




## Proper digestion as a regulator of female reproductive physiology-An Ayurvedic perspective

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Article History:	ABSTRACT		
Received on: 06.03.2019 Revised on: 22.06.2019 Accepted on: 26.06.2019	<p>Neuro-hormonal regulation of female reproductive system is a well-established theory till today which believes that Gonadotropin-Releasing Hormone(GnRH) is the primary signal that control the activity of Anterior Pituitary Gonadotrops which regulates secretion of Follicular Stimulating Hormone (FSH) and Luteinizing Hormone (LH). Further FSH and LH regulate growth of ovarian follicle and their proper balance results in ovulation. There is consensus among experts about hypothalamus that secret GnRH is the primary site that regulates female reproductive physiology. Now researchers are focused on the factors regulating HPO axis. Since last one decade role of GIT in regulation of HPO axis became the area of interest for researchers. Various studies have been done showing relationship between GIT and HPO axis. In <i>Ayurvedic samhitas artava dhatu</i> and <i>artava-vaha strotasas</i> are considered as the factors regulating reproductive physiology. In present study literature review of <i>Charak Samhita</i>, <i>Sushruta Samhita</i> and <i>Ashtanga Hridaya</i> was done to understand concept of <i>artava dhatu</i> and its regulatory factors. It was found that <i>artava dhatu</i> is formed only after proper digestion. Various factors e.g. type of diet, life style and <i>Agni</i> (status of digestive capacity) having their role on digestion that indirectly influencing <i>artava</i> and <i>artava-vaha strotas</i>. It can be concludes that <i>Ayurvedic</i> concept of <i>ahar</i>, <i>agni</i> and digestion have their regulatory role on female reproductive physiology by regulating formation of <i>artava dhatu</i>.</p>		
<b>Keywords:</b>			
Agni, Ahar, Artava dhatu, Artava-vaha strotasa, HPO axis, Reproductive physiology			

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### INTRODUCTION

Human body is made up of different systems which act in cumulative ways to perform body activity but in modern medical world, specialty and super specialty have segregated human body. For proper functioning of body fine-tuning between each system is necessary. Various external and internal factors are influencing body homeostasis. *Ayurveda* being the life science believes in promotion of health of healthy one and pacification of disease of ill person (Pandey and Chaturvedi, 2005b) It has holistic approach towards body and life. There is no system wise segregation of body. As per *Ayurveda* body is made up of 3 *doshas* (*vata*, *pitta*, *kapha*), 7 *dhatu*s (*rasa*, *rakta*, *mamsa*, *meda*, *asthi*, *majja*,

*shukra*) & 3 *malas*(*mutra, purish, sweda*) (Shastri, 2005b) *Doshas* are functional unit and *dhatu&mala* are structural unit of body. Each *dosha, dhatu&mala* has their specific function (Shastri, 2005d). Homeostasis between them is required for proper functioning of body (Shastri, 2005c). Each *dosha* have certain qualities i.e. responsible for proper functioning of *dosha* (Pandey and Chaturvedi, 2005c). These qualities of *doshas* get disturb by various factors i.e. diet, life style & mental status of body. Concept of *Agni* and *strotasas* are also two important concepts for regulation of *dosha, dhatu & mala* in body. A thorough understanding of *dosha, dhatu, mala, Agni & strotasas* are important before understanding reproductive physiology.

### Concept of *doshas*

Physiological unit of body is termed as *tridosha* in *Ayurveda*, when they get disturbed results in diseases (Tripathi, 2011a). *Vata* is responsible for all movement in body and as regulator of body physiology (Pandey and Chaturvedi, 2005i). Functions related to digestion and energy expenditure are regulated by *pitta* (Pandey and Chaturvedi, 2005k). All anabolic activities are under control of *kapha* (Pandey and Chaturvedi, 2005l).

### Vitiating factor of *doshas*

It is beauty of *Ayurveda* where regulating factors of *doshas* (physiological unit of body) in terms of diet, life style & mental status have been described in very detail and during management of disease avoidance of these factors is considered as first line of management (Shastri, 2012). This concept of causative factors for disturbing body physiology is lacking in modern physiology. Researchers have been started in this area but are in very preliminary stage. *Ayurvedic* concept of *nidan*, disturbing body physiology and causing specific disease (Pandey and Chaturvedi, 2005f) can give a new area of research for understanding links between external factors and body physiology & along with this it can help in filling gap between interlinked physiologies of different body system and give a more holistic picture of body physiology.

