



## Review Article

www.ijrap.net (ISSN:2229-3566)



### AN INSIGHT INTO AYURVEDA DIETETICS TO FIGHT THE IMPACT OF ABNORMAL DIETARY HABITS ON MENSTRUAL HEALTH: A CRITICAL REVIEW

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Received on: 18/01/21 Accepted on: 18/06/21

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DOI: 10.7897/2277-4343.1204115

#### ABSTRACT

Menstrual health is fundamental to women's sexual and reproductive health. Diet constitutes the life of living beings and influences the human lifestyle as well as individual quality of life. Dietary habits and choices play a significant role during adolescence for normal functioning of reproductive potential and significantly affect menstrual functioning in young women. In today's era, over consumption of high calorie dense food popularly called as junk food, disordered eating habits, meal skipping are major causes of menstrual disorders which are on increasing trend amongst teenagers. These abnormal eating habits have carved up the developing nations and posing great threat to human health. Only way to cope up with this nutritional pandemic is to focus on Ayurveda dietetics which not only emphasizes on nutritional value of food but even places greater emphasis on type of food, quantity, digestive capacity, dietary customs, habitat, food processing, meal intake timings etc. for the promotion of positive health and prevention and management of wide range of ailments. It is imperative to reinvigorate the ancient science of dietetics to obtain its prime benefits for mankind. Knowledge emphasizing about the eating habits, nutritional diet, disadvantages of unhealthy foods, their impact and preventive measures should be given to create awareness and render health education for a change towards healthy eating practices. Therefore, this review summarizes the ancient and current scientific evidence on association between dietary habits and reproductive potential as well as preventive management approach through Ayurveda.

**Keywords:** Menstruation, Dietetics, Junk food, *Dosha*, *Rasa dhatu*, Reproduction

#### INTRODUCTION

Menstrual health is fundamental to women's sexual and reproductive health. Menstruation is normal physiological phenomenon occurring in reproductive age group females characterized by visible manifestation of cyclic physiological uterine bleeding due to shedding of endometrium following invisible interplay of hormones of HPO axis. It occurs 28 days apart, lasting for 3 to 7 days with an average amount of 30 to 80 ml blood loss. Reproductive health of women depends to large extent on normal functioning of menstrual cycle. Although every woman experiences slight variation in her menstrual cycle during her reproductive years but now a days due to altered food habits, widespread consumption of fast food, meal skipping, shift from fresh home cooked food to processed packaged food, calorie restriction due to cosmetic purpose incidence of menstrual disarrays are increasing day by day and responsible for significant health problem and social embarrassment. Changes in menstrual pattern affect her physical, psychological, and social wellbeing. In India, there are 355 million menstruating women and girls, out of which 78% are reported to have menstrual dysfunction affecting daily chores of life.<sup>1</sup> Oligomenorrhoea, irregular menstruation, dysmenorrhoea, menorrhagia, and PMS are one of the leading reasons for seeking medical health attention. A study conducted by Dr, Sheema *et. al.* in Kashmir region of North India found that dysmenorrhoea was most common menstrual disorder present in 51% females followed by PMS (48%) and menorrhagia (24%).<sup>2</sup> Some reported that premenstrual symptoms were significantly high in girls who were regularly eating junk food. Similarly, some studies found that intensity of dysmenorrhoea was high in those with a history of dieting in adolescence with

consuming junk food/ fast food very frequently. All these disarrays are attributed to unhealthy and inappropriate dietary habits affecting quality of life. Dietary habits are fundamental factors that influence human lifestyle and individual quality of life. Though centuries, food has been recognized as important for human being in both health and diseased state. Eating a healthy diet consisting of appropriate composition and calorie intake is fundamental to maintaining a state of optimum physical and psychological health. Diet mediates body weight, body composition and is considered as fundamental factor to reproduction. But sadly, nowadays world has been acclimatized to a system of consumption of food that has adverse health impacts. Urbanization has greatly affected one's consumption habits and compelled many folks to consume lavish and high calorie quick foods popularly called as fast food/junk food. The ready availability, taste, low cost, marketing strategies and peer group pressure make them popular among young adolescents. India has rich custom of food and recipe. Calorie and fat content (rich in trans-fats and saturated fats) in Indian fast food prepared by deep frying is very high and posing a great threat to human health. Beside this, another issue is poor energy intake/inappropriate food selection due to dietary limitations for cosmetic purpose resulting in nutrient deficiency. In today's world, burning concept of 'Thin is Beautiful' being hammered into young minds and eating disorders such as anorexia nervosa and bulimia nervosa, binge eating virtually unheard a decade earlier is becoming serious issues of concern and are speculated to influence the normal functioning of menstrual cycle thereby declining status of health in society. That's why relationship between food customs and menstrual dysfunctions has become an important issue in the world. In *Ayurveda*, meticulous description

