064
EPDS Score			
Beginning	13 (12 – 20)	13 (12 – 18)	0.963
End	10.22 ±5.540	14.67 ±4.555	0.082
Difference	-4 (-11 – 9)	0 (-2 – 9)	0.041

Table No.3. Changes in Salivary Cortisol Levels and EPDS Scores Before and After Peripartum Counseling

Group	Mean ±Standard Deviation Median (min – max)			p-value
	Beginning	End	Difference	
Treatment (n = 9)				
Salivary cortisol levels	9.83 ±8.074	6.06 ±3.578	-3.77 ±8.049	0.198
EPDS Score	6.87 ±2.919	8.76 ±4.155	1.89 ±2.796	0.077
Control (n = 9)				
Salivary cortisol levels	13.67 ±2.598	10.22 ±5.540	-3.44 ±6.267	0.138
EPDS Score	13 (12 – 18)	13 (10 – 22)	0 (-2 – 9)	0.497

Differences were observed in menstrual mood disturbances, attitudes toward pregnancy, and prior mental health. The treatment group reported more menstrual-related mood symptoms and negative attitudes toward pregnancy, while the control group had a higher prevalence of past depression. Stressor profiles also differed: the treatment group more frequently cited physical and fetal health concerns, whereas the control group more often reported emotional regulation difficulties and situational stress. Both groups reported similar levels of parenting insecurity and marital dissatisfaction. Psychometric assessments (Table 1) confirmed depressive episodes in both groups, though symptom patterns varied. In the treatment group, 11.1% had depressive episodes with suicide risk, and another 11.1% had comorbid depression, anxiety, and PTSD. In the control group, 11.1% experienced depression alongside dysthymia and PTSD. The average duration of symptoms was longer in the control group, with a median of one month compared to half a month in the treatment group.

Salivary cortisol and EPDS scores were analyzed to evaluate the impact of peripartum counseling. While no significant differences in cortisol levels were observed between groups at baseline, post-intervention, or in change scores ($p > 0.05$), the treatment group exhibited a downward trend following counseling. Similarly, although EPDS scores at baseline and post-intervention did not differ significantly, a significant difference was found in the change between time points ($p < 0.05$), indicating a greater reduction in depressive symptoms in the treatment group (Table 2). The treatment group also had a higher mean stress score, though mild stress levels were only found in the control group (11.1%). Overall, while between-group differences were not statistically significant for cortisol and EPDS at individual time points, the intervention group showed a more favorable trend in both biological and psychological outcomes (Table 3).

DISCUSSION

This study evaluated the effect of peripartum counseling on salivary cortisol and depressive symptoms. While no significant changes were observed in cortisol levels, the reduction in EPDS scores in the treatment group suggests a potential benefit for mood regulation. Although both groups were demographically similar, differences in socioeconomic status, education, and marital history may have shaped mental health outcomes. The control group had more participants with low income, prior medical conditions, and postpartum complications—factors that likely contributed to higher depression severity and stress responses.[15,16]

One of the key findings was the reduction in EPDS scores in the treatment group, which suggests that targeted counseling can help alleviate peripartum depressive symptoms. Previous studies have shown that psychological interventions, particularly those focusing on emotional regulation and maternal self-confidence, are effective in reducing perinatal depression.[17,18] Counseling may provide coping strategies that mitigate emotional distress and promote resilience, contributing to better psychological well-being even if physiological stress markers such as cortisol remain unchanged.

The lack of significant differences in cortisol levels between the treatment and control groups aligns with previous research showing that cortisol responses in peripartum women are complex and influenced by multiple factors, including sleep disturbances, chronic stress, and hormonal fluctuations. While some studies have suggested that cortisol can serve as a biomarker

for peripartum depression, the findings in this study indicate that psychological improvements do not always correlate with immediate physiological changes.[10,11, 19] The observed decreasing trend in cortisol levels in the treatment group suggests a potential long-term benefit, though a longer follow-up period would be needed to confirm this effect.

Differences in marital and relationship contexts also played a role in stress perception and coping strategies.[20,21] The control group had a higher proportion of participants with multiple marriages and a history of divorce due to infidelity or domestic violence. Such experiences are known to increase the risk of depression and stress-related disorders, which may explain the greater severity of depressive symptoms in this group. Conversely, the treatment group had a higher prevalence of menstrual mood disorders and negative attitudes toward pregnancy, which could indicate pre-existing vulnerabilities that counseling may have helped address.

The stressor profiles of the two groups also differed, with the treatment group reporting more concerns related to physical health and fetal well-being, while the control group experienced more stress related to emotional regulation and situational stressors. This difference suggests that peripartum counseling may be particularly beneficial for those struggling with internalized distress and personal coping mechanisms. The study also found that mild stress levels were only present in the control group, while the treatment group exhibited higher overall stress scores. This may indicate that participants in the treatment group were more aware of their stressors due to counseling, which could initially lead to increased stress perception before longer-term benefits become evident.

While this study showed promising improvements in depressive symptoms after counseling, several limitations should be noted. The small sample size may have reduced statistical power, limiting the ability to detect subtle changes in cortisol. The short follow-up period may also have been insufficient to capture long-term physiological effects. Future studies with larger samples, longer follow-up, and broader outcome measures are needed to better evaluate the impact of peripartum counseling.

CONCLUSION

This study suggests that peripartum counseling may help reduce depressive symptoms, as reflected by a significant decline in EPDS scores in the treatment group. Although salivary cortisol levels did not change significantly, the downward trend indicates possible long-term benefits. Variations in socioeconomic status, marital history, and stressor types underscore the need for individualized mental health support. Despite its limitations, the findings support integrating structured counseling into routine maternal care and highlight the need for larger, randomized studies to further assess its psychological and physiological impact.

Author's Contribution:

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