### Factors Vitiating *Doshas* in Body

As per *Ayurveda* certain diet and life style have their role in aggravation of particular *dosha*.

#### 1 *Vataj nidan* : (Shastri, 2005i).

*Vata vardhak aharaj nidan*

*Rasa* –Excessive use of *katu* (pungent), *teekshna* (bitter) and *kashaya* (astringent) *rasa*

*Guna* - Over indulgence of *ruksha* (dry), *sheeta* (cold) etc. diet provokes *vata*

#### *Vata vardhak viharaja nidan*

Factors related to life style i.e. *ati-maithuna* (excessive coitus), *ati yanavarohana*,

*Ati-margagamana* (excess travelling), *ati-bharavahana* (carrying excess weight), *apatarpana* (Excess fastin), *ratri jagarana* (awakening in night) aggravates *vata dosha* in body.

*Vata vardhak manasik nidan* : *Bhaya* (fear), *shoka* (sorrow)

#### 2. *Pittajnidan*: (Shastri, 2005j).

#### *Pitta vardhak aharaja nidan*

*Rasa* –Excessive use of *amla* (sour), *lavana* (salty) and *katu* (pungent) *rasa*

*Guna* – *ushna* (hot), *tikshna* (spicy) etc. diet provokes *pitta*

#### *Pitta vardhak viharaja nidan*

Factors related to life style i.e. *Viruddha bhojana* (eating food item those are opposite in

Nature), *ati madya sevana* (excess alcohol), *aggravates pitta dosha* in body.

*Pitta vardhak manasik nidan* : *Krodha* (anger), *Ershya* (jealousy)

#### 3. *Kapha vardhak ahar vihar* : (Shastri, 2005k).

#### *Kapha vardhak aharaja nidan*

*Rasa* –Excessive use of *madhura* (sweet), *amla* (sour) and *lavana* (salty) *rasa*

*Guna* – *Guru* (heavy), *snigdha* (oily/fatty), *abhishtyandi* (diet having ability to obstruct

*stotasa*) etc. diet provokes *kapha*

#### *Kapha vardhak viharaja nidan*

Factors related to life style i.e. sedentary life style, *adhyashana* (eating before digestion of

Previous food), *ajeerana* (indigestion), *divaswapna* (sleeping during day time) aggravates

*kapha dosha* in body.

*Kapha vardhak manasik nidana* : *lobha* (greed)

**Concept of *Agni* and *Dhatu***: *Agni* that is present in body, termed as *kayagni* is divided into three as (Pandey and Chaturvedi, 2005e).

***Jatharagni***: It looks after digestion and absorption of food.

***Bhootagni***: It converts all *vijateeya panchabhautic dravyas* to *sajateeya dravyas*.

***Dhatvagni***: It is present in their respective *dhatu*s and performs synthesis and breakdown of *dhatu*s.

There are four functional state of *agni* according to predominance of *dosha* and *dushya* (Pandey and Chaturvedi, 2005d) i.e.

**Samagni** : It is due to influence of normally equilibrated *dosha*. It ensures complete digestion of food ingested at proper time without any irregularity leads to proper functioning of *dhatu*s.

**Visamagni** : It is due to influence of predominance of *vata dosha*. In this state function of *Agni* is irregular and fitful. It sometime helps the process of complete digestion and other time improper digestion. Thus leads to improper formation of *dhatu*s.

**Tikshnagni**: It is due to influence of predominance of *pitta dosha*. In this condition *agni* is excessively excited, it easily digests even a very heavy meal, in very short span of time and when it gets no food to digest it starts digesting *dhatu*s and thus cause *dhatu* shosha.

**Mandagni**: It is due to influence of predominance of *kapha dosha*. In this state *Agni* is unable to digest even a small quantity or otherwise even easily digested food leads to *vidaha*.

Functions of *jatharagni* includes

- Digestion of food
- Saarakitta vibhajana

After function of *jatharagni* *ahara rasa* get form, and then *bhootagni* and *dhatvagni* comes into play so *vijateeya ahara rasa* get converted into *sajateeya* to different *mahabhutas* of body and after functioning of *dhatu paka* gives nourishment to body tissue.