of concept of dietetics has been given in detail. Food has been compared to *prana* (vital force) and has been considered as one of the key pillars of life.<sup>3</sup> Modern science has particularly described food according to its nutritional value but *Ayurveda* places greater emphasis on selection of food, nature of food article, processing/cooking modifications, quantity, meal intake timings and eating etiquettes. Despite endowment of healthy eating codes by our progenitor, food and its related code and conducts has been long forgotten by human being due to modern civilization and fast paced life resulting in long term reproductive and general health consequences. Latest development of organic diseases accompanied by dysmenorrhoea, menorrhagia and PMS is a major public concern under current nutritional environment in young women. Growing evidence of impact of diet suggest that various aspect of nutrition contribute to risk of fertility problems in reproductive age population. Thus, it is an important issue to evaluate the present situation of eating habits and estimate their influence on quality of reproductive functions and it is need of hour to revitalize the ancient science of dietetics to obtain its prime benefits for mankind.

### Concept of dietetics in Ayurveda

“A Healthy outside starts from the Inside”

The word ‘*Ahara*’ is very much familiar since time immemorial. Food (*Ahara*) has been compared to (*Prana*) vital force required for sustenance and vitality of individuals. It has been considered as one of the key pillars (*upstambha*) of life. *Acharya Charaka* has quoted that the body as well as diseases both are due to food (*Ahara*)<sup>4</sup>. As per commentator *Chakrapani*, food (*Ahara*) means everything which is ingested, and it includes both diet and drugs. Food is said to be *Mahabhaishajya* (greatest medicine) by *Mahrishi Kashyapa*<sup>5</sup>. Diet is said to be basis of longevity, strength, complexion, growth, and development.<sup>6</sup> Food is abode for six tastes and these tastes are cause for increase, decrease and normalcy of biological humors (*doshas*)<sup>7</sup>.

The principle of dietetics has been meticulously explained in *Ayurvedic* text by giving due emphasis to nature of food articles (*Prakriti* of *Ahara*), wholesome and unwholesome diet (*Pathya-apathya Ahara*), quantity (*matra*), intake timings (*kala*), disciplines of eating (*Ahar Vidhi Vidhan*) etc. *Acharya Sushruta* described that body as well as food are mainly constituted by five body elements (*mahabhuta*)<sup>8</sup>. Body is product of food and food is harbinger of happiness and suffering. All the dietary articles are composed of five body elements (*Panchamahabhutas*) while three body humors (*Tridosha*) are biological derivatives of these five elements. Balanced diet in *Ayurveda* is planned in relation to known *Panchabhautik* composition and *tridoshik* impacts in living body. Equilibrium of biological humour (*dosha*) and body tissue (*dhatu*) is considered as healthy state and this normalcy can be achieved by indulging in beneficial food (*Hitkara Ahara*) only.

*Acharya Sushruta* has categorized food into three types i.e., *Ekant Hitkara* substances (which are biologically stable to body such as water, ghee, rice, milk) *Ekant Ahitkara* (substances which are always harmful for the body like poison) and *Hitaahitkara* (substances which are compatible to one and incompatible for another)<sup>9</sup>. Similarly, *Acharya Charaka* has given the concept of wholesome-unwholesome diet (*Pathya-apathya*). He has specified that Food which maintains the equilibrium of balanced body tissue (*Sama dhatu*) and regains the equilibrium of imbalanced tissue (*Visham dhatu*) is called *Pathya* or wholesome food whereas the diet which dislodge the vitiated biological humors (*doshas*) from body but do not expel them out of the body are regarded as unwholesome<sup>10</sup>.

Apart from this, a set of satisfactory dietetic codes called *Aharavidhivisheshayana* has been identified and prescribed in *Ayurveda*<sup>11</sup>. When the food is taken judiciously and according to code of dietetics then only the benefit of food can be achieved. Any aberration in diet and their preparation style leads to ill health. *Aharavidhivisheshayana* are certain dietary customs responsible for wholesome and unwholesome effect of food. These are guidelines for selection of food because *Acharya Kashyapa* has beautifully quoted that health is dependent upon food and food looks for appropriate methods. These eight methods of *Ahara Vidhi* are *Prakriti* (Nature of food articles), *Karan* (modifications/preparation), *Samyoga* (combination), *Rashi* (quantity), *Desha* (habitat), *Kala* (time factor), *Upyogamstha* (rules of use) and *Upyokta* (user). Similarly, *Sushruta* has described twelve considerations to be followed during the consumption of food.

