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Understanding *Srama* as a *Nidana* for Male Infertility w.s.r to Psychological Stress

Rijin Mohan[1]* and Saranya S Kumar[2]

[1]Dept of Roga Nidana, Shri Dhanwantry Ayurvedic College and Hospital, Sector 46-B, Chandigarh, Punjab, India

[2]Dept of Kayachikitsa, Shri Dhanwantry Ayurvedic College and Hospital, Sector 46-B, Chandigarh, Punjab, India

ABSTRACT

Male infertility is defined as the inability of a male to cause pregnancy in a fertile female. Ayurveda explains four major contributory factors responsible for reproduction. They are Ritu, Kshetra, Ambu and Beeja. Among which Beeja plays a pivotal role. Psychologically deferring factors like Chinta, Shoka, and Bhaya etc attribute to mental stress in individuals. In the present day lifestyle, stressors like family issues, occupational stress, inter personal maladaptation etc contributes in the unveiling of Manasika Bhava. Due to chronic and repeated exposure to such psychological eruptions, there will be derangement in various hormonal metabolisms. Ayurveda perceives improper metabolism as the result of Jataragni and Dhatwagni Mandya. Krodha, Shoka, Bhaya and Chinta results in Vata Pitta Prakopa, leading to Rasa- Raktha Dusti, which get lodged in Shukravahasrotas, with an end outcome of improper nourishment as well as development of Shukra Dhatu. It also results in Soshana of Aap Dhatu and increase in Agneya quality which is opposite to the quality of Shukra contributing to Shukra Kshaya. In a modern perspective, HPG Axis function gets altered due to stress. Increased production of stress hormones like cortisol, ACTH and other neurotransmitters like Epinephrine, Oxytocin etc causes suppression of Gonadotropin resulting in decreased gonadal activity, which is manifested as Male Infertility. This presentation intends to explain the etiopathogenesis of various aspects of Srama in the causing male infertility.

KEYWORDS

Male infertility, Srama, HPG Axis

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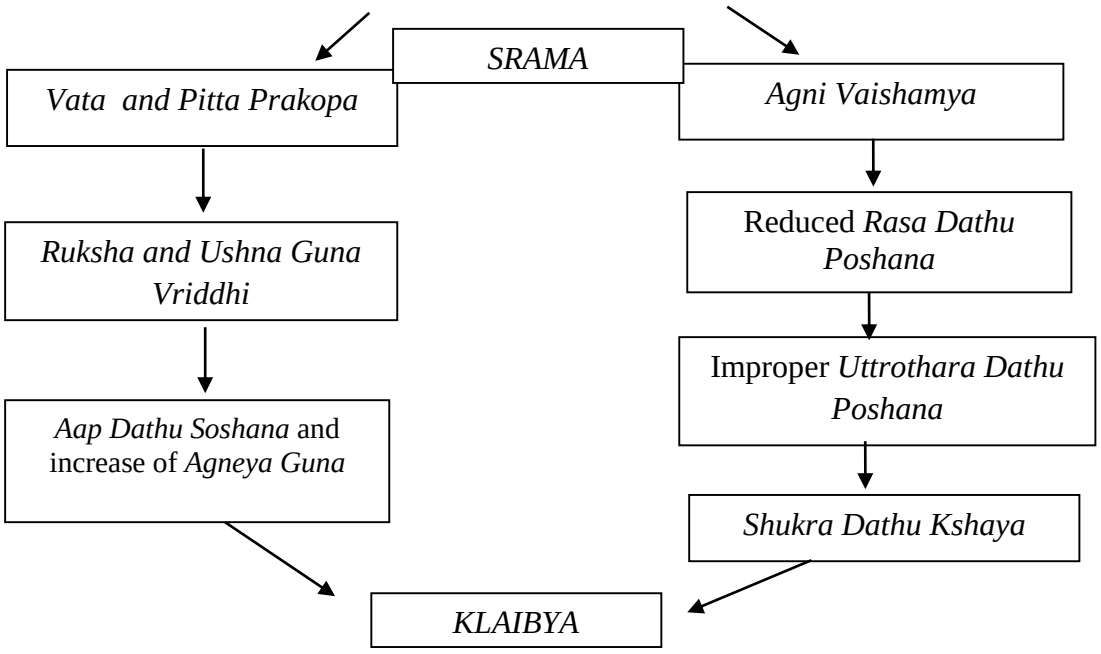
INTRODUCTION