But when proper functioning of *Agni* gets disturbed, *ama* gets formed at various levels in body that leads to different pathological conditions.

- Apakva ahara in amashaya
- Apakva ahara rasa in amashaya
- Ama at dhatu level

When food gets properly digested it forms *sara* and *kitta bhaga*. *Sara bhaga* get absorb and after digestion with *dhatvagni* forms *sthayi* and *asthayi* *poshaka dhatu*. *sthayi poshaka dhatu*s gives nutrition to permanent *dhatu* i.e. *sthayi* *rasa dhatu* gives nutrition to *rasa dhatu* proper and *asthayi* *rasa dhatu* after functioning of *raktagni* forms *sthayi* and *asthayi* *rakta dhatu*s, in the same manner other *dhatu*s get form and get their nutrition from their previous *dhatu*s. *Dhatu*s are structural unit of body and have their specific function. *Rasa*, *rakta*, *mamsa*, *meda*,

*asthi*, *majja* and *shukra* are 7 *dhatu*s described in Ayurveda, each have their specific function (Shastri, 2005e).

Disturbance in function of *Agni* at any level i.e. *jatharagni*, *bhutagni* and *dhatvagni* leads to formation of *ama* that is causative factor of different pathological conditions. But gross digestion takes place in *amashaya*, that's why *Acharya* has described formation of *ama*, primarily in *amashaya*.

Due to improper functioning of *agni*, food remain undigested and form *ama* which is foul in smell, very slimy and vitiates *doshas* and *dhatu*s when get absorbed (Tripathi, 2011b).

### Symptoms of Ama

- Srotarodha
- Weakness
- Heaviness
- Coated tongue
- Improper digestion

This *Ama* is responsible for vitiation of all the *doshas* and *dhatu*s (Tripathi, 2011c).

Concept of *Agni* is very different concept in comparison to of modern concept of digestion. In modern Gastroenterology digestion takes place in body by the help of various types of enzymes. There is no direct evidence about the longevity, health, cheerfulness, plumpness, luster vitality etc. having relation with proper digestion as *Ayurvedic* concept about function of *agni* is (Pandey and Chaturvedi, 2005a). But new researches has shown and giving glimpse that has been well elaborated in *samhitas* in relation to concept of *Agni* and *ama*. Researchers have shown that apart from digestion digestive system has control on immunity, brain and hormonal secretion.

### Concept of Srotas

It is very unique concept of *Ayurveda*. *Srotas* are the structures in human body through which *dhatu*s and *doshas* moves. *Srotas* allows materials to pass through them very slowly. *Acharya Charak* has described thirteen major *srotas* (Pandey and Chaturvedi, 2005m) along with it *Acharya Sushruta* has described 2 extra pair of *srotas* in female i.e. *Artavavaha srotas* and *Stanyavaha srotas*. *Artavavaha srotas* are two in numbers and having their root in *garbhashaya* and *artavavahi dhamanis* (Shastri, 2005a).

### Functions of Srotas

*Srotasas* have important role in formation, maintenance and nutrition of *dhatu*. *Acharya Charaka* defines *Srotas* as transporting channels of *dhatu*s (tissue elements) undergoing transformation (Pandey and Chaturvedi, 2005h). This transformation of element occurs with the aid of specific *Agni* (digestive power specific to each element) located at the base or root of each *Srotas*. They are variously called as *Poshaka dhatu*s (providing nutrition), *Asthayi dhatu*s (circulating metabolites) and *Margag dhatu*s (moving through channels). Growth and development, depletion of body tissues take place only through *Srotasas* (Pandey and Chaturvedi, 2005j). Thus, proper functioning of *srotasas* is necessary to maintain the health.

Faulty diet, life style and psychology vitiates *srotasas* and certain *gunas* of specific *doshas* and when that specific *dosha* reaches at particular vitiated site of *srotas* causes *srotodushti* (Pandey and Chaturvedi, 2005f). The main signs of the vitiation of the *srotas* are (Pandey and Chaturvedi, 2005g) 1. *Ati-pravrutti*—increased flow of contents of the *srotas* 2. *Sanga*—Obstruction in the flow of contents in the *srotasas* 3. *Sira granthi*—Appearance of nodular growth in the *srotasas* 4. *Vimarga gamana* – Diversion in the flow of contents of *srotas*.