### Prakriti

While considering *prakriti* i.e., nature of food articles, *Acharya* has emphasized that food essentially contain five elements of nature i.e., *Panchamahabhuta* which are *Akash*, *Vayu*, *Agni*, *Jala*, *Prithvi* therefore when consumed in appropriate proportion, food helps in balancing similar elements in body. Commentator *Chakrapani* opined that *laghu*/ light food are *vayu*, *agni*, *akasha mahabhuta* predominant while *guru*/ heavy food articles are *Prithvi* and *Jala mahabhuta* predominant<sup>12</sup>. *Guru Ahara dravya* such as *vallura* (dried meat) *Sushka shaka* (dried vegetables), lotus rhizome, *Kurchika* (boiled buttermilk), *Kilata* (Inspissated milk) should not be taken regularly<sup>13</sup>.

### Sanskara

Second factor is *Sanskara* i.e., modification result in transformation of attribute of food article. Various methods/preparation styles have been mentioned in *Ayurvedic* text like *Peya* (thin gruel), *Yavagu* (*khichari*), *Mand* (grueling water), *Yusha* (soup) etc. depending upon the amount of substance, water, additives, preparation style and cooking timing resulting in difference in their properties and digestibility.

### Rashi/Quantity

Beside this, *Ayurveda* has greatly emphasized on proper quantity of food for proper maintenance of positive health. Quantity of food is the amount which gets digested as well as metabolized in proper time without disturbing the equilibrium of *doshas* (biological humours)<sup>14</sup>. Standard measurement of amount of food for an individual is to be determined based on digestive capacity which varies according to season and age of individual. Stomach capacity has been divided into three parts, one part for solid food, one part for liquids and third part should be left empty for movement of *doshas* which aids in digestion<sup>15</sup>. Quantity of food has been enumerated as two *Hina matra* (dietic deficiency) and *ati matra* (excessive intake) and further divided into two types in context of *Sarvgraha* and *Parigraha*<sup>16</sup>. The quantity of food taken entirely is *Sarvgraha* and quantity of each of its ingredient is *Parigraha*. Dietic deficiency (*Hina matra*) causes affliction of body, mind, intellect, senses as well as impairment of excellence of *dhatu*s while *ati matra* causes vitiation of all the three *dosha*, vitiation of digestive power resulting in indigestion. *Acharya Vagbhata* has emphasized that quantity of food not only depends on *agni* (digestive fire) but also depends upon *Ahara dravya* (nature of food substances)<sup>17</sup>. So, *Guru Ahara dravya* should be consumed to half of one’s capacity of digestion while *Laghu Ahara dravya* should be consumed till one’s satisfaction<sup>18</sup>.

### Kala/ Time Factor

Ayurveda has also greatly emphasized on Kala (time factor) because other factors like quantity (*Matra*), metabolism (*Ahar Parinama*), strength (*Bala*) and even digestive fire (*Agni*) also depends upon Kala. It is considered in dual aspect i.e., *Awasthik Kala* (in context of Age and diseased or healthy state) and *Nityaga Kala* (in context of season and time of day). All these factors influence digestive fire (*Jatharagni*) resulting in digestion and metabolism of food. Seasonal consideration of food has been mentioned thoroughly in *Ayurvedic* text that during winter season the digestive power of healthy people gets increased and capable of digesting any heavy food but in spring season, *Kapha* gets aggravated so light and easily digestible food should be taken. During summer season, one should consume sweet, cold liquid diet whereas in rainy season due to weakened digestive power one should take old barley, wheat, red (*Shali*) rice. Similarly, food should be taken on appropriate time of the day with giving due consideration to digestive power. *Acharya Sushruta* has clearly mentioned that inappropriate meal intake timings like eating before the previous meal is digested (*Adhyashana*), eating compatible and incompatible food together (*Samshana*), eating at inappropriate time (*Vishamashana*), incompatible food (*Viruddhashana*) lead to vitiation of *Agni* resulting in formation of *Ama* root cause of every disease<sup>19</sup>.

### Ahara Vidhi Vidhan/Dietary Etiquettes

While describing the general principles of taking food, *Acharya Charaka* emphasizes on taking food which is hot, emollient because it tastes well, stimulates digestive fire, criminate flatus, increases strength of the body. Meal should be taken only after digestion of previous meal otherwise ingested food vitiates all body humours (*dosha*) quickly<sup>20</sup>. These *Ahara Vidhi Vidhan*<sup>20</sup> are as follow

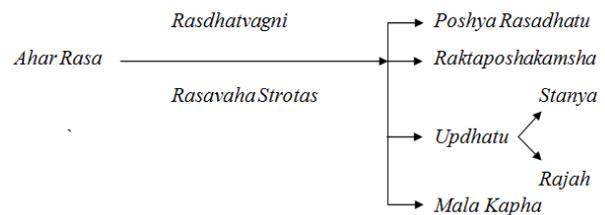
- One should eat warm, emollient food in proper quantity (*ushna, snigdha matravatashniyat*)
- One should eat only after previous meal is digested (*Jirneashniyat*)
- One should eat food having non-antagonistic property (*veeryavirudhaashniyat*)
- One should take light, easily digestible food in the evening.
- One should eat sweet substances first followed by sour and salty and later pungent, bitter, and astringent substances at the close of meal for ensuring good digestion.
- One should consume fruits first followed by liquids and at last end by solid food.
- One should sit in *Sukhasan* (easy posture) with erect body during eating.
- One should eat food neither too hurriedly nor too slowly for uniform digestion.
- One should consume food with full concentration.
- One should take water in between the meals.
- One should not consume *vyushit* (spoiled/insipid), *Chirsidh* (cooked on previous day), *punah ushnikrit* (reheated), *updagdh* (burnt food).
- One should ensure moderation in food for perfect digestion and maintenance of fundamental principles of body in their normal state.

### Food Intake and Menstrual Disorders

Menstruation is normal physiological phenomenon occurring in females. Menstrual irregularities are major gynecological problem among female adults specially adolescents. Irregular menstruation is one of the positive clinical symptoms which

predicts dysfunction of HPO-Axis. A healthy diet plays an important role in maintaining hormonal balance in women. In *Ayurveda*, all gynecological disorders have been portrayed under common heading of *Yonivyapad*. Menstrual cycle has been termed as *Rituchakra* in classics and formation of menstrual blood/ovum (*Artava*) has been mentioned as product of essence part of *Ahara* and byproduct of *Rasa dhatu*<sup>21</sup>.

So, *Rasa* provides nourishment to all body constituents. Development and maturation of all *dhatu* is function of *Rasa*. *Acharya Vagbhata* has specified that the female who regularly consumes buttermilk, milk in diet, *Rajah* functions for longer duration in these women. This indicates that nourishment of *Rasa dhatu* is responsible for nourishment of *Rajah*. On considering this, formation of *Rajah* takes place in following way.



Thus, *Ahara* and *Agni* play a vital role in optimum functioning of reproduction and act as prime factor for vitiation of *Rasa dhatu* and ultimately affliction of *Artava*.

During description of *Yonivyapad*, *Acharya Charaka* has clearly said that unwholesome diet is primordial factor for causation of all types of gynecological disorders<sup>22</sup>. Equilibrium of *dosha* is considered as healthy state and this normalcy can be maintained only by indulging in *Hitkara Ahara*. *Hitkara Ahara* leads to formation of unvitiating *Ahara rasa* which further leads to formation of *rasa dhatu*. *Rasa dhatu* being the origin of *Artava* is an important factor in causation of gynecological disorders. *Acharya Vagbhata* has also mentioned *dushta bhojana* (insipid food /cooked on previous day) as major cause for occurrence of gynecological disorders<sup>23</sup>. If a lady consumes unwholesome diet without giving due consideration to nature, processing, quantity, intake timings, season etc. the natural phenomenon of accumulation (*Sanchaya*), aggravation (*Prakopa*) of *dosha* in the respective season will be disturbed leading to vitiation of *dosha* in the body.

*Acharya Kashyapa* has also mentioned that consumption of excessive hot substances lead to occurrence of *Artava Vyapada* (menstrual disarrays)<sup>24</sup>. As per *Acharya Charaka*, consumption of excessive salty (*Lavana*), sour (*Amla*), heavy (*Guru*), pungent (*Katu*), curd (*Dadhi*), vinegar (*Sukta*), curd water (*Mastu*), *Viruddhashana* (incompatible diet), *Adhyashana* (*Ajeeranashana* (eating before the previous meal is digested) leads to occurrence of dysfunctional uterine bleeding (*rakta pradara*)<sup>25</sup>. *Viruddhashana* (Incompatible diet) causes vitiation of *Tridosha*, *Agnimandhya*, *Ama* formation. *Adhyashana*, *Ajeeranashana* also aggravates all the three *dosha* and responsible for formation of *Ama dosha* resulting in *agnimandhya*. All the etiological factors provoke *vata dosha* and along with vitiated *vata* due to specific *ushna, katu, vidahi nidana sevana, Pitta* along with *rakta* also gets vitiated due to *guna sadharmya* leading to increased quantity of *rakta*. This increased quantity of *rakta* driven by vitiated *vata* through *rajovahi siras* expelled out of *Garbhashaya* mixed with *Artava* hence resulting in quantitatively increased status of *Artava* known as *Rakta Pradara*. *Charaka* has also mentioned *pradara* as *shonitjanya roga* and causative factors like *atilavana* (salty),

*ushna* (hot), *ksharamla* (alkaline), *atyadaan* (excessive food intake) has been mentioned<sup>26</sup>.

While describing *Bandhyatava* (Sterility) in *Charaka Sharira Sthana*, *Acharya* has specified abnormal dietetics as one of the major contributing factor<sup>27</sup>. *Acharya Charaka* has also greatly emphasized on dietetic incompatibilities and long-term complications of these incompatibilities is *Santana dosha* (Infertility)<sup>28</sup>. *Klaibya* (Impotence) has also been mentioned as *Santarpanjanya roga* in *Charaka Sutra Sthana*.

While describing about the benefits and adverse effects of *Shada rasa* intake he has described *Pumstavnasha* due to excessive intake of *Lavana* (salty), *Katu* (pungent) and *Kashaya rasa* (astringent)<sup>29</sup>. Thus, on screening the literature regarding etiology of gynecological disorders, it seems clear that there is a definite relationship between diet, dietary customs, and reproductive health potential.

## DISCUSSION

Diet is the corner stone in prevention of menstrual disorders. Changes in food habits can cause inadequate intake of calories, micronutrients, fats, phytoestrogen, essential amino acids, dietary fibers vitamins and minerals, and pose to increasing environmental toxins. These factors not only influence the present lifestyle but also induce various gynecological disorders affecting the quality of life of women. Poor nutrition in adolescents and young women compromises reproductive health and increases the risk of adverse pregnancy outcome.

### Impact of Dietary Habits on Menstruation

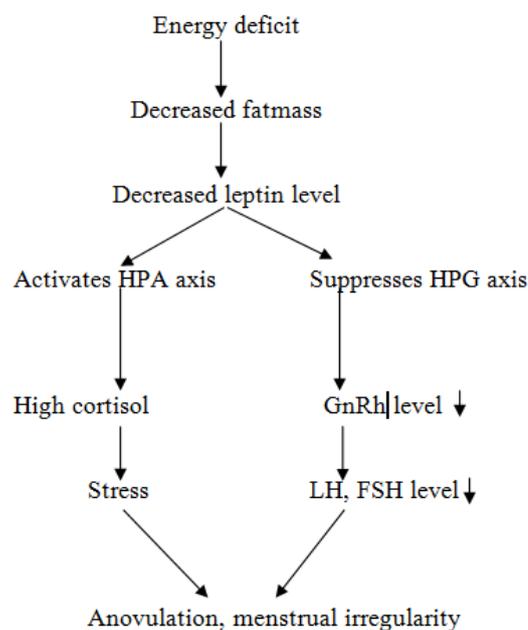
Diet virtually constitutes the life of living beings. Good nutrition is fundamental for good health and is maintained by taking balanced diet that enables proper growth and development and maintains *Tridoshik* equilibrium. The reproductive axis is closely linked to nutritional status and is influenced by both under nutrition as well as over nutrition state. Dates back to antiquity, Indian cuisine consisted of wide variety of regional and traditional cuisines native to Indian subcontinent mainly consisted of legumes, vegetables, fruits, whole grains, dairy products, healthy meat, honey etc. but later on heavily influenced by religion, foreign invasion, trade relation, colonialism and global food marketing strategies leading to introduction of certain packed, unhealthy foods of abnormal habitat to our plate and adoption of these cuisines and eating habits magically had impact on our health reflected as replacement of healthy wholesome food by new food mantra called fast food /junk food. Junk food simply means empty calorie food/ highly dense calorie food that lacks in micronutrients such as vitamins and minerals, amino acids and fibers and has been given awfully attractive appearance by adding certain additives and colors to enhance flavor, texture for increasing shelf life. It contains high level of refined sugar, white flour, trans fats, salt, and various food additives such as monosodium salt and atrazine like fried food, burgers, French fries, pizza, microwaved and fried snacks, packaged chips, chocolates, cheese, snacks, ice cream, aerated drinks etc. consumption of these fast food affects reproductive potential either due to inadequate calorie intake resulting in malnutrition or by highly dense calorie intake resulting in obesity. Studies indicate that body's fat content must account for 17% of body weight before menarche can occur and at eighteen years of age fat content must be at least 22% for maintenance of regular menstrual cycle<sup>30</sup>. This critical amount of body fat implies that a particular body composition is important in triggering and maintaining pubertal process.

Hypothalamic sensitivity to estrogens is decreased when critical ratio of lean mass to body fat is reached and changes in hypothalamic and pituitary hormones promote pubertal progression and establishment of reproductive functions. Poor nutrition alters the ratio of lean mass to body fat and delays the onset of menarche.

