CHAPTER - I

INTRODUCTION

EFFECT OF CHRONIC STRESS ON LACTOGENESIS IN HUMANS
1.1. BACKGROUND:

Stress has become an integral part of our daily life. Generally, stress phenomenon is a physiologic response to psychological and physical demands. The threats are known as stressors. Stress develops due to demand – capability imbalance in the organism’s homeostatic mechanism. Lazarus defined stress as an inward process that happens when a person confronted with a demand that is seen to surpass the assets accessible to successfully react to it and where inability to effectively respond to it, has undesirable consequences.

Stress is associated with some changes in the structure as well as chemical composition of the body. Stress leads to many manifestations and changes which also include body’s defensive adaptive processes. Hypertension, varicose veins, insomnia, fatigue, feeling jittery, poor concentration, general illness etc. are sensations of stress.

1.2. ACUTE AND CHRONIC STRESS:

Stress can be acute or chronic. Acute stress is a short-lived stress. The physiological response to this type of stress causes effective resolution to the stressors such as demand or threat. Chronic stress is long-lived stress, generally lasting weeks to months to years. The physiological response does not have effective resolution to the stressors. The basis for chronic stress depends upon frequent occurrence of stressors over a period of time. So, chronic stress is a state of continuous arousal of physiological response. This is because when a body experiences too many threats and demands or only one stressor continuously
for a long period of time, but it does not have the capacity to activate the relaxation response. This type of stress develops due to everyday stressors which are neglected or poorly managed or in response to traumatic events.\(^6\)

Acute stress is not dangerous to health. It can actually be beneficial in certain circumstances of life, as it can increase alertness and performance. Stress for a prolonged time i.e. chronic stress has been linked to ill-health consequences. So, stress hormones are to blame.\(^7\) Pregnancy is one of stressful events in woman’s life, as pregnancy is a time of physiological change which requires huge psychological adjustment.\(^8\) Studies indicate that high stress or anxiety levels during pregnancy are at increased risk for preeclampsia, spontaneous abortion, preterm labor and delayed fetal growth.\(^9\) - \(^11\).

1.3. PHYSIOLOGY OF STRESS RESPONSE:

Autonomic Nervous System (ANS) and Hypothalamic – pituitary – adrenal axis (HPA) axis get activated in response to stress.\(^12\) With chronic stress, both the systems are repetitively activated. This results in persistent physiologic effects.\(^13\) Prolonged stress alters HPA axis, malfunctions negative feedback loop resulting in excess production of Corticotrophin Releasing Hormone (CRH) from hypothalamus. This stimulates the anterior pituitary for the systemic release of ACTH. This subsequently signals the adrenal glands to release glucocorticoids predominantly Cortisol.\(^14,15\).

Chronic stress response leads to pregnenolone steal, which causes production of huge amount of Cortisol (the principal stress hormone). So, serum cortisol level can be considered as a more objective measure of chronic stress. Excessive Cortisol levels during
pregnancy has been associated with adverse pregnancy outcomes\textsuperscript{16,17}. Keeping in view of this, present study was conducted to assess effects of chronic stress on lactogenesis.

### 1.4. INTERACTION BETWEEN STRESS AND LACTATION:

The primary lactogenic hormones associated with milk synthesis and ejection are Prolactin, Oxytocin, Glucocorticoids and also other hormones such as Insulin, Growth Hormone, Leptin and Opiates. The data available from both animal and human studies indicate that the physiological trigger for lactogenesis is a fall in progesterone, maintained Prolactin and Cortisol after child birth\textsuperscript{18}

There are no clinical studies demonstrating a direct correlation between measures of maternal stress and decreased lactation. Animal studies indicate that stress depresses lactation directly by acting on hypothalamus which inhibits secretion of Prolactin and Oxytocin from anterior and posterior pituitary respectively or indirectly by activating sympatho-adrenomedullary system, which secrete norepinephrine, epinephrine and cause the peripheral inhibition of milk ejection. This is due to vasoconstriction at the level of mammary glands, stimulation of mammary myoepithelial cells and potential increase in mammary ductal tone\textsuperscript{19-21}.

Animal experiments have demonstrated suppression of lactation when animals were exposed to certain types of stressful stimuli\textsuperscript{22}. In humans, lactation insufficiency may be due to the stress imposed by preterm delivery, infant medical condition, maternal life style or life events\textsuperscript{23,24}. Duration of stress and its sites of action lead to decrease in milk synthesis or ejection which causes the suppression of lactation\textsuperscript{25,26}. As per the human experiment done by
Newton and Newton, various types of acute stressful stimuli decreased the milk ejection reflex\textsuperscript{27}. Udea T et al have shown that mental stress and noise stress have reduced milk volume\textsuperscript{24}. These studies were demonstrated during established lactation and not during lactogenesis. This research indicate the effect of acute stress on lactation i.e. Milk volume was measured before the induction of stress, during the time of stress and after the removal of stress. Milk volume was normal before induction of stress, volume was reduced during the time of stress as the milk ejection was affected and normal milk volume was regained after the recovery from stress. The effects of chronic stress on lactogenesis are not yet known. So, this study was conducted to assess the effect of chronic stress on lactogenesis.
REFERENCES:


