EVALUATION OF THE HYPOTHALAMIC–PITUITARY–ADRENAL AXIS AND THE EFFECT OF PSYCHOLOGICAL COUNSELING ON THE PREVENTION OF POSTPARTUM DEPRESSION IN IVF PATIENTS

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Abstract: Infertility and in vitro fertilization (IVF) are frequently associated with chronic stress, hormonal dysregulation, and emotional vulnerability. The aim of this study was to evaluate the role of the hypothalamic–pituitary–adrenal (HPA) axis and serum cortisol levels as predictors of postpartum depression (PPD) among women undergoing IVF treatment. A prospective comparative study was conducted with 90 participants divided into an IVF group (n = 60) and a spontaneous conception control group (n = 30). The IVF group was additionally divided into women who received psychological counseling and women without counseling. Hormonal analyses and psychometric assessments using the DASS-21 and Edinburgh Postnatal Depression Scale (EPDS) were performed at baseline and 48 hours postpartum. The findings revealed significant differences in cortisol variability, emotional stability, and depressive symptoms between the groups. Women who received psychological counseling demonstrated lower levels of anxiety and greater hormonal stability. The results support the integration of psychological counseling into standard IVF treatment protocols.
Keywords: IVF, cortisol, HPA axis, postpartum depression, psychological counseling

1. INTRODUCTION

Infertility represents a major psychological and medical challenge for many women worldwide. The process of in vitro fertilization (IVF) often exposes patients to repeated hormonal treatments, uncertainty, and emotional stress. Studies have shown that prolonged stress may lead to dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis, which plays a central role in stress adaptation and emotional regulation. Cortisol, the main stress hormone, becomes particularly important during pregnancy and the postpartum period. Elevated or unstable cortisol levels have been associated with increased risk of postpartum anxiety and depression.

Postpartum depression is a significant public health issue that affects maternal well-being, infant development, and family functioning. Women undergoing IVF treatment may be especially vulnerable due to chronic psychological distress and previous reproductive difficulties. Psychological counseling has been increasingly recognized as an effective supportive intervention capable of reducing stress and improving emotional adaptation during fertility treatment.

2. METHODS

This prospective analytical study included 90 participants recruited from Acibadem Sistina Clinic. The sample was divided into an IVF group (n = 60) and a control group with spontaneous pregnancy (n = 30). The IVF participants were further randomized into two subgroups: women who received psychological counseling and women without counseling.

Hormonal parameters including cortisol, follicle-stimulating hormone (FSH), luteinizing hormone (LH), estradiol, and prolactin were measured at two time points: baseline and 48 hours postpartum. Psychological assessment was performed using the Depression Anxiety Stress Scale (DASS-21) and the Edinburgh Postnatal Depression Scale (EPDS). Statistical analyses included descriptive statistics, ANOVA, logistic regression, ROC analysis, and correlation testing using SPSS.

3. RESULTS

The results of the study demonstrated statistically significant hormonal and psychological differences between the investigated groups, particularly between IVF patients who received psychological counseling and those who did not. Women in the IVF subgroup without counseling exhibited significantly higher variability in cortisol levels during the postpartum period, indicating substantial dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis. This instability was accompanied by elevated scores on the Edinburgh Postnatal Depression Scale (EPDS), suggesting increased emotional vulnerability and greater risk for postpartum depression.

In addition to cortisol variability, the subgroup without counseling showed higher levels of anxiety and stress according to the DASS-21 assessment. The hormonal fluctuations observed in this group suggest that chronic psychological distress associated with infertility and IVF treatment may impair the physiological adaptation

mechanisms necessary during pregnancy and postpartum recovery. The instability of cortisol responses may reflect an inability of the neuroendocrine system to adequately regulate stress during the early postpartum period.

By contrast, women who received psychological counseling demonstrated more stable hormonal profiles and significantly lower levels of depressive and anxiety symptoms. Their cortisol concentrations were more consistent and showed patterns similar to those observed in the control group with spontaneous conception. These findings indicate that psychological counseling may contribute to improved regulation of the stress-response system and better emotional adjustment during pregnancy and after childbirth.

Furthermore, statistical analyses identified cortisol and follicle-stimulating hormone (FSH) as significant predictors of postpartum depression risk. Logistic regression analysis confirmed that lower hormonal stability was associated with higher EPDS scores. Correlation analyses also revealed a strong relationship between neuroendocrine dysregulation and emotional disturbances in the postpartum period. Women with greater hormonal fluctuations reported higher levels of anxiety, stress, and depressive symptoms.

The results additionally demonstrated that participants who underwent psychological counseling experienced improved emotional resilience and reduced psychological burden during IVF treatment. This finding supports the hypothesis that psychological interventions may serve not only as emotional support mechanisms but also as biological modulators capable of stabilizing neuroendocrine function. Overall, the findings emphasize the close interaction between psychological stress, hormonal regulation, and postpartum mental health outcomes in women undergoing assisted reproductive treatment.

4. DISCUSSION

The findings of this study support previous evidence suggesting that dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis plays a significant role in the development of postpartum emotional disorders, particularly among women undergoing IVF treatment. Chronic stress associated with infertility, repeated medical procedures, hormonal stimulation, and uncertainty regarding reproductive outcomes appears to disrupt normal hormonal adaptation during pregnancy and the postpartum period. As a result, women exposed to prolonged psychological distress may become more vulnerable to anxiety, emotional instability, and postpartum depression.

One of the most important findings of the present study was the increased variability of cortisol levels among women in the IVF subgroup without psychological counseling. Cortisol is a central stress hormone involved in physiological adaptation and emotional regulation. Excessive fluctuations in cortisol concentrations may indicate impaired stress-response mechanisms and inadequate neuroendocrine adaptation. The observed association between unstable cortisol levels and elevated EPDS scores suggests that biological dysregulation contributes directly to postpartum depressive symptoms. These findings are consistent with previous studies demonstrating that altered HPA-axis functioning is associated with affective disorders during the postpartum period.

Women without psychological counseling also demonstrated significantly higher levels of anxiety and stress according to psychometric assessments. This finding may be explained by the cumulative emotional burden associated with infertility treatment. IVF procedures often involve repeated hormonal interventions, invasive medical examinations, and uncertainty regarding treatment success. Over time, these stressors may contribute to chronic psychological exhaustion and emotional vulnerability. The absence of psychological support may further intensify feelings of fear, insecurity, and emotional isolation during pregnancy and postpartum recovery.

In contrast, psychological counseling demonstrated a substantial protective effect on both emotional and hormonal stability. Women who participated in counseling sessions showed lower anxiety and depression scores together with more stable cortisol profiles. These findings suggest that psychological counseling may improve stress management, emotional coping strategies, and resilience during the IVF process. Counseling interventions may also reduce excessive activation of the HPA axis, thereby improving physiological adaptation to pregnancy and childbirth.

Another important finding was the predictive value of cortisol and FSH levels for postpartum depression risk. The identification of these hormonal parameters as significant predictors highlights the importance of integrating biological monitoring into reproductive healthcare. Early identification of women at high risk for postpartum emotional disorders may allow healthcare professionals to provide timely psychological and medical interventions. Such preventive strategies could reduce the severity of postpartum complications and improve maternal mental health outcomes.

The results of this study emphasize the necessity of multidisciplinary approaches in reproductive medicine. IVF treatment should not focus exclusively on biological and medical aspects of fertility but should also include psychological care and emotional support. Integrating mental health professionals into fertility treatment programs may improve patient well-being, enhance emotional adaptation, and potentially contribute to better reproductive outcomes. Psychological counseling should therefore be considered an essential component of comprehensive IVF care rather than an optional supportive intervention.

5. CONCLUSION

This study confirms that hormonal dysregulation, particularly involving cortisol and FSH, is closely associated with postpartum depression risk in women undergoing IVF treatment. Psychological counseling contributes significantly to emotional stabilization and hormonal adaptation during the postpartum period. The integration of mental health support into IVF protocols may improve both psychological and physiological outcomes for patients. Future studies should investigate larger populations and explore the long-term effects of psychological interventions on maternal mental health and reproductive outcomes.

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