Male infertility is defined as the inability of male partner to cause pregnancy in a fertile female partner. Globally it accounts for 40 to 50%. Fertility rate of young men has decreased to 15% worldwide. According to WHO distribution of diagnosis for male infertility guidelines, 48.5% of cases are accounted as idiopathic[1]. Ayurveda explains four major factors which are responsible for reproduction. Stress typically presents a negative impact on the mental and physical well being of an individual. Central nervous system exerts an inevitable role in regulating stress-related mechanism. HPG axis and HPA axis play a crucial part in spermatogenesis and related hormonal mechanism. Psychologically deferring factors like *Chinta, Shoka, Bhaya* etc attribute to mental stress in individuals. *Shukra* have the predominance of *Jala Mahabootha* and *Akasha Maha Bootha* and possess *Saumya Guna*. *Manasika hethus* are explained for producing the *Dusti* of *Shukra Dathu*, which includes *Kama, Krodha, Bhaya, Chinta, Shoka, Vibhrama* etc. *Ksheena shukra lakshana* includes *Srama* and *Klaibya*[2].

DISCUSSION

Psychological stressors that greatly contribute for male infertility are familial conflicts, occupational stress, inter personal relationship issues, substance abuse, impaired sleep wake cycle, psychiatric illness etc. In Ayurveda *Kama, Krodha, Bhaya, Chinta, Shoka* etc are considered to be contributively causing to *Manasika Srama*[3].

Diagram 1: ***SAMPRAPTHI*** **(Pathogenesis)**



The pathogenesis of *Klaibya* due to *Srama* can occur simultaneously as mentioned in above mentioned schematic diagram. Exposure to Srama can cause *Agnivaishmya* as well as *Vata* and *Pitta Prakopa*. The imbalance in *Agni* results in irregular *Ahara Pachana*. This causes reduced *Rasa Dathu* nourishment and ends up in *Kshaya* of preseeding dathus. It causes the *Shukra Kshaya* also. At the same time vitiated *Vata* and *Pitta*, were *Ruksha* and *Ushna Guna Vriddhi* occur. It contributes to the *Aap Dathu Soshana* and increase of *Agneya Guna*, which is opposite to the quality of *Shukra*. All of which results in *Shukra Kshaya* ending up in *Klaibya* as mentioned in Figure 1. In the pathogenesis the *Dusti* of *Agni* at different levels are inevitable.

HPA AXIS

The functions of HPA (Hypothalamo Pituitary Adrenal) axis includes immune modulation, digestion, mood control, sexual drive, emotional control. Any alteration in the function of HPA axis ends up in alteration of its functions.