### Impact of Low-Calorie Intake/ *Hina matra*

*Hina matra* as per *Acharya Sushruta*, tends to weaken the body (*Bala kshaya*) indicating towards malnourishment of body tissue (*dhatukshaya*) leading to *balakshaya*<sup>31</sup>. As we know *Rasa dhatu* is essence of food and its superior byproduct is *Artava* so here *Artava* is also affected. In Modern scenario, Malnutrition is major problem in developing countries due to inadequate food supply and poverty whereas calorie restriction for cosmetic purpose is arising as major concern among both developed as well as developing countries either by rigid control of intake or by high energy demand of intensive exercise. Studies have reported that frequency of irregular menstruation was increased in young women who were on dieting and intensity of dysmenorrhoea was high in those females with a history of dieting in adolescence suggesting that diet in adolescence has long lasting adverse effects on reproductive functions in young women<sup>32</sup>.

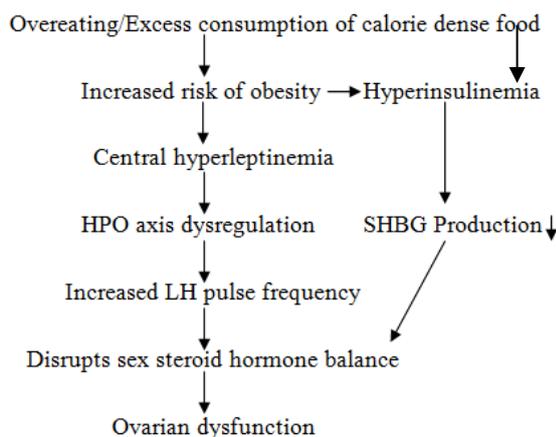
Leptin, an adipocyte derived factor acts as permissive factor in function of HPG axis. It is a major gate signal for metabolic control of reproduction and critical circulating leptin level is necessary to trigger reproductive ability in women. It works by stimulating GnRh release by increasing the amplitude and frequency of GnRh pulses via inter-neurons. Reduction of circulating leptin level following food restriction is associated with reduced secretion of LH and FSH<sup>33</sup>. On the other hand, Ghrelin (Hunger hormone) secreted from gut is major regulator of food intake, energy balance and body weight and it has been known from decades that activity of HPG Axis is decreased in states of energy restriction. Plasma levels of ghrelin are inversely correlated with BMI and are strongly elevated during enhanced appetite, consequently strongly elevated in states of under nutrition. Ghrelin suppresses the secretion of LH and FSH thereby affecting the reproductive potential<sup>34</sup>.



### Impact of High-Calorie Intake/ *Sarvgraha Atimatra*

Overeating (*Atimatra*) causes various distressing symptoms such as *Alasya* (languor), *Gaurav* (heaviness), *Aatopa* (disinclination for movements), *Agnivaishmya* (vitiating of digestive fire, indigestion, and vitiating of all the three body humours<sup>35</sup> leading to production of *Sama rasa* resulting in malnourishment of further *dhatu*s and disproportionate increase in *Snehamsha* of *medo dhatu* causing obesity (*Medo roga*). Body fat content in puberty is identified as critical prerequisite for onset and maintenance of regular menstrual cycles but excessive consumption of calorie dense fast food increases the risk of obesity, and it is well known fact that obesity is root explanation for infinite gynecological health issues due to abnormality of sex steroid hormone balance and SHBG production.

Fat is a site of intense sex hormone metabolism by steroidogenic enzymes including aromatase. Increased aromatization of androgens in peripheral adipose tissue leads to chronic elevation of circulating estrogen level. Estradiol levels have direct negative effect on hypothalamus, modifying GnRh Pulsatility and reducing pituitary LH and FSH secretion.<sup>36</sup> Studies have reported that irregular menstruation is more frequently observed in women who become obese during puberty than those who were obese in infancy. In young women, a low-fat diet was shown to decrease symptoms of dysmenorrhoea along with increasing SHBG production<sup>37</sup>.



