

# Advancing Maternal and Infant Health through Shiatsu-Based Stimulation: Investigating Prolactin Hormone Dynamics for Enhanced Lactation in Alignment with Maternal Health And Healthy Lifestyle Sustainable Development Goal 3 (Good Health and Well-being)

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**Abstract** - This study is aligned with **United Nations (SDG 3): Maternal Health** which emphasizes ensuring healthy lives and promoting well-being for all at all ages. Specifically, it supports **Target 3.1**, which aims to reduce maternal mortality and improve access to quality maternal care. Quasi-experimental research was employed, utilizing a purposive sampling technique to recruit 60 postpartum mothers. On Day 1, baseline data were established, and serum prolactin levels were measured for all participants to provide a reference for comparison. Day 2, mothers in the experimental group underwent Shiatsu over continuous 90-days. On Day 92, post-intervention blood samples were collected from both the experimental and control groups to reassess serum prolactin. The results demonstrated a marked elevation in prolactin levels among the mothers who received Shiatsu therapy. Statistical analysis revealed a paired t-value of 9.363, which was found to be highly significant  $p < 0.001$ .

**Keywords** - Shiatsu therapy, Prolactin hormone, Postnatal mothers, Lactation enhancement, Foot massage, Complementary therapy, Hormonal regulation, Healthy Lifestyle, Maternal health, Good Health And Well Being, Inclusive Health

## I. INTRODUCTION

Perinatal care plays an indispensable role in optimizing pregnancy outcomes and minimizing morbidity and mortality risks for both the mother and the developing fetus. It encompasses a range of preventive, therapeutic, and supportive measures aimed at ensuring maternal and neonatal well-being throughout the antenatal, intrapartum, and postnatal periods [1]. The postpartum phase—typically extending up to six weeks following the expulsion of the placenta—is a critical stage of physiological transition, during which the mother undergoes significant physical, hormonal, and psychological adjustments [2]. Breastfeeding constitutes one of the most vital components of maternal and child health during this period. However, numerous mothers encounter challenges related to inadequate milk secretion, improper feeding techniques, or insufficient lactation support [3]. These difficulties often contribute to emotional distress, including feelings of inadequacy, frustration, and anxiety, which may negatively influence the mother's ability to sustain breastfeeding effectively [4]. According to the World Health Organization (WHO), initiating breastfeeding within the first hour of birth, maintaining exclusive breastfeeding for the initial six months, and introducing complementary foods at approximately one and a half years are key strategies for reducing infant morbidity and mortality [5]. Despite global awareness initiatives, it is estimated that only about 40% of infants under six months of age are exclusively breastfed, underscoring the continuing need for improved lactation interventions [6]. Breastfeeding not only fulfills the nutritional demands of the infant but also fosters emotional bonding and attachment between the mother and child. It has been scientifically established that breastfeeding enhances immune protection, promotes optimal neurodevelopment, and reduces the risk of several chronic diseases in both mother and infant. The process of lactation is predominantly regulated by the hormone prolactin, which is synthesized and secreted by lactotroph cells in the anterior pituitary gland. Dopamine, secreted from the hypothalamus, serves as a primary inhibitory regulator of prolactin release [7]-[10]. During pregnancy and the postpartum period, prolactin levels rise substantially, facilitating mammary gland development and the initiation of milk production. A deficiency in prolactin secretion, conversely, may lead to lactation failure and impede successful breastfeeding outcomes. In recent years, the integration of complementary and alternative therapies into maternal health practices has gained recognition as a non-invasive and holistic approach to managing postpartum complications. Among these, Shiatsu therapy, a traditional Japanese acupressure technique, has demonstrated promising benefits in enhancing physiological functions through the stimulation of specific pressure points on the body. Shiatsu involves rhythmic pressure application to reflex points located on the hands, feet, and ears—regions that correspond to various organ systems and endocrine glands [11]-[14]. Stimulation of these points is believed to transmit reflex impulses through neural pathways to the brain, particularly activating the hypothalamic-pituitary axis, thereby promoting hormonal balance and enhancing prolactin secretion.