*Ayurveda* opines that vitiation of *doshas* are prime for generation of disease. Concept of *Anshamsha dusti* of *Doshas* (Tripathi, 2011d) and *Kha- Vaigunya* and *srotodushti* is also a very important concept for a disease process. Every *Dosha* has its specific *gunas* and in a disease, specific *guna* get vitiated by particular *nidan sevana* (Pandey and Chaturvedi, 2005f) Abnormalities at particular site of body (very similar to concept of *Kha-Vaigunya* of *Srotasas*) are also starts with *nidansevana*. Such treatment that gives consideration to whole disease process (i.e. *Samprapti Vighatana*) is beauty of *Ayurveda* whereas in Modern Medicine after effect of causative agent on body is treated, they have no concept about management of body homeostasis which gets disturbed in the state of Disease.

### Formation of *artava*

Proper functioning of reproductive physiology can be assessed by proper functioning of *artava dhatu* and *artava-vaha srotasas*. *Artava* is final outcome of reproductive physiology either in form of regular menstruation or proper conception, because in *samhitas* conception is considered as function of *aartava* (Shastri, 2005f).

Factors which regulate formation of *artava* also regulate whole reproductive physiology. To understand these regulatory factors process of *artava* formation should be understood in detail. It is clearly ex-

plained in *Ayurveda* that after proper digestion of *rasadi dhatu*, *raja / artava* forms in female every month (Shastri, 2005h). Here monthly formation of *artava* indicates ovulatory cycle because after ovulation if conception has not taken place menstrual bleeding takes place every month.

*Dhatu*s moves in body through their respective channels. It is clearly described in *samhitas* that *raja* is formed from *rasa dhatu* in body during digestive process that accumulates in *garbhashay* throughout the month by fine vessels present in uterus and get excreted every month for three days through *yoni*.

### Role of diet in controlling reproductive physiology in light of role of leptin and its relation with HPA axis

*Ayurveda* opines that generalized health, nutrition and proper digestion have relation with *artava* formation (Satyapal, 2008a). In girl, before onset of puberty, as *yoni* (reproductive organ) is underdeveloped *artava* is not expressed, it is present in whole body. Due to effect of diet and generalized body health this *artava* comes in *yoni* at the age of twelve year and get excreted through vagina (*yoni mukha*) every month (Satyapal, 2008b).

*Artava* get form from *rasa dhatu* after proper functioning of *Agni*. This *artava* reaches every month to uterus by *aartava-vahi dhamanis* where fine blood vessels provide nutrition to uterus, *artava* get accumulate throughout the month to provide nourishment to the fetus if conception taken place and if it not happens this accumulated *artava* get excreted through *yoni mukha* every month (Shastri, 2005g).

Proper functioning of *agni* is responsible for proper *artava* formation. Modern physiology also started accepting that nutrition affects HPO axis and thus have effect on formation of sex hormones. Liver that is important organ related with metabolism and detoxification plays important role in regulation of reproductive physiology.

Estrogen and progesterone are two basic hormones which are important for various reproductive functions i.e. development of reproductive organ, proper menstrual flow, oocyte development for fertilization, capacitation, fertilization, embryo implantation and development.

It is proven now that reproductive physiology depends on the energy reserves stored as fat in adipose tissue. In 1994, leptin was discovered that was the first adipokine which linked missing link between body nutrition and reproduction. Leptin is a 16kDa peptide hormone secreted mainly from adipose tissue plays important part in regulation of body weight and energy expenditure (Friedman and

Halaas, 1998). Plasma level of leptin is regulated by feeding and fasting. Leptin not only regulates body weight homeostasis, but also thermo genesis, angiogenesis, hemopoiesis, osteogenesis, chondrogenesis, neuroendocrine and immune function (Bouloumié *et al.*, 1998; Fantuzzi and Faggioni, 2000; Sagawa *et al.*, 2002; Khan *et al.*, 2012). Leptin have regulatory role in ovarian function, oocytes maturation, embryo development as well as implantation and placentation (Cervero *et al.*, 2005). Researchers have demonstrated that leptin plays an integral role in the normal physiology of the reproductive system with complex interaction at all levels of hypothalamic pituitary gonadal axis (HPG), stimulatory effects at the hypothalamus and pituitary and inhibitory action at the gonads. Thus leptin explains relation between metabolic status with the reproductive axis that is very similar to the concept of *aartava dhatu* formation which is under control of *ahar*, status of *agni* and *ahar rasa* formed after proper digestion.

