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EFFECT OF MATERNAL PSYCHOLOGICAL DISTRESS ON LACTATION: A REVIEW OF THE LITERATURE

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ABSTRACT:

Most of studies show close relationship between maternal psychological distress (e.g., stress, anxiety, depression) and breastfeeding outcomes, such as decreased proportion and duration of exclusive breastfeeding. To explain this, we evaluated the evidence for relationships between maternal psychological stress and lactation, and breastfeeding outcomes in pregnancy and postpartum and the possible physiological mechanisms that facilitate these relationships. Psychological distress may impair the release of oxytocin that's lead to decreased milk production. Maternal distress also yields elevated levels of serum cortisol and decreased insulin sensitivity, which are associated with decreased milk production. The relationship between psychological distress and breastfeeding is likely to be bidirectional, breastfeeding appears to reduce maternal distress, again possibly via their effects on the pleasure/reward and calming effects of oxytocin on the mother.

KEYWORDS: Maternal psychological distress, lactation; breastfeeding.

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INTRODUCTION:

World Health Organization and American Academy of Pediatrics recommend exclusive breastfeeding for an infant up to 6 months of age.^{1,2} Breastfeeding is associated with many health benefits, including decreased risk of type 1 diabetes^{3,4}, asthma and respiratory illness^{5,6}, gastrointestinal infections⁷, and sudden infant death syndrome for the infant⁸ and decreased risk of ovarian cancer⁹, cardiovascular disease¹⁰. Despite the known benefits of human milk for infants, only 25% of infants are exclusively breastfed at 6 months of age, and 60% of women do not reach their own breastfeeding goals.^{11,12} Maternal psychological distress (e.g., perceived stress, anxiety, depression) has been linked to lactation deficiency and breastfeeding cessation.¹⁷⁻¹⁹

The associations between maternal distress and breastfeeding outcomes are unclear. Thus, we will focus on these relationships in this review.

Aim: The review of literature to find out updates on Maternal psychological distress and their effects on lactation and breastfeeding outcomes.

Objective: To study the incidence, pathophysiology, causes, clinical features and consequences of Maternal psychological distress on milk insufficiency or lactation insufficiency.

Material and Method

Data Source: Bibliographic literary review on the issue was performed by searching publications from the Medline database and from national and international organizations, reference books and classical Ayurvedic Samhitas. Some key articles cited in other sources such as PubMed and other Web sites were selected.

Lactation and the mother-baby: The first stage is controlled primarily via increases in estrogen and progesterone secreted from the placenta²⁰, the basal layer of the ductal

epithelium becomes the myoepithelium, responsible for milk ejection. The luminal layer of the mammary epithelium is composed of epithelial secretory cells called lactocytes, which synthesize and secrete milk components into the lumen of the alveoli.²²⁻²⁴ High progesterone level during pregnancy inhibit milk secretion, leading to small amounts of colostrum and no milk production.²⁵ Within 48–72 hours after delivery, maternal progesterone levels decline 10-fold, which leads to activation in the mammary gland, with copious production of milk^{23,26}. Prolactin maintained lactation as progesterone falls^{20,27,28}. During early lactation, glucocorticoids helps in the closure of tight junctions between lactocytes, which prevents the leakage of milk components, while insulin is observed to facilitate the expression of genes involved in milk protein synthesis.^{29,30} Many other hormones play a role in lactation including cortisol, thyroid hormone, and serotonin.²⁰ Disturbance in these hormone-controlled procedure may lead to delayed milk production or insufficient milk volume.¹⁸ Infant suckling also leads to oxytocin release from the posterior pituitary, which causes milk to be ejected into the ducts for passage to the infant.^{32,33}

Maternal psychological distress

For this literary review, ‘psychological distress’ to refer to different physiological responses to stressful challenges, such as cognitive appraisals of stress (i.e., perceived stress), symptoms of anxiety or depression, and cortisol levels.^{35,36} Depression, anxiety, and perceived stress are grouped together to characterize maternal distress in perinatal period.³⁷⁻³⁹ Psychological distress is commonly measured by assessing maternal perception with help of psychometric instruments⁴⁰ or using biological markers such as cortisol (serum, saliva).^{41,42} Maternal