HPG AXIS

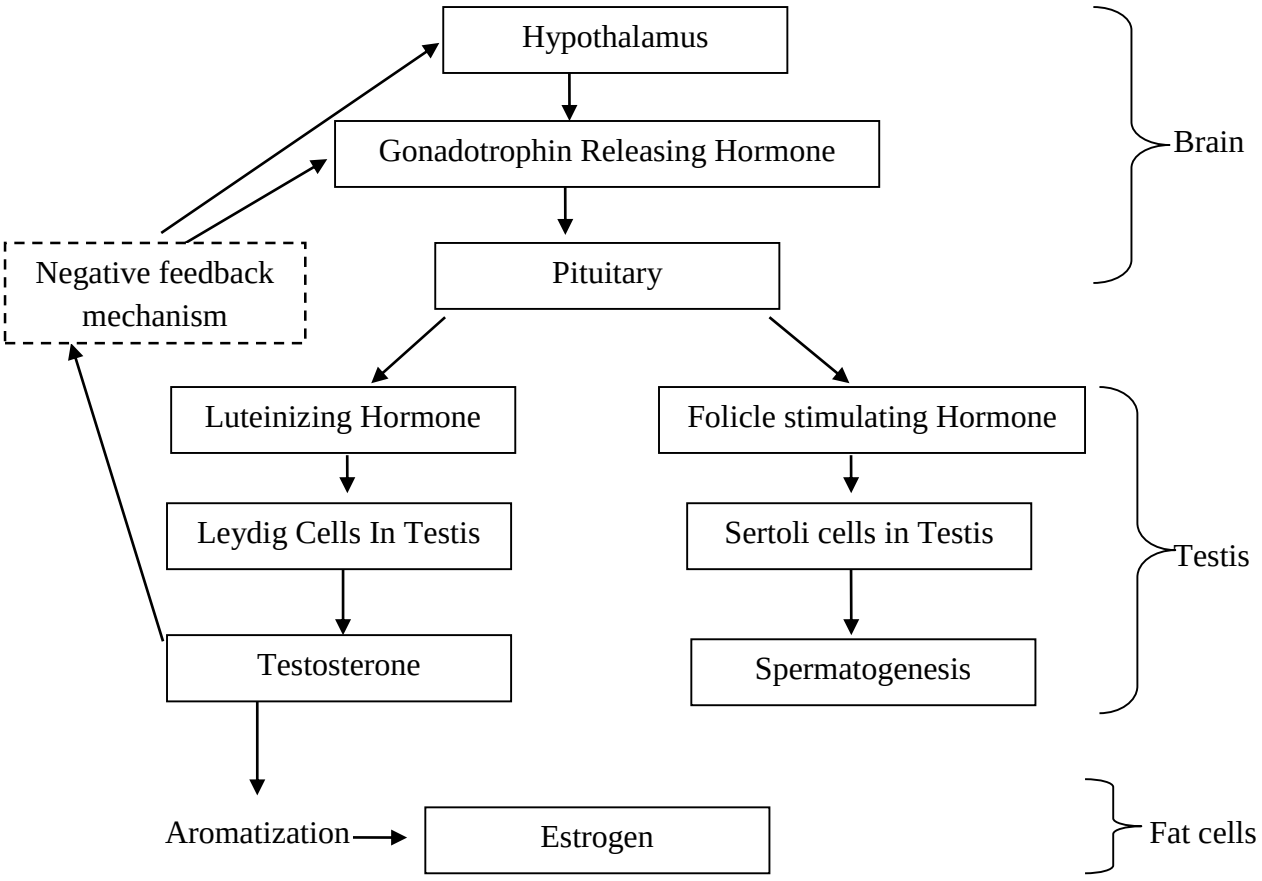
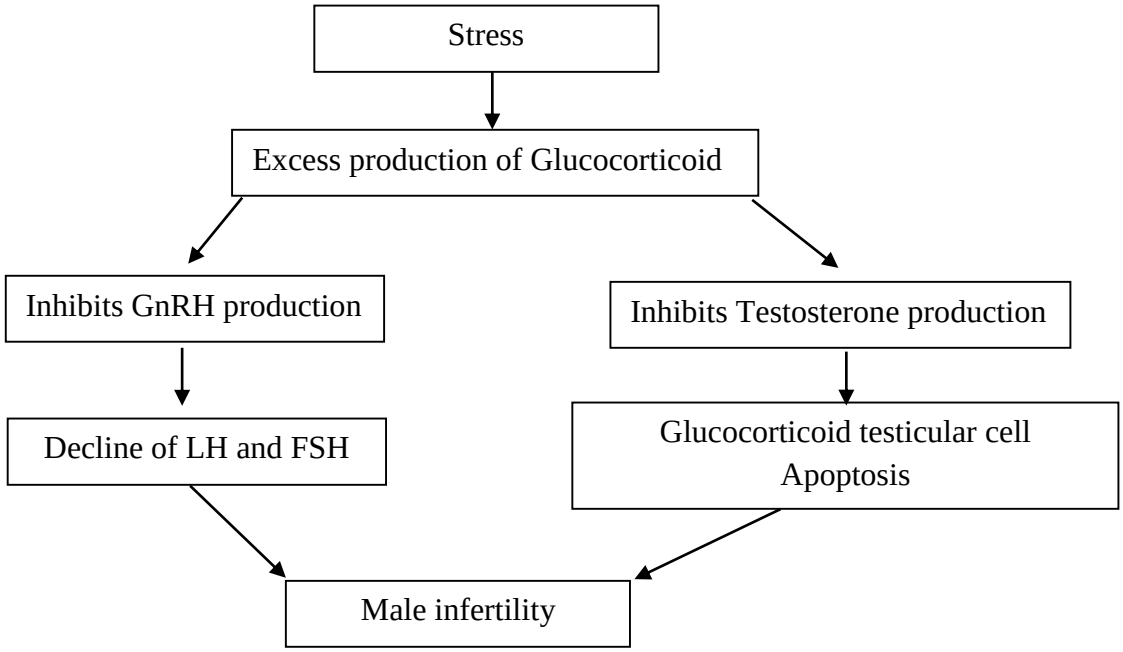


Diagram 2 Functioning of Hypothalamo Pituitary Gonadotrophic axis

Hypothalamus release Gonadotrophin Releasing Hormone and is stored in Pituitary gland. Pituitary secretes hormones such as LH and FSH, all this occur at brain. LH acts over the Leydig cells in testis and helps in secretion of Testosterone and FSH acts on Sertoli cells in testis which stimulates the process of spermatogenesis as shown in figure 2. Both LH and FSH have key role in development and nourishment of sperm as well as overall sex functioning in male. Testosterone helps in Aromatization of Estrogen which happens in fat cells.

PATHOGENESIS



Stressors acts up on HPA and alter its normal functioning, which causes the excessive secretion of Glucocorticoid. This will act in two ways, that is Glucocorticoid will inhibits the GnRH production which results in decline in the secretion of LH and FSH[4]. It hampers the overall functioning of HPG axis, which ends up in poor production of testosterone and improper spermatogenesis, were resultant is male infertility. Increased quantity of Glucocorticoid also inhibits the testosterone production, were it stimulates the Glucocorticoid testicular cell apoptosis. It also ends up in Male infertility.

Discussion on HPA-HPG Axis and its role in causing infertility

In an ideal condition, the adrenal glucocorticoids released by hypothalamic-pituitary-adrenal (HPA) axis, provide defence against homeostasis. The glucocorticoid hypersecretion has a great

role in pathogenesis of several forms of systemic, neurodegenerative and affective disorders. The HPA undergo gonadal influence, associated with neuropathology and HPA dysfunction[6]. The interrelationship of HPG and HPA systems make it difficult to understand how these hormones act on brain[5]. ACTH release is controlled by testosterone-dependent effects on arginine vasopressin synthesis, and corticosterone-dependent effects on CRH synthesis in the paraventricular nucleus (PVN) of the hypothalamus. Whereas, the testosterone and corticosterone interact on stress-induced ACTH release and drive to the PVN motor neurones. HPA Axis regulated the medial preoptic area, central and medial amygdala and bed nuclei of the stria terminalis which relay on homeostatic information and integrate reproductive and social behaviour[6].

The adrenal gland consists of two functional units; the medulla which produces catecholamines and cortex which produces mineralo corticoids, (aldosterone and corticosterone), glucocorticoids (cortisol) and androgens[7]. The cortex is most important in male fertility as it releases androgens. Few disorders related to adrenal gland causing fertility issues are: Adrenal insufficiency, Adrenal fatigue or burn out, Classical congenital adrenal hyperplasia, Non classical congenital adrenal hyperplasia etc[8]. Increased stress raises cortisol and brings down progesterone levels (both potential signs of infertility). The cortisol and progesterone are produced by adrenal gland which has an impact on the reproductive cycle[9]. It also causes thyroid and prolactin hormone imbalances that are yet another etiology for infertility. Research reveals that stress hormones such as cortisol, inhibits the body's main sex hormones GnRH (gonadotropin releasing hormone) and subsequently suppresses ovulation, sexual activity and sperm count.