#### Role of Leptin in the Regulation of HPG Axis

Gonadotropin Releasing Hormone (GnRH) cells of the hypothalamus are the primary regulators of reproductive axis, these cell resides in the brain in the preoptic area of the hypothalamus. GnRH is secreted into the hypophyseal portal blood vessels and controls secretion of the Pituitary Gonadotropines Luteinizing Hormone (LH) and follicle stimulating hormone (FSH) (Chehab *et al.*, 1996). Studies are showing that in human, patients lacking leptin protein (Strobel *et al.*, 1998) or functional leptin receptor (LEPRs) (Clément *et al.*, 1998) do not attain pubertal maturity and have low serum level of FSH & LH. A threshold leptin concentration is important for initiation of the menstrual cycle and the function of reproductive system. Leptin receptor (LEPR) is expressed abundantly with in arcuate and ventromedial hypothalamic nuclei which controls both sexual behaviour and food intake (Mercer *et al.*, 1996). This evidence explains and gives experimental evidence about the Ayurvedic concept which states that *aartava* formation (which is responsible for reproductive function and menstruation) is regulated by *ahar* and proper functioning of *agni*, *vata* and *strotasas*.

Leptin has direct effect on the anterior pituitary (Jin *et al.*, 1999). Pituitary tissue culture studies showed that leptin induces a dose-related increase in LH, FSH and prolactin release via nitric oxide synthase activity in the gonadotropes (Yu *et al.*, 1997). Several studies showed that restricted feeding inhibits LH secretion but leptin treatment in these subject results in LH surge (Amstalden *et al.*, 2002).

In leptin deficient (ob/ob) mice leptin administra-

tion accelerates sexual maturation and puberty in normal female mice (Ahima *et al.*, 1997). Rodents a human with LEPR deficiency have hypothalamic hypogonadism, resulting in delayed pubertal development and infertility too. It has been found that there is synchronicity of LH, estradiol and leptin rhythmicity during mid-to-late follicular phase of the menstrual cycle in healthy woman (Licio *et al.*, 1998). These studies are showing that regulation of LH secretion (important for ovulation) is regulated by leptin and thus establishes the link between nutrition and generalized health of body on regulation of reproductive physiology.

#### Role of leptin in ovarian function

Leptin receptors (LEPRs) have been identified in granulosa, theca and interstitial cells of the human ovary (Sir-Petermann *et al.*, 1999) and leptin protein has been found in follicular fluid, with concentrations same as present in serum (Cioffi, 1997). Leptin plays role in follicular development as well as in luteal function because leptin transcription has been detected at early follicular states whereas leptin protein appears only in mature follicle. (Archanco *et al.*, 2003) various in vitro studies have shown that treatment with medium-high physiologic doses (starting from 10ng/ml) of leptin inhibited steroidogenesis in human granulosa and theca cells (Agarwal, 1999) and results in marked decline in the number of ovulated oocytes (Duggal *et al.*, 2000). These studies show that ovarian estradiol production get suppressed by high leptin concentration, this reduced estradiol production interfere with the development of dominant follicles and oocyte maturation and finally results an anovulation.

Therefore, the condition where excess energy stores or metabolic disturbances are there like obesity and PCOS, leptin have an inhibitory effect on ovaries and in suboptimal nutritional status like anorexia nervosa, exercise induced amenorrhoea and functional hypothalamic amenorrhoea, leptin deficiency results in HPG dysfunction (Farooqi *et al.*, 1999).

So, it can be concluded that the relation between leptin and nutritional status of body along with proper metabolism, and role of leptin in regulation of HPG axis (which controls reproductive physiology) are probably experimental evidence about Ayurvedic concept that states how optimal nutrition with proper functional of *agni* and *vata* are responsible for *suddha aartava dhatu* in body and it reaches to *garbhashaya* through *artva-vaha strotas* where it performs its action that in fetus formation after conception or get excreted as menstrual blood.