psychological distress during pregnancy has been associated with negative pregnancy outcomes such as low birth weight, preterm birth, and later risk for neurodevelopmental, psychiatric, cardiovascular, and metabolic disease.⁴⁷⁻⁵² Activation of the HPA axis leads to increased maternal cortisol level this is the most commonly studied physiological mechanism for assessing the effects of maternal psychological distress on infant outcomes.⁵³ Maternal cortisol can be directly cross the placenta and enter fetal circulation and has been observed to account for approximately 40% of the variance in fetal cortisol concentrations.⁵⁴ The majority of maternal cortisol is metabolized during passage through the placenta, increased maternal cortisol concentrations may still have a significant effect on fetal concentrations.⁵⁵ Indirect mechanisms such as colonization of the infant gut by maternal microbes may be affected due to maternal distress.⁵⁶ The physiological mechanisms explaining the relationships between maternal psychological distress and adverse breastfeeding outcomes remain unclear.¹⁷⁻¹⁹ For explaining these mechanisms, in this review, we aimed to evaluate the evidence for relationships between psychological distress and non-optimal breastfeeding outcomes in humans and to identify potential physiological mechanisms that could underlie these associations. We observed 7 systematic reviews and one meta-analysis examining maternal distress and breastfeeding outcomes.⁵⁸⁻⁶⁵ The relation between maternal anxiety, depression, or stress and breastfeeding outcomes were inconclusive, with several meta-analyses citing low quality studies and heterogeneous outcomes. The link between maternal depression and breastfeeding outcomes, however, appears to be stronger, with one meta-analysis reporting associations between elevated maternal depressive

symptoms and non-exclusive breastfeeding or shorter breastfeeding duration for over half of the 38 studies examined. In review of the literature,¹⁵ studies found positive associations between maternal distress (perceived stress, anxiety, and depression) and non-optimal breastfeeding outcomes, while 6 studies found no association, and 5 studies found that maternal distress was associated with increased breastfeeding and potential evidence for a bidirectional relationship.

There are two primary time points when maternal stress causes decrease the breastfeeding:

- 1) Before breastfeeding begins (delaying in lactogenesis),
- 2) After breastfeeding is initiated.

1) Delayed onset of lactogenesis: Delayed onset of lactogenesis is defined as insufficient milk production in the first two weeks postpartum.²⁶ It may occur due to multiple reasons such as poor infant suckling ability and incomplete emptying of milk from the breast⁶⁶. Most of studies have noted that prolong labor and emergency Cesarean section, which are strongly linked with postpartum stress for both mother and infant at birth.^{57,67,68} Higher post-delivery stress result in delayed onset of lactation.⁶⁸⁻⁷⁰ Mother with delayed onset of lactation may require formula milk supplement to their infants after birth. Milk Supplementation of human milk during hospitalization is predictive of breastfeeding cessation in early lactation.^{71,72}

2) After breastfeeding is initiated: Insufficient milk supply and decreased duration and exclusivity of breastfeeding” Many women discontinue exclusive breastfeeding so early when infants are between 3 and 6 months of age. After one-month postpartum maternal psychological distress may also affect breastfeeding even after lactation has been fully established.^{12,73-}

⁷⁵ Maternal anxiety during pregnancy and postpartum period, are associated with shorter duration of exclusive breastfeeding.^{39,76-79} In a sample of 255 Canadian women, Adedinsewo et al. found that every point increase in State Trait Anxiety Inventory score at 3 months postpartum (when lactation had already been established) was related with decreased odds of any breastfeeding at 12 months postpartum. Exposure to stressful events may negatively affect breastfeeding exclusivity. Data from the Pregnancy Risk Assessment and Monitoring System (PRAMS) shows that among women ≤ 24 years old, the odds of exclusive breastfeeding for 3 months were lower for those who experienced ≥ 2 stressful life events as compared with those who experienced no stressful life events⁸⁰. Another study shows that bidirectional relation between maternal distress symptoms and breastfeeding duration in a group of 205 women who were followed prenatally and at 3, 6, 12, and 24 months after birth.⁸¹ Women with increased depressive symptoms during pregnancy weaned their infants approximately 2 months earlier than women who did not experience prenatal depression, and furthermore, women who breastfed more frequently at 3 months postpartum showed greater decreased in depressive symptoms up to 2 years after birth. Mothers exclusively breastfeeding at 3 months postpartum had significantly lower perceived stress scores compared to those providing mixed feedings (breast milk and formula).⁸² Exclusive breastfeeding for first 4–6 months postpartum is associated with lower maternal stress compared to milk supplementation.⁸³

Potential mechanisms by which psychological distress affects lactation

Physiology by which maternal psychological distress may impair lactation are not fully

explained, from animal studies or from human's observational studies it can be explained. First, we have to see the potential impact of distress on hormones involved in lactation and HPA axis-related mechanisms.