### Impact of High Dietary Fats/ *Parigraha Atimatra*

*Acharya Sushruta* has advised not to take *Guru Ahara dravya* (heavy food) in high quantity. Similarly, *Charaka* has also advised to avoid heavy and processed food like *Kurchika* (boiled buttermilk), *Kilata* (Inspissated milk) *Moratt*, cheese, butter as they are main cause of *Agnimandhya*. These should not be consumed on regular basis but occasionally one can consume these to half of one's capacity. As per modern parlance, fried fast food like *Kachori* (pie), *Samosa* (rissole), *Pakore* (fritters), *Jalebi* (funnel cake), *Khoya* (condensed milk), *Malai* (cream), *Malpua* (pancake) consist of excess dietary fats because these are fried mostly in soya bean oil and palm oil having high saturated fat content and high smoke point favorable for high heat cooking methods like frying, sautéing etc. Dietary fats are energy yielding macronutrients that compose 33% of average calorie intake and provide 900 calorie energies. Although dietary fats are essential nutrients required to perform important functions in the body, but it is recommended to consume 20% to 35% of calories as dietary fats while saturated fat intake recommended by American dietary guidelines is below 10% of total calories<sup>38</sup>. High fat diet intake with or without the development of obesity impairs female HPO

axis functionality and fertility. The chronic consumption of high fat diet leads to development of obesity and metabolic complications including Insulin resistance in liver and muscles resulting in compensatory hyperinsulinemia which further affects ovarian steroidogenesis, gene expression and central control of reproduction<sup>39</sup>. High fat diet is associated with altered beta-glucuronidase activity, decreased excretion of estrogen metabolites resulting in increased level of circulating estrogen<sup>40</sup>. Studies have also reported a biological role of PUFA's particularly Omega-6 and Omega-3 fatty acids in steroid synthesis through various pathways. Studies have shown that supplementation of PUFA from fish oil resulted in increase in high quality oocyte number and better oocyte membrane stability. Evidence suggests that increase in total and specific types of dietary fatty acids intake improved menstrual functions. Amongst PUFA's omega-3 is key to optimum health and well known for its anti-inflammatory properties thereby soothes menstrual pain, reduces serum concentration of testosterone, and regulates menstrual cycle whereas omega-6 fatty acids contribute to formation of pro-inflammatory eicosanoids involved in modulation of prostaglandin E<sub>2</sub> production<sup>40</sup>. So, Omega-3 rich oils like fish oil, olive oil and canola oil should be used at the place of saturated fats and omega-6 PUFA's. Trans fat occur abundantly in fast food and are associated with ovulatory infertility.

### Impact of High-Carbohydrate Load / *Parigraha Atimatra*

*Acharya* has advised that *Guru Ahara dravya* such as *Vallura* (dried meat) *Sushka shaka* (dried vegetables), lotus rhizome, processed food like (*Prithuk*) *chiwra* should not be taken regularly because these food substances cause *Agnimandhya* (vitiating of digestive fire). Though carbohydrates are main source of energy and are classified as short chain carbohydrates (simple/refined carbohydrates), long chain carbohydrates and dietary fibers. Amongst these Simple/refined carbohydrates include sugar and refined grains that have been stripped of all bran, fibers and nutrients and are empty calories with high glycemic index. Like White bread Pizza dough, pasta, pastries, white flour, white rice, sweet desserts whereas complex carbohydrates include whole grains having high dietary fibers and nutrients. High carbohydrate diet (> 60% of total dietary energy) consisting predominantly of high glycemic carbohydrates have detrimental metabolic effects by influencing glucose metabolism and insulin sensitivity. Much evidence suggests that Insulin sensitivity may be an important detriment of ovulatory function and fertility<sup>41</sup>. Thus, reducing carbohydrate load can reduce circulating insulin levels, improve hormonal imbalance and results in resumption of ovulation.

On the other hand, fiber intake is inversely associated with serum estradiol level due to increased intestinal excretion of estrogen metabolites<sup>40</sup>. Thus, whole grain carbohydrates like Hulled Barley (*Hordeum vulgare*), *Shali* rice (*Oryza sativa*), oat (*Avena sativa*), millets (*Pennisetum glaucum*), whole wheat, having high dietary fibers and low glycemic index should be used for maintaining good menstrual health. In *Ayurveda*, Barley (*Hordeum vulgare*), *Shasthika Shali*/ Red rice (*Oryza sativa*) having higher amounts of dietary fibers has been mentioned as *Pathya* (wholesome food) for gynaecological disorders as well as for infertile women.

### Impact of meal skipping/ *Amatra*

*Amatra* (meal skipping) has been mentioned as cause of loss of strength, vitiating of digestive fire, and loss of potency. Breakfast as a part of healthy diet positively impacts children's health and wellbeing. Nowadays, Breakfast skipping has increased during

transition to adulthood and is associated with weight gain. Studies have reported that young women who skip breakfast have significantly higher degree of dysmenorrhoea symptoms than young women who ate breakfast suggesting a positive correlation between skipping breakfast and menstrual disorders<sup>42</sup>.