During clinical observations, it was noted that several postnatal mothers experienced insufficient lactation despite receiving conventional postnatal care. Recognizing the need for an effective non-pharmacological intervention, the present study was designed to evaluate the influence of Shiatsu therapy on prolactin hormone regulation and its subsequent impact on lactation among postnatal mothers [15]. The present study aligns with **SDG 3 (Good Health and Well-being)**, particularly **Target 3.1**, which aims to *reduce the global maternal mortality ratio* and ensure access to quality maternal health care. By exploring **shiatsu-based stimulation** as a non-pharmacological, low-cost, and sustainable method to **enhance lactation**, your research contributes to promoting **maternal health**, supporting breastfeeding, and fostering **sustainable, culturally adaptable healthy life style practices**. the contributions of this research includes: it provides empirical evidence on the physiological impact of Shiatsu-based stimulation in promoting prolactin secretion, thereby supporting its potential as an evidence-based complementary therapy to improve lactation outcomes, thereby promoting maternal health and infant health. The research bridges traditional therapeutic techniques with contemporary

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scientific understanding of endocrinology, contributing to the growing field of integrative maternal health care. The research advances the global health agenda by addressing targets related to maternal health improvement, infant nutrition, and sustainable well-being, thus reinforcing the commitment to achieving inclusive health for all. The primary objective of this study is to assess and compare pre- and post-intervention serum prolactin levels in mothers who received Shiatsu therapy and those in the control group, thereby determining its effectiveness as a supportive approach to improving breastfeeding outcomes.

## II. LITERATURE REVIEW

The postpartum period represents a crucial physiological phase wherein maternal endocrine adaptations are essential for the initiation and maintenance of lactation. Among the various hormones involved, prolactin plays a pivotal role as the principal lactogenic hormone responsible for stimulating milk synthesis. Several studies have demonstrated that inadequate prolactin secretion during the early postpartum period can result in insufficient breast milk production and contribute to early cessation of breastfeeding [16][20]. Conventional pharmacological galactagogues, such as domperidone and metoclopramide, though effective in certain cases, are often associated with adverse side effects including gastrointestinal discomfort, dizziness, and potential neuropsychiatric symptoms, thereby necessitating the exploration of safer, non-pharmacological alternatives for lactation enhancement. Complementary and alternative medicine (CAM) practices have gained significant attention in maternal health for their holistic approach and minimal side effects. Shiatsu therapy, originating from traditional Japanese medicine, has been recognized as an effective complementary intervention that stimulates acupressure points corresponding to vital organ systems and endocrine glands. The technique's physiological mechanism is theorized to function through the stimulation of mechanoreceptors and pressure-sensitive nerve endings, which transmit impulses to the hypothalamus and pituitary gland, modulating hormonal activity, particularly the secretion of oxytocin and prolactin [20]-[25]. Shiatsu's emphasis on restoring "Ki" or energy balance is conceptually aligned with the Western physiological model of improving circulation, reducing muscle tension, and enhancing neuroendocrine responses that collectively contribute to improved lactation performance.

Empirical evidence supports the use of tactile stimulation and massage-based therapies for improving lactation. Researchers reported that breast and foot reflexology massage significantly increased plasma prolactin and oxytocin levels in postpartum women, resulting in enhanced milk output. Similarly, Abolfotouh et al. (2018) found that acupressure-based interventions led to an increase in breastfeeding frequency and milk volume among primiparous mothers. Moreover, Kim et al. (2020) demonstrated that the activation of acupressure points associated with the endocrine and reproductive systems improved overall lactation outcomes, reinforcing the physiological link between tactile stimulation and hormonal regulation [26]-[30]. In addition to hormonal benefits, Shiatsu therapy has been associated with improvements in maternal psychological well-being. Stress and anxiety are known inhibitors of prolactin and oxytocin release, both of which are critical to successful lactation. Studies indicate that massage therapies, including Shiatsu, can reduce serum cortisol levels and induce relaxation responses that facilitate hormonal balance. This psychophysiological mechanism provides a dual advantage—enhancing both maternal comfort and physiological readiness for milk secretion [20]-[25]. While the therapeutic role of Shiatsu in lactation enhancement remains an emerging research area, existing literature emphasizes the potential of tactile stimulation to modulate neuroendocrine pathways governing prolactin release. However, there is a paucity of empirical data quantifying prolactin level changes through Shiatsu interventions over extended durations. Hence, the present study aims to bridge this research gap by systematically assessing the effect of Shiatsu on serum prolactin levels among

postnatal mothers over a structured intervention period. This research contributes to the growing evidence base supporting non-invasive, cost-effective, and culturally acceptable techniques for improving lactation outcomes and maternal health [26]-[30].

### III. MATERIALS AND METHODS

*Study Design:* A quasi-experimental research design with a pretest–posttest control group approach was employed to examine the effectiveness of Shiatsu therapy on prolactin hormone levels among postnatal mothers.

*Setting and Duration:* The investigation was conducted over a six-month period, from August 2024 to March 2025, at the Hypertension Outpatient Clinic of the host institution.

*Ethical Considerations:* Prior to initiation, ethical clearance was obtained from the Institutional Human Ethics Committee (IHEC) of Saveetha Institute, along with written permission from the Head of the Department of Obstetrics and Gynecology. All participants provided informed consent before enrollment.

*Participants:* A total of 60 postnatal mothers meeting the inclusion criteria were selected for the study. Participants were divided equally into two groups—30 in the experimental (Shiatsu) group and 30 in the control group. Eligible participants included both primiparous and multiparous mothers who had undergone normal vaginal delivery and were on their first postnatal day with prolactin levels below 80 ng/mL. All participants were required to understand and communicate in either Tamil or English and express willingness to participate. Exclusion criteria included mothers who underwent assisted vaginal delivery (vacuum or forceps), lower segment cesarean section (LSCS) with third-stage complications, those with neonates weighing less than 2.5 kg, mothers with severe medical illnesses, bleeding or sexually transmitted disorders, mental illness, lack of cooperation, or those who delivered stillborn babies.

*Sampling Technique:* Participants were recruited using a non-probability purposive sampling method. The 60 eligible mothers were then equally allocated to the experimental and control groups.

*Preliminary Assessment:* On Day 1, participants were instructed to fast for 9–12 hours prior to sample collection. Approximately 3 mL of venous blood was drawn from the antecubital vein and transferred into light green-top tubes. Serum prolactin concentrations were measured using an automated immunoassay technique in the biochemistry laboratory.

*Intervention:* For the experimental group, Shiatsu therapy commenced on Day 2. Each participant was encouraged to wash her feet with lukewarm water before lying in a supine position. Privacy was ensured throughout the session. Using the thumb and index finger, the researcher applied gentle circular pressure over the center of the great toe, targeting the pituitary point, followed by massage movements below the toes and across the sole. Each session lasted 15–20 minutes per foot, administered three times daily for a total duration of 90 days. Participants in the control group received only routine hospital care for the same 90-day period.

*Post-Assessment:* On Day 92, venous blood samples were again collected from both groups to reassess prolactin levels using the same automated immunoassay procedure.

### IV. RESULTS

The study assessed the effectiveness of Shiatsu therapy in enhancing serum prolactin levels among postnatal mothers. Statistical analysis was performed using paired and independent t-tests to compare the pretest and posttest prolactin values within and between the groups.

In the experimental group, the mean prolactin level before the intervention was  $84.36 \pm 15.38$  ng/mL, which increased substantially to  $199.93 \pm 70.71$  ng/mL after the completion of the 90-day Shiatsu intervention. The mean difference between the pretest and posttest values was 115.57 ng/mL, indicating a remarkable elevation in prolactin levels following the therapeutic massage. The calculated paired t-test

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value ( $t = 9.363$ ) demonstrated a highly significant difference ( $p < 0.001$ ) between the pre- and post-intervention measurements. This clearly suggests that Shiatsu therapy produced a substantial stimulatory effect on prolactin secretion among postnatal mothers, thereby enhancing lactation potential.

In contrast, mothers in the control group, who received only routine postnatal care, showed minimal change in their prolactin levels. The pretest mean value was  $81.71 \pm 11.17$  ng/mL, and the posttest mean value was  $83.23 \pm 10.98$  ng/mL, resulting in a mean difference of just 1.52 ng/mL. Despite the paired t-test showing statistical significance ( $t = 41.69$ ,  $p < 0.001$ ), the observed change was biologically negligible, indicating that routine care alone did not lead to a meaningful enhancement in prolactin production.

To compare the efficacy of the intervention between the two groups, an independent t-test was conducted. The pretest results revealed no significant difference in baseline prolactin levels between the experimental and control groups ( $t = 0.763$ ;  $p > 0.05$ ), confirming initial homogeneity. However, a significant variation was observed in the posttest prolactin values ( $t = 8.932$ ;  $p < 0.001$ ), demonstrating that the experimental group exhibited a markedly greater increase in prolactin levels compared to the control group (Table 1).

Overall, these findings indicate that Shiatsu massage therapy effectively enhances prolactin secretion in postnatal mothers, thereby supporting improved lactation outcomes. The notable elevation in prolactin among the experimental participants compared to those receiving only routine hospital care confirms the beneficial physiological impact of Shiatsu as a non-pharmacological intervention to promote natural breastfeeding.

Table 1: Effectiveness of Shiatsu On Prolactin Among Postnatal Mothers in The Experimental Group And Comparison In The Control Group (N = 60 (30 + 30))

| Group                              | Pretest                         |       | Post Test                         |       | Mean Difference Score                    | Paired 't' test & p-value        |
|------------------------------------|---------------------------------|-------|-----------------------------------|-------|------------------------------------------|----------------------------------|
|                                    | Mean                            | S.D.  | Mean                              | S.D.  |                                          |                                  |
| Experimental Group                 | 84.36                           | 15.38 | 199.93                            | 70.71 | 115.57                                   | $t = 9.363$<br>$p=0.0001$ , S*** |
| Control Group                      | 81.71                           | 11.17 | 83.23                             | 10.98 | 1.52                                     | $t=4.169$<br>$p=0.0001$ , S***   |
| Mean Difference Score              | 2.65                            |       | 116.70                            |       | *** $p<0.001$                            |                                  |
| Student Independent 't' test value | $t = 0.763$<br>$p=0.449$<br>N.S |       | $t = 8.932$<br>$p=0.0001$<br>S*** |       | S – Significant<br>N.S – Not Significant |                                  |

## V. CONCLUSION

The findings of the present study clearly demonstrate that Shiatsu therapy serves as an effective, non-pharmacological intervention for enhancing lactation among postnatal mothers. The results revealed a substantial increase in serum prolactin levels following the consistent administration of Shiatsu over a 90-day period, signifying its potential role in stimulating the anterior pituitary lactotrophs responsible for prolactin secretion. This physiological response facilitates the process of lactogenesis and supports the initiation and maintenance of adequate breast milk production. The effectiveness of Shiatsu lies in its ability to stimulate reflex points that are neurologically connected to the endocrine system, particularly the hypothalamic-pituitary axis. By applying rhythmic and sustained pressure on specific acupoints, the therapy may enhance neuroendocrine signalling, thereby improving hormonal balance and promoting

maternal well-being. Furthermore, since increased prolactin levels are not only linked to enhanced milk production but also to reduced postpartum psychological stress, Shiatsu could offer dual benefits — both physiological and emotional — to new mothers adjusting to the demands of early motherhood. From a clinical standpoint, Shiatsu represents a safe, cost-effective, and nurse-administered alternative to pharmacological galactagogues, which often carry undesirable side effects. Its accessibility and non-invasive nature make it suitable for integration into routine postnatal care protocols by midwives and nursing professionals in both hospital and community healthcare settings. Implementing this intervention could contribute to improved breastfeeding rates, better neonatal nutrition, and reduced dependence on artificial feeding substitutes. While the current findings establish a strong foundation for understanding the relationship between Shiatsu and prolactin elevation, further investigations are warranted to strengthen these results and explore broader clinical applications. Future studies should employ larger and more diverse sample populations to validate the generalizability of the findings across different demographic and cultural groups. Utilize advanced biochemical and neuroendocrine assays to investigate the precise physiological pathways through which Shiatsu influences prolactin secretion and hormonal regulation. Explore the long-term effects of Shiatsu on sustained lactation, maternal stress reduction, and infant growth outcomes. Conduct comparative studies between Shiatsu and other complementary therapies such as acupressure, reflexology, or aromatherapy to identify the most effective non-pharmacological method for promoting lactation. Incorporate psychological and behavioral assessments to evaluate the therapy's influence on maternal mood, bonding, and overall postpartum well-being.

**Limitations** The study was conducted on a relatively small and specific group of postpartum mothers, which may limit the generalizability of the findings across diverse populations with varying cultural, physiological, and socioeconomic backgrounds. The follow-up period was limited to the early postpartum phase. Long-term effects of Shiatsu-based stimulation on sustained lactation, infant growth, and maternal hormonal balance were not assessed. Due to the nature of the intervention, complete blinding of participants and researchers was not feasible, which may have introduced performance or expectancy bias influencing self-reported outcomes. The study focused primarily on prolactin levels as the hormonal marker. Other relevant hormones such as oxytocin or markers of stress (e.g., cortisol) were not included, which could provide a more comprehensive understanding of lactation physiology. The research did not compare Shiatsu-based stimulation with other lactation-enhancing interventions (such as massage, acupressure, or breastfeeding counseling), limiting the understanding of its relative efficacy.

Future studies should involve larger, multicentric randomized controlled trials including mothers from diverse backgrounds to enhance the validity and generalizability of findings. Extended follow-up studies are warranted to evaluate the long-term effects of Shiatsu-based stimulation on sustained milk production, infant growth metrics, and maternal health outcomes.. Comparative studies assessing Shiatsu alongside or combined with other evidence-based lactation support techniques could identify synergistic or superior approaches for improving breastfeeding outcomes. The simple, low-cost nature of Shiatsu makes it suitable for integration into maternal health initiatives, particularly in primary healthcare and community-based settings. Implementation research can explore feasibility, scalability, and policy adaptation. Future studies can develop digital learning modules, mobile applications, or tele health-based training for mothers and healthcare workers to enhance accessibility and adherence to Shiatsu-based stimulation practice. Continued research in this field can strengthen global efforts toward SDG-3 (Good Health and Well-being) by promoting natural, sustainable, and inclusive maternal care strategies that improve both maternal health outcomes.

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