Regulation of hormones implicated in lactation

Lactation is depending on coordination of hormones such as progesterone, prolactin, and oxytocin. One study shows physiological mechanism for the relationship between maternal distress and lactation is the impaired release of maternal oxytocin, which impedes the contraction of myoepithelial cells involved in milk ejection.¹⁸ 22 women at 5 days postpartum, Ueda and colleagues found that maternal stress impaired oxytocin release in response to infant suckling.⁹⁰ Participants were exposed to stressors via either noise or mental calculation (arithmetic problems), and the number of pulsatile releases of oxytocin in maternal blood was noted. Women with stress groups had decreased and delayed responses to suckling and decreased number of oxytocin pulsatile releases. Similarly, Doulougheri et al. found that positive maternal emotions were associated with increased infant feeding frequency with increased milk volume. Since positive emotions are associated with increased maternal oxytocin⁹³, Thus, mothers with positive emotions and less distress may have better lactation outcomes. Maternal distress may affect lactation by interfering with insulin sensitivity and secretion. Insulin and its regulation of glucose are play important for lactation. Insulin resistance and impaired glucose tolerance such as that observed in type 2 diabetes mellitus or gestational diabetes have been associated with delayed onset of lactation and low milk supply to baby with decreased breastfeeding duration.⁹⁴⁻⁹⁶ Animal (mouse) models also reveal that acute psychological stress can

alter glucose metabolism by decreasing hepatic sensitivity to insulin, leading to insulin resistance.^{100, 101} These studies outline a potential physiological mechanism by which stress-induced glucose dysregulation and insulin resistance may lead to lactation difficulty¹⁰². The effects of stress-induced alterations Cortisol is an important cofactor for milk production and is involved in the differentiation of mammary gland cells into lactocytes, as well as milk secretion and lactogenesis.²⁸ Lactation results in a reduction in maternal cortisol levels during feeding and an attenuation of maternal HPA axis reactivity to stress. Maternal psychosocial distress and difficulties with lactation are associated with altered HPA axis functioning, suggesting that maternal HPA axis dysregulation is a pathway by which maternal distress compromises lactation.

DISCUSSION:

In this literary review, we evaluated the evidence for relationships between maternal psychological distress and lactation and breastfeeding outcomes. This article gives us an idea about possible physiological mechanisms that facilitate these relationships. We reviewed PubMed using the following search terms: “stress”, “anxiety”, “depression”, “breastfeeding”, and “lactation”. A further hand-search was conducted to ensure a thorough review of the literature. Milk composition may be altered by maternal psychological distress and have an impact on lactation and breastfeeding. The macronutrient content, specifically fatty acid concentration, of human milk is negatively associated with maternal stress (measured via saliva cortisol in response to cold). Maternal psychological distress may also affect the immune components present in milk. This study shows the mothers with positive emotions and less distress may have better lactation outcomes. Future research

should include an exploration of the bidirectional benefits of breastfeeding on maternal psychological distress and maternal health. While maternal psychological distress may decrease breastfeeding duration, breastfeeding itself may decrease maternal distress.^{82,83,93} In Ayurveda According to *Acharya Sushruta manasbhavas* like *shoka*, *krodha*, *avatsalya* are playing a major role in *Stanyakshaya*. (lactation insufficiency). *shoka*, *krodha*, *avatsalya* these are the *manas bhava* (psychological state/behavior).¹⁰³ The relationship between *sharirik doshas* and *manas bhavas* is clearly defined in *Charak samhita*, which states that *udvega*, *shoka* and *krodha* affect *vata*, *pitta*, *kapha* dosha.¹⁰⁴ Women are facing plenty of issues because of their adaptation to western lifestyles, diet modification and increased exposure to stress and strain.¹⁰⁵

CONCLUSION:

This study suggests a potential role for acute and chronic maternal psychological distress in lactation success and difficulties, including both establishment of lactation and continued duration of breastfeeding. Both physiological and social/behavioral factors may be involved, but additional studies are needed to understand the mechanisms behind these relationships. Strategies have to be developed for decrease maternal psychological distress, as well as policies that focus on dismantling structural barriers to breastfeeding, may improve breastfeeding outcomes. This suggests encourage lactation and breastfeeding goals in women who score high on measures of psychological distress would be beneficial for both maternal and infant well-being.

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