#### Role of *agni* w.s.r. liver in regulation reproductive physiology

No proper consideration has been given to proper metabolism in management of disorder related with reproductive physiology. As it has been explained in this article that leptin is a missing link between metabolic regulations of reproductive physiology. Estrogen and progesterone are the two basic hormones involved in reproductive physiology. Metabolism of estrogen is also very important because disturbed metabolism of it is also associated with disturbed folliculogenesis, impaired oviduct function, impair growth of embryo and placenta, abortion, endometriosis, PCOS etc (Rosselli and Dubey, 2006). Liver is involved in metabolism and detoxification of estrogen, any disturbances in this process disturbs reproductive physiology. In modern physiology liver is considered as regulator of all metabolic process likewise in *Ayurveda* all the functions related to metabolism are conducted by *Agni* present in body at different level. So disturbed liver functions and their impact on reproductive physiology should be investigated under umbrella of *Ayurveda* that will give possible explanation about how disturbed *Agni* and *vata* in body alters reproductive physiology. Proper production of estrogen, metabolism and excretion are important for normal reproductive function.

#### Role of Liver in Metabolism of Estrogen

Under normal condition, 2-methoxyestradiol which is metabolite of estrogen is very low at local level but under influence of certain exogenous factors, enzyme CYP (that is responsible for conversion of estrogen to 2-methoxyestradiol) get activated and level of 2-methoxyestradiol rises at local level. Some of its Adverse effect on reproductive physiology are as follows **Improper nutrition of developing follicle**

Proper angiogenesis in ovaries is under control of estrogen that is important for nutrition of developing follicle. 2-methoxyestradiol metabolite of estrogen derived from liver impairs this angiogenic process and leads to condition like PCOS and failed ovulation resulting in infertility (Dubey and Jackson, 2001).

#### Effect on oviduct

Proper cell growth of oviduct is important because it is the site where fertilization takes places. Catabolite metabolite of estradiol impairs the cell growth in oviduct that impairs its ciliary and contractile function which is important for movement of ovum and sperm. 2-methoxyestradiol hampers the function related to oviduct in process of fertilization i.e. rhythmic contraction and ciliary movement within the lumen of oviduct, capacitation process, early embryo development, gene expression, implantation

and placental development (Zhu and Conney, 1998; Dubey and Jackson, 2001).

#### Estrogen in blood

Estrogen in blood exists mainly in the bound form with carrier proteins but only unbound form of estrogen is physiologically active and it can only enter in cell. Sex hormone binding globulins (SHBG's) are one of such protein which regulates the unbound form of estrogen in blood. These SHBG's are synthesized in liver and has half-life of seven days. SHBG is affected by circulating androgen concentration. Several physiological and pathological conditions causes shift in the circulating level of this high affinity steroid binding protein and cause several androgen abnormality (Maruyama et al., 1987). SHBG gets suppressed by elevated testosterone level while stimulated by high estrogen level. SHBG has high affinity for testosterone as compared to estrogen level because of this in case of PCOS where testosterone level is high, SHBG level get decrease and because of that blood concentration of free estrogen that is biologically active get increases.

SHBG level get suppressed in conditions like obesity, PCOS, hypothyroidism, hirsutism, acne vulgaris, acromegaly and androgen secreting ovarian tumours. Levels of SHBG in blood get elevated in conditions like anorexia nervosa, hyperthyroidism, androgen insensitivity / deficiency and primary biliary cirrhosis (Cumming and Wali, 1985).

Liver also takes part in detoxification of estrogen that is very important for normal reproductive physiology. Liver metabolizes the estrogen in phase-I (hydroxylation) and phase-II (methylation, glucoronidation and sulphation) pathway and finally it get excreted through urine and stool (Wood, 1996). Alteration in these detoxification process disturbs estrogen metabolism and disorder related to increased estrogen level that get manifested as menstrual irregularity, endometrial hyperplasia, endometriosis, PCOS, fibroid uterus, fibrocystic breast disease, abortion and problem related to infertility