The main control in this axis are corticotrophin releasing hormone or factor (CRF), adrenocorticotropic hormone (ACTH) and cortisol[10]. Several brain neurotransmitters such as vasopressin, oxytocin, β-endorphin, angiotensin II, epinephrine, norepinephrine and serotonin among others are involved in mediating and integrating the stressful stimuli[11]. Stress hormone in stress response serves as a biochemical marker to assess the stress response and increased CRF secretion as they are always associated with an activation of HPA axis. Catecholaminergic and serotonergic system is also marker for HPA activation during stress response and the interference with the action of these amines can result in blunted or nullified

stress response[12]. The elevated level of ACTH increases cortisol secretion from adrenal gland which leads to a number of adaptive changes in metabolic activity. In addition to this neurohormonal pathway, there is also direct neural stimulation to the adrenal medulla which results in enhanced secretion of adrenaline[13]. Different studies showed that stress has negative impact on sperm parameters; mainly morphology, motility and density. Another study provides evidence for a significant setback in semen quality of male IVF patients and demonstrates an inverse relationship between semen quality and specific aspects of psychological stress[14]. Sperm concentration, percent motility, and semen volume are dependent on psychological job stress and traumatic life-event. Death of a close family member was associated with a reduction in straight-line velocity and percent of progressively motile sperm[15]. Although, another prospective study showed that the effect of a man's daily life psychological stress on his semen quality is negligible and effects only on fecundability, which is seen only among men with low sperm concentration. Psychological stress on male infertility was found to be associated with tiring occupation with night shifts, more exposed to noises, and had reported with a new habit of smoking. Many of the reports indicated certain other disturbances of male infertility, such as impotence, sham ejaculation, retrograde ejaculation and oligospermia which have been associated with psychological factors[16].

Psychological distress describes anxiety, depression and underlying psychopathology which are related to success or failure in conceiving, and physiological changes that alters the mental status leading to infertility. The consequences of infertility show overwhelmingly distressing psychological effects for women than it is for men. Psychological distress is high in a women suffering from abuse and are associated with infertility and female infertility expressed higher distress to infertility than their husbands[17]. A couple that is trying to conceive will undoubtedly experience feelings of frustration and disappointment if a pregnancy is not easily achieved[18]. Psychological factors affecting infertility in women are low mood, palpitation, sleeplessness and stress-dependent changes. Diurnal changes in cortisol release is associated with mental stress and it mediates the down-regulation of the HPG axis. It involves inhibitory mechanisms of GnRH at the pituitary level, by reducing the release of FSH and LH. Researches show that the effect of cortisol on the HPG axis depends on the endocrine status of the

ovary in the menstrual cycle[19]. Psychological distress significantly increases norepinephrine and cortisol concentrations and a lower concentration of norepinephrine and cortisol, both in serum and follicular fluid, were found in fertile women. Norepinephrine and cortisol concentrations may negatively influence the clinical pregnancy[20]. These could be the link in the complex relationship between psychosocial stress and infertility. Infertile may have negative emotional responses, such as stress, anxiety and depressions which are both a physical and emotional burden on women and their partners.

CONCLUSION

Manasika Nidanas which causes srama has an inevitable role in causation of male infertility. *Prakupita Vata* and *Pitta* which causes *Agnimandya* in various levels, which leads to *Shukra Dusti* and *Shukra Kshaya*. HPA axis which is activated via stressors releases corticosteroids, inhibits HPG axis and ends up in improper spermatogenesis and testosterone secretion. A healthy approach on psychological stressors is essential to prevent male infertility.

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