EFFECT OF MATERNAL PSYCHOLOGICAL STRESS (KRODHA-SHOKADI MANSIKA BHAVA) ON FETAL DEVELOPMENT

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ABSTRACT

Nature has given the magical power to the pregnant mother over the living material of her child. Throughout the nine months of pregnancy a woman not only forms the physical body of child, but psychological, social and spiritual too. This built up is altered if mother is encircled with stress(krodh-shoka-chinta-bhay) and can have both immediate and long term effect on offspring. In Ayurveda, it is mentioned that garbhopaghatakara bhava (factors likely to harm the fetus) and its effect on fetus. The object of this paper is to introspect the effect of maternal stress on prenatal, perinatal, postnatal development of the fetus.


INTRODUCTION

The fetal period is one of particular ontogenetic vulnerability. That is, exposures – good or bad – during this time would be expected to have lasting effects. Even casual observers of science and medicine would be familiar with how certain molecules, such as folic acid, could have a dramatic influence on the long-term health outcomes of the developing fetus. The prenatal stress model makes a parallel hypothesis focusing on stress hormone exposure, and cortisol in particular – although there may be a number of mechanisms involved.

Psychological distress definition

Chronic stress is a multidimensional, composite concept making measurement difficult.[1] Stress appraisal, personal history and outlook, lifestyle, coping style and environmental threats (real or imagined) are only some of the contributors to the experience of stress. Psychological distress has a well-documented association with and is generally presumed to
be a common response to chronic stress.[2,3] The three most commonly identified and measured aspects of psychological distress are depression, anxiety and perceived stress. Within the context of pregnancy, psychological distress may be a marker of an elevated risk for adverse perinatal outcome.[4]

Possible explanations include interactions between stress physiology and the normal physiology of pregnancy and birth, in addition to individual health behaviors and genomic makeup.[5] These interactions frequently involve immune mediators, such as interleukins (IL) 1, 6, 10 and Tumor Necrosis Factor-alpha (TNFα) and hormonal/neurohormonal mediators, such as placental corticotrophin-releasing hormone (pCRH).[6-9]

Cortisol is a downstream product of the Hypothalamic-Pituitary-Adrenal (HPA) axis, one of the most-studied mind-body systems. cortisol crosses the Placenta,[10] Although the placenta screens out many substances, That implies that stressed or anxious mothers who have elevated cortisol may have fetuses who are exposed to elevated levels of cortisol in utero. If prenatal maternal anxiety or stress did alter fetal HPA axis via early cortisol exposure, then the implications for development would be substantial. That is because of the wide reaching impact of the HPA axis on many areas of functioning, including stress physiology, cognition and memory, immunology and cardiovascular health.[11]

**Psychoneuroimmunology (PNI) framework**
provides a PNI framework that explains the theoretical links between psychosocial and behavioral stress, psychological distress, alterations in the neurohormonal and immune systems during pregnancy and adverse pregnancy outcome. These links form the framework for the current study.
Antenatal stress and preterm birth.
Cortisol stimulates the synthesis and release of placental corticotrophin-releasing hormone (pCRH). In humans, elevated cortisol early in pregnancy predicts pCRH levels later in pregnancy, and pCRH predicts preterm birth.\(^{[12]}\)

Antenatal stress and nervous system
results of some studies have documented that relatively high levels of prenatal maternal cortisol predict:
- Greater behavioral and physiological stress reactivity in fetuses, infants and children
- Decreased cognitive ability in infants
- Increased affective problems in young children
- Altered amygdala volumes in young girls\(^{[13]}\)

Stress and gut development
stress during the first trimester of pregnancy alters the population of microbes living in a mother’s vagina. Those changes are passed on to newborns during birth and are associated with differences in their gut microbiome as well as their brain development.

During a vaginal birth, a newborn is exposed to its mother’s vaginal microbes, collectively known as the microbiota, which importantly colonizes the newborn’s gut, helping its immune system mature and influencing its metabolism. These effects take place during a critical window of brain development.