#### Future perspective of research in field of leptin and estrogen metabolism in light of *Ayurveda*

For proper functioning of reproductive physiology proper functioning of HPA axis is important. Any disturbance in it results in reproductive disorder like menstrual irregularities, hormonal imbalance, PCOS, fibroid uterus, endometriosis, infertility etc. Established principle of management of diseases in modern medical science is not sufficient because there is no permanent cure of these diseases and incidence of these problems are increasing day by day. It is need of the day that factors regulating HPA

axis should be identified so that management can be done at root cause of pathogenesis. *Ayurveda* being a life science and having holistic approach towards body explains effect of external and internal factors (diet, life style, psychology) on body physiology. Avoidance of causative factor is first line of management of any disease as per *Ayurveda*. This step is very important to break pathogenesis of disease and to establish body homeostasis because *Ayurveda* believes that disease is nothing but the state of altered body homeostasis. Proper digestion is the first requirement for maintenance of body homeostasis because diet and life style influences physiological units of body i.e. *tridoshas*. *Tridoshas* has influence on *agni* (digestive process), *dhatu* and *strotasa*. Importance of diet, life style, *agni* and *strotasa* are explained in chapters of *Ayurvedic samhitas* such as *Dincharya Adhyaya*, *Ritucharya adhyaya*, *Matrashiteeya adhyaya*, *Navegannadharaneeya adhyaya*, *Doshadhatumala kshaya vridhhi vigyaneeya adhyaya*, *Strotoviman adhyaya*. Concepts explained in these chapters helps in maintaining proper homeostasis of body. New researches related to role of leptin and liver in regulation of reproductive physiology are attempt to search a new line of management of reproductive disorders. Researchers are showing that level of leptin in body is regulated by feeding and nutrition. *Ayurveda* can help in the area about regulation of leptin level and its relation with different type of *ahar* vitiating a particular *dosha* i.e. what is the difference in leptin level in particular person after eating *vata/pitta/kapha vardhaka ahar* or what is the difference in leptin level in particular person after doing activities that vitiates particular *dosha* / what is change in leptin level when a particular food item is given to persons having different type of *agni* like *samagni*, *vishamagni*, *teekhanagni* and *mandagni*. These researches help to control leptin level by selection of food according to predominance of *dosha* in body and status of *Agni* in particular person. Disturbed estrogen metabolism is cause of various reproductive disorders as described earlier and liver has regulating role in its transport, metabolism and excretion. But no proper management principle is present in modern medical science to regulate these functions of liver like SHBGs synthesis, estrogen metabolism and excretion. *Ayurvedic* concept of *agni* and *shodhan* (body purification) can help in these area because functions related to metabolism can be correlated to functions of *agni* and *pitta* and body purification processes like *virechana* (medicated purgation) can help to remove excess estrogen from body because it is proven now that estrogen is excreted through body via stool. So researches should be done to

study role of status of *Agni* in estrogen metabolism, detoxification and SHBGs synthesis. Role of *virechan* should be investigated in case of disorders having estrogen excess in body.

## CONCLUSIONS

It can be concluded that feeding and fasting by means of leptin regulates reproductive physiology by regulating HPA axis as well as having direct role in regulation of ovarian function, oocyte maturation, embryo development, implantation and placenta. Along with this liver is playing important role in synthesis of SHBGs, metabolism, detoxification and excretion of estrogen because alteration in these step results in menstrual irregularity, endometrial hyperplasia, endometriosis, PCOS, fibroid uterus, fibrocystic breast disease, abortion and problem related to infertility. But researches in field of regulation of reproductive physiology by leptin (indirectly nutrition) and liver are in very primary phase. *Ayurveda* can help in this area because *artava* and *artava-vaha strotas* are responsible for reproductive functions and there is very elaborate description about role of proper digestion and metabolism in formation of *artava dhatu* and function of *artava-vaha strotas*. Role of diet and life style on status of *Agni* and *doshas* are explained in very detail. Vitiating of *doshas* and *Agni* by these etiological factors i.e. diet, life style and psychological status have their role in formation of *artava* and function of *artava-vaha strotas*. *Ayurveda* believes in avoidance of etiological factors as first line of management. This concept of management is lacking in modern medical science. So role of diet, life style and status of *Agni* and their relation with regulation of leptin and liver function can give a new area of research and management principle of reproductive disorders.

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