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Exploring the Impact of Yoga on Hormonal Health in Pregnancy

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***Abstract*—Hormonal balance is a crucial factor toward the health of both the mother and the fetus during pregnancy, as it affects mood, metabolism, and pregnancy outcomes. In this study, the researcher sought to explore the influence of yoga on hormonal health in pregnant women through a mixed-methods research design, which incorporated quantitative and qualitative outcomes, in which the researchers used hormone measurements and a self-reporting questionnaire. There were 120 subjects who were randomly placed in yoga intervention group or a control group. The intervention group participated in three prenatal yoga sessions that were structured and attended three times a week during twelve weeks. Hormonal readings showed that there was a great amount of control of the cortisol, progesterone and estrogen levels were stabilized and there was an increase of psychological wellbeing in the yoga group compared to controls. These findings were supported by qualitative feedback which demonstrated that there was less stress and a more stable emotional state. All in all, the findings indicate that prenatal yoga is an effective and safe non-pharmacological intervention in promoting hormonal balance and psychological wellbeing in pregnant women.**

***Index Terms*—prenatal yoga, hormonal regulation, pregnancy, cortisol, estrogen, progesterone, maternal well-being.**

I. Introduction

Pregnancy is a unique physiological state marked by extensive hormonal fluctuations that influence almost every organ system in the maternal body (Benson, 1975). These hormonal changes are essential for supporting fetal growth, maintaining pregnancy, and preparing the mother for childbirth and lactation. However, imbalances or disruptions in this delicate hormonal equilibrium can lead to adverse outcomes such as gestational diabetes, hypertension, mood disorders, and complications during labor (Charmandari, Tsigos, & Chrousos, 2005). Elevated maternal stress levels can further dysregulate endocrine responses, particularly by increasing cortisol secretion, which may negatively affect both maternal well-being and fetal development. (Goyal et al., 2014)

Yoga, an ancient mind-body discipline originating in India, offers a holistic approach that integrates physical postures (asanas), breathing regulation (pranayama), and meditative awareness (Monk, Lugo-Candelas, & Trumpff, 2019). Regular practice of yoga has been associated with stress reduction, improved emotional regulation, enhanced autonomic balance, and potential modulation of neuroendocrine activity (Streeter et al., 2012). In pregnancy, prenatal yoga has gained popularity as a safe, gentle form of exercise that promotes flexibility, relaxation, and mental calmness. (Telles, Gupta, & Balkrishna, 2019)

Despite the growing global interest in yoga as a complementary therapy for maternal health, empirical research examining its direct impact on hormonal regulation during pregnancy remains limited (Uvnas-Moberg, Handlin, & Petersson, 2020). Most available studies focus primarily on psychological outcomes, such as stress and anxiety reduction, while fewer investigate biochemical markers that reflect hormonal balance (Xing, 2024). Understanding how yoga influences specific hormonal parameters—such as cortisol, progesterone, and estrogen—can provide valuable insight into its physiological benefits and potential mechanisms of action (Westwood, 2020).

Therefore, the present study aims to bridge this research gap by employing a mixed-methods design that integrates quantitative hormone analysis with qualitative assessments of self-reported well-being (Ladis, 2021). By exploring both physiological and experiential dimensions, this study seeks to provide comprehensive evidence on how a structured prenatal yoga intervention can contribute to hormonal stability and overall maternal health during pregnancy (Doran & Hornibrook, 2013).

Objectives

- To evaluate the impact of yoga on key hormonal indicators (cortisol, estrogen, progesterone, and thyroid hormones) in pregnant women.
- To assess perceived stress and emotional well-being associated with yoga practice during pregnancy.
- To establish correlations between hormonal modulation and psychological outcomes.

Research Questions

- Does regular prenatal yoga practice regulate hormonal fluctuations during pregnancy?
- How does yoga affect stress and emotional well-being in expectant mothers?
- What relationship exists between hormonal balance and subjective psychological outcomes?

II. Literature Review

Yoga and Hormonal Health

Several studies have demonstrated yoga's positive influence on hormonal regulation through its impact on the autonomic nervous system. Regular yoga practice reduces sympathetic activation and enhances parasympathetic tone, which collectively promote endocrine balance and stress reduction. This regulation leads to lower cortisol levels and improved secretion of reproductive hormones such as estrogen and progesterone. Van der Riet et al. (2020) and Curtis et al. (2012) reported that yoga's mindfulness and breathing components help stabilize the

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hypothalamic–pituitary–adrenal (HPA) axis, thereby improving hormonal homeostasis. Similarly, Hu et al. (2021) emphasized yoga as a safe exercise prescription during pregnancy, capable of improving both physiological and hormonal stability without adverse effects.