Antenatal stress and psychological behavior
A study released in March 2015, utilized the information provided by baby’s first blood draw (heal prick) after birth shows that infants whose mother’s cortisol levels were consistently higher than normal early on in pregnancy, had higher than normal cortisol levels themselves. These infants displayed a much higher sensitivity to stress than other babies with lower cortisol levels. As these babies grew into toddlerhood, they exhibited heightened levels of anxiousness compared to other children and by the time they were six years old, MRI scans revealed their amygdale (the section of the brain associated with the human response to frightening stimuli) were larger than normal.\(^{[14]}\)
Antenatal stress and intelligence

The intelligence of more than 100 babies and toddlers whose mothers had suffered unusually high stress in pregnancy was studied and in January 2015, results were released showing their IQ’s were generally about 10 points below average. Many of these small children also had higher than average levels of anxiety and attention deficit problems. [15]

Numerous studies have found that males appeared most affected and may have implications for the development of disorders such as autism and schizophrenia, both of which disproportionately affect males in our society.

Antenatal stress and immunity

Shown below: Maternal stress also impacts normal fetal tissues and organs’ development and increases the risk of development of cardiovascular, metabolic syndrome, stroke and various neurobehavioral, neuropsychological, neuropsychiatric diseases later in life. [16]

Antenatal stress and brain development

The brain development is strongly compromised by maternal stress. Expression patterns of key functional mediators that contribute to the heightened susceptibility of neonatal HIE (Neonatal hypoxic ischemic encephalopathy is a devastating disease that primarily causes neuronal and white matter injury and is among the leading cause of death among infants.) The response of these mediators may be stress-specific.
Prenatal stress changes normal brain developmental trajectory, alters brain cellular behavior, remolds cerebral structure and morphology, disturbs neurotransmission and reprograms the vulnerability or resiliency to neurological diseases in later life.\textsuperscript{[17]}

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\textsuperscript{[17]} http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3404248/

**Antenatal stress and respiratory system**

Asthma and Allergies: Babies born to mothers who are experiencing extreme stress levels had more immunoglobulin E (IgE) in their blood at birth than babies who are born to mothers with normal stress levels. IgE is an immune system compound (antibody) that indicates an immune system response. This suggests that these babies would be more likely to have asthma or allergies because IgE is an antibody involved in allergic and asthmatic reactions. Obviously this is not conclusive as there are many other factors that determine whether a child will be asthmatic or allergy prone but certainly elevated IgE is suggestive of an increased risk.

- Aacharya charaka has mentioned that shoknitya stree(always distressed or grieved pregnant mother) may have, slender, short lived or less digestive powered child.
- Nature of troubling others, jealous and henpecked child develop if mother had been Psychologically malevolent or constantatly worried during her pregnancy. (Abhidhyayini stree)
- Intolerant mother (Amarshinee stree) may give birth to furious, deceitful, insidious, calumnious child.\textsuperscript{[18]}
DISCUSSION
Glucocorticoids and more generally cortisol, have numerous biological functions. Principal actions of cortisol in normal physiology are: increase rate of protein catabolism, stimulate glucogenesis and lipolysis, provide resistance to stress. But chronic or extreme maternal stressed condition in mother, increases vessel Tone of mother, may reduce blood flow to the fetus. Reduced supply of oxygen may, in turn, activate the fetal HPA axis, increasing fetal cortisol exposure. Maternal stress may also lead to the production of placental CRH, further activating the fetal HPA axis. Though fetal exposure to glucocorticoids is essential for some aspects of normal maturation in the CNS, excessive glucocorticoids exposure has widespread effects on neuronal structure and synapse formation and is particularly toxic to neurons in the hippocampus, which is the primary regulator of the HPA axis in the limbic region.

In cause of onset of labour, in normal labour, mechanism is likely (feto placental contribution): Due to fetal HPA activation -increased cortisol secretion –placental production of oestrogen and prostaglandin increase-activation of labour. So in etiopathogenesis of preterm labour, this activation start earlier due to increased level of cortisol.

Aacharya charaka says, krodha(anger), shoka(grief), asuya(calumniaition), irshya(jealousy), bhaya(fear), trasas(terror) are the garbhini(pregnant woman)’s Manasika bhavas which are responsible for garbhastrav-garbhapata.

Acharya vagbhatt has also mentioned that shoka(fear) is one of the responsible factor for” upashushkak Garbha”, which can be correlated with intra uterine growth retardation.

CONCLUSION
Prenatal maternal stress or anxiety has been shown in a variety of studies to be a risk for poor or compromised development in the child, indexed by such measures as cognitive and language ability, temperament, neurodevelopment and behavioral and social adjustment risk to the child. One of the more notable findings from recent studies is that early parent-child relationship quality may eliminate or otherwise modify the effects of prenatal stress on the child.
REFERENCES


19. charak samhita shaareer sthan chapter 8/18.
22. Astang Hriday shareer sthan chapter 2/15.