### Impact of *Sanskara* (Dietary Modifications)

*Sanskara* has been mentioned in ancient literature as modifications of natural properties of substances by dilution, clarification, flavoring, preservation etc. for establishing new good properties in substances. Although Cooking practices have evolved along with evolution of man from raw eating to low flame cooking and later modernized to high flame cooking such as baking, caramelizing, grilling, roasting, deep frying for enhancing flavor and desired texture in food but today's workaholic environment has directed people towards pre-prepared and processed foods which possess highest amount of exogenous AGE's (Advanced Glycation End Products) as compared to freshly home cooked meal. Glycation of proteins/lipids at high temperature changes to sugar permanent residues known as AGE's. Most AGE's are produced in foods processed with dry technology. AGE's mimic hormones or modify their receptor mechanism thus in women, high AGE diet directly correlates with high level of androgens, AMH, Insulin producing ovarian dysfunction<sup>43</sup>.

Similarly, Biogenic amines are found in fish, fish products, cheese, meat, and fermented products due to their processing and packaging in modified atmosphere, vacuum, high hydrostatic pressure, irradiation etc., cause several health hazards. On the other hand, overheating as well as reheating of food after refrigeration also leads to damage in structure and texture of food with loss of heat liable nutrients. Thus, moist cooking methods such as boiling, and steaming done at lower temperature are healthiest way to prepare food without losing nutrients.

### Impact of *Samyoga* (Combinations)

*Samyoga* refers to combinations of food substances for enhancing taste, texture, and shelf life. Natural substances like salt, sugar, vinegar, spices have been used as preservatives since time immemorial but due to increased demand for ready to eat preserved food majority of preservatives used today are artificial rather than natural. Several of them are toxic and have potential life-threatening side effects. Researchers have reported that artificial preservatives such as nitrates (used in meat, fish, poultry), benzoates (used in fruit products, margarine), sorbates (used in syrups, cake, mayonnaise etc.), parabens (used in beverages and dressings), BHA (Butylated Hydroxyanisole- used in bakery products, cereals, fats and oils), Calcium lactates (used in frozen desserts, jams and jellies cause serious health hazards such as hypersensitivity, asthma, hyperactivity, neurological damage and cancer<sup>44</sup>.

Besides this Flavoring agents and coloring agents are key food additives to impart taste as well as to make them attractive, appealing due to consumer concerns. Indian spices like asafetida, black pepper, cardamom, clove, fennel etc. have been used as flavoring agents in ancient times now being replaced by chemical agents obtained by chemical processes or by chemical modifications of natural substances like Vanillin identical to vanilla but not obtained from vanilla nodes, strawberry flavor due to ethyl methyl phenylglycidate, banana flavor due to amyl acetate etc. These agents add no nutritional value to food products but pose health risk especially smoked food which is both toxic as well as carcinogenic<sup>45</sup>. Apart from this, one study has reported that women who drink water contaminated with low level of weed

killer Atrazine likely to have irregular menses and low estrogen levels. Food substances having antagonistic properties should not be eaten.

### Impact of *Kala* (Food Intake Timings)

*Acharya Sushruta* has advised that meal should not be eaten before the appointed time, nor before the appetite has fully come. Eating at improper time brings large number of diseases and may ultimately lead to death. A meal eaten at an hour long after the appointed time tends to aggravate *vayu* (biological humour) affecting digestive fire leading to malnourishment of further *dhatu*s and *upadhatu*s<sup>46</sup>. Meal timing and frequency of meals have very positive impact on maintaining optimum health because times of day and night affect our body's circadian clock rhythm which regulates all aspects of metabolism. Studies have reported that taking high calorie heavy food in morning and low-calorie small meal in evening helps in improving hormonal level, decreases insulin resistance and improves fertility outcome<sup>47</sup>. Human subjects with nocturnal life consuming majority of calories just before overnight sleep showed weak association between glucose elevation and insulin secretion which is likely to be a risk factor of obesity and diabetes.

### Impact of *Ahara Vidhi Vidhan* (Rules of Eating)

A set of satisfactory dietetic code has been identified and prescribed by *Ayurveda*. One should follow these dietetics rules while taking food. The description given by *Acharya Charaka* is for both healthy and unhealthy whereas *Acharya Sushruta* has mentioned *dwadshān vichara* only for unhealthy persons.

If these dietetics rules are not followed, then lead to large number of diseases due to vitiation of digestive fire resulting in diminution of further *dhatu*s and *upadhatu*s and later on also reflects as occurrence of menstrual disarrays due to affliction of *Artava*.

### CONCLUSION

Modern diet has certainly carved up the third world due to globalization. It is an integral part of life in the developed and developing world and coming with it is a massive increase in obesity and associated health hazards. Diet virtually, constitutes the life of living beings. Good nutrition is fundamental for good health. Poor nutrition in adolescent girls and young women compromises reproductive health