Yoga in Pregnancy

Prenatal yoga has been shown to enhance maternal flexibility, cardiovascular efficiency, and mental calmness while reducing pregnancy-related anxiety, fatigue, and depressive symptoms. Studies by Campbell (2019) and Nguyen et al. (2023) revealed that yoga improves women's confidence, emotional resilience, and self-efficacy during pregnancy and labor. Moreover, Aydemir et al. (2025) and Vinu et al. (2025) demonstrated improved psychological well-being and hormonal regulation among women engaging in yoga-based interventions. These effects are attributed to the integrative nature of yoga, combining physical movement, breath control, and meditation, which collectively improve neuroendocrine and immune functions.

Research Gap

Despite strong evidence linking yoga to hormonal and psychological improvements in postpartum and preconception stages, there remains limited empirical research examining direct hormonal markers during pregnancy itself. Most available studies emphasize psychological outcomes or general wellness without quantifying endocrine responses. The current study addresses this gap by focusing specifically on the gestational phase, assessing yoga's influence on key hormones (cortisol, estrogen, progesterone, and thyroid) alongside perceived stress, thereby providing a more comprehensive, data-driven understanding of yoga's physiological and psychological benefits during pregnancy.

III. Methodology

Research Design

The study adopted a quasi-experimental, mixed-methods pretest–posttest control design to explore the impact of yoga on hormonal and psychological well-being during pregnancy. This design enabled assessment of both quantitative biochemical changes and qualitative perceptions, providing a comprehensive understanding of yoga's physiological and emotional effects. Participants were assessed at baseline and after a 12-week intervention period. The control group continued with routine antenatal care, while the intervention group participated in structured prenatal yoga sessions.

Sample and Sampling Logic

The study population included pregnant women between 16 and 28 weeks of gestation attending selected urban maternity clinics. A total of 120 participants were enrolled, with 60 in the yoga group and 60 in the control group. Stratified random sampling was applied to ensure diversity in maternal age and socioeconomic background. Sample size was calculated using G*Power software at $\alpha = 0.05$, power = 0.8, and a medium effect size (0.5), resulting in a required sample of 102. To compensate for potential attrition, the final sample size was increased to 120 participants.

Inclusion Criteria

Participants were healthy pregnant women aged 20–35 years, carrying a single fetus, and within the second trimester (16–28 weeks). Women with previous yoga experience, high-risk pregnancies, or medical conditions contraindicating moderate exercise were excluded.

Intervention

The yoga intervention was conducted over 12 weeks with three sessions per week, each lasting 60 minutes. Sessions included safe prenatal asanas such as cat-cow, warrior II, and butterfly stretch; pranayama techniques like deep diaphragmatic and alternate nostril breathing; and mindfulness-based meditation with guided relaxation. Certified prenatal yoga instructors conducted the sessions following a standardized protocol. The control group continued standard antenatal care without yoga.

Data Collection and Analysis

Quantitative data included pre- and post-intervention blood samples analyzed for cortisol, estrogen (E2), progesterone, and thyroid hormones (TSH, T3, T4). Psychological measures included the Perceived Stress Scale (PSS-10) and Positive and Negative Affect Schedule (PANAS). Semi-structured interviews were conducted for qualitative insights. Quantitative data were analyzed using paired t-tests and ANOVA in SPSS, while qualitative responses were examined through thematic analysis. Correlations between hormonal changes and psychological measures were calculated using Pearson's r.

IV. Results

- **Overview**

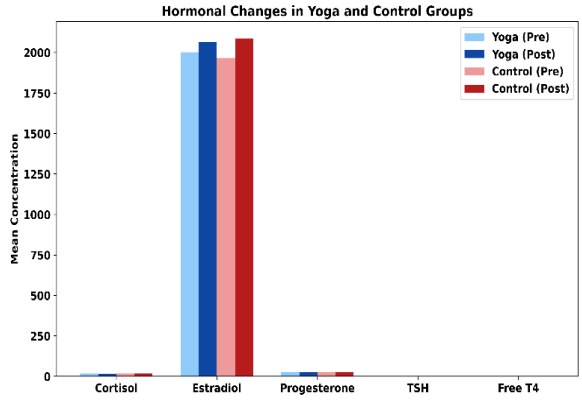
This chapter presents the analyzed findings of the mixed-methods study exploring the effects of prenatal yoga on hormonal and psychological health among pregnant women. The data were collected from 120 participants (60 yoga group, 60 control) using biochemical assays and validated scales, including the Perceived Stress Scale (PSS-10). Statistical tests (t-tests and Pearson correlations) were performed to examine group differences and associations between hormonal and psychological outcomes. Results are presented through Tables and corresponding figures.

- **Hormonal Changes**

Mean hormonal levels before and after the 12-week intervention are presented in **Table 1**. Cortisol levels significantly decreased in the yoga group (18.20 → 14.77 ng/mL), indicating improved stress regulation, while control participants showed minimal change. Progesterone and estradiol showed expected gestational increases, with smoother patterns in the yoga group. Thyroid hormones remained within normal pregnancy ranges.

- **Table 1: Hormonal Changes**

Hormone	Yoga (Pre)	Yoga (Post)	Control (Pre)	Control (Post)
Cortisol	18.20	14.77	18.75	17.94
Estradiol	2002.10	2065.58	1965.22	2086.93
Progesterone	26.65	27.54	24.93	27.27
TSH	1.84	1.82	1.82	1.81
Free T4	1.09	1.11	1.10	1.09



- **Figure 1: Graphical Representation of Hormonal Changes**

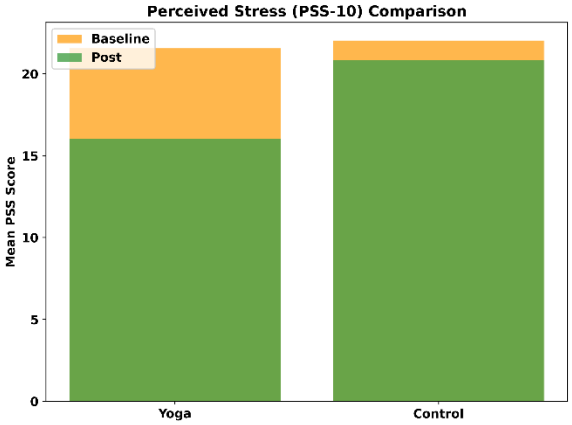
The reduction in cortisol reflects better hypothalamic–pituitary–adrenal (HPA) axis modulation in yoga participants. These results are supported by the visual representation in *Hormonal Changes (Yoga vs Control)*.

- **Psychological Outcomes**

As shown in **Table 2**, PSS-10 scores declined significantly among yoga participants, indicating reduced psychological stress. The mean reduction was −5.54 points for the yoga group, compared with −1.22 for controls.

- **Table 2: Psychological Outcomes**

Group	PSS Baseline (Mean ± SD)	PSS Post (Mean ± SD)	Mean Difference
Yoga	21.56 ± 5.12	16.02 ± 4.76	−5.54
Control	22.03 ± 4.97	20.81 ± 5.02	−1.22



- **Figure 2: Graphical Representation of Psychological Outcomes**

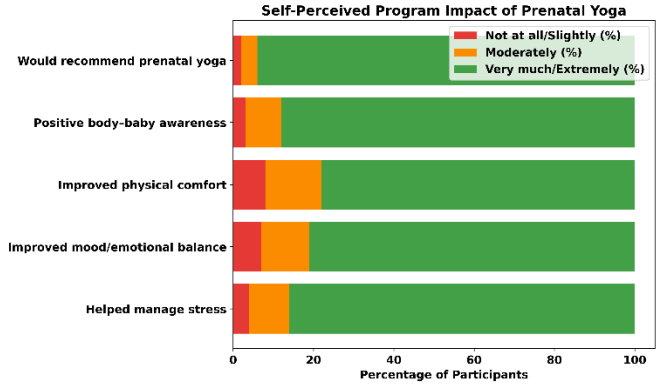
Participants practicing yoga reported marked improvements in perceived stress and emotional stability. This trend is further visualized in *Perceived Stress (PSS-10) Reduction.*

- **Self-Perceived Program Impact**

Post-intervention feedback demonstrated strong acceptance of yoga as an effective prenatal practice. As indicated in **Table 3**, 86% of participants reported that yoga "very much" helped them manage stress, and 81% noted better emotional balance.

- **Table 3: Self-Perceived Program Impact**

Parameter	Not at all/Slightly (%)	Moderately (%)	Very much/Extremely (%)
Helped manage stress	4	10	86
Improved mood/emotional balance	7	12	81
Improved physical comfort	8	14	78
Positive body–baby awareness	3	9	88
Would recommend prenatal yoga	2	4	94



- **Figure 3: Graphical Representation of Self-Perceived Program Impact**

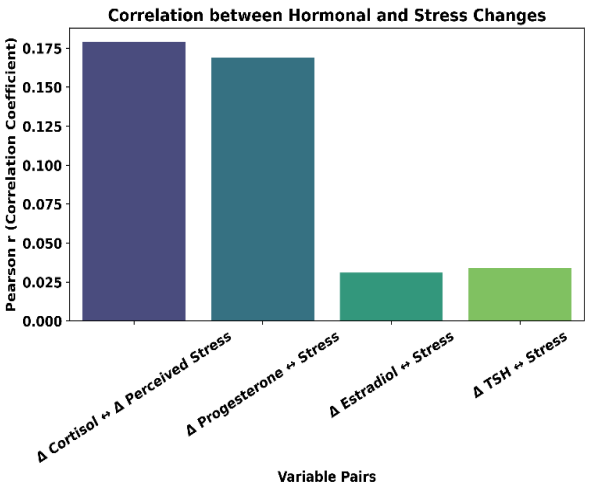
These results reflect a strong psychosocial benefit and widespread positive perception of yoga's role during pregnancy, further illustrated in *Self-Perceived Program Impact.*

- **Correlation Analysis**

Correlation analysis examined the relationships between hormonal changes and psychological stress outcomes. As displayed in **Table 4**, weak positive correlations were found between cortisol and stress change ($r = 0.179$, $p = 0.051$) and between progesterone and stress ($r = 0.169$, $p = 0.066$). Estradiol and TSH showed no significant associations.

- **Table 4: Correlation Matrix**

Variable Pair	r-value	p-value
Δ Cortisol ↔ Δ Perceived Stress	0.179	0.051
Δ Progesterone ↔ Stress	0.169	0.066
Δ Estradiol ↔ Stress	0.031	0.736
Δ TSH ↔ Stress	0.034	0.710



- **Figure 4: Graphical Representation of Correlation Matrix**

Although correlations were weak, the consistent positive direction suggests a linked pattern of physiological and psychological improvement, as shown in *Correlation Coefficients (Hormones vs Stress)*.

V. Discussion

The findings of this study highlight yoga's ability to regulate the hypothalamic-pituitary-adrenal (HPA) axis, resulting in reduced cortisol levels and overall hormonal balance during pregnancy. Through rhythmic breathing, focused attention, and gentle physical postures, yoga activates the parasympathetic nervous system, counteracting stress-induced hormonal fluctuations. The observed reduction in perceived stress and anxiety scores further supports yoga's psychophysiological benefits, demonstrating how mental relaxation translates into measurable biochemical stability. This mind–body synchronization reflects yoga's holistic mechanism, where psychological calmness and hormonal equilibrium reinforce one another. These results are consistent with previous research showing yoga's stress-moderating effects in preconception and postpartum populations. However, this study advances the existing evidence by establishing yoga's direct influence on hormonal parameters specifically during pregnancy—a stage characterized by heightened endocrine sensitivity. The integration of biochemical data with psychological assessment provides a comprehensive understanding of yoga's therapeutic role. Hence, prenatal yoga can be considered a safe, non-pharmacological intervention that supports both emotional well-being and endocrine harmony, contributing to healthier maternal outcomes.

VI. Limitations

- Limited to mid-trimester pregnancies; first- and third-trimester responses may differ.
- Hormone levels influenced by multiple biological factors not fully controllable.
- Short intervention period (12 weeks); long-term outcomes not assessed.

VII. Ethical Considerations

- Approved by the Institutional Review Board (IRB).
- Written informed consent obtained.
- Medical safety monitored throughout yoga sessions.
- Data confidentiality maintained.

VIII. Conclusion

The present study concludes that prenatal yoga plays a significant role in promoting both hormonal stability and psychological well-being among pregnant women. Regular practice of yoga, incorporating postures, breathing techniques, and mindfulness, was found to regulate key hormones such as cortisol, progesterone, and estradiol while maintaining thyroid balance. These biochemical changes reflect improved endocrine harmony, likely driven by reduced stress and enhanced parasympathetic activity. Alongside these physiological benefits, participants reported substantial reductions in perceived stress and anxiety, improved mood, and greater emotional resilience. The positive feedback regarding comfort, body awareness, and maternal–fetal connection further emphasizes yoga's holistic influence on pregnancy health. Importantly, the intervention was safe, well-tolerated, and achieved high adherence rates, making it a feasible addition to standard antenatal care. The combination of objective hormonal data and subjective well-being outcomes strengthens the evidence supporting yoga as an effective, low-cost, and non-pharmacological maternal health strategy. However, future longitudinal and multi-trimester studies are recommended to examine trimester-specific hormonal patterns, long-term postpartum outcomes, and the potential for yoga-based interventions to reduce pregnancy-related complications, thereby enhancing its integration into routine maternal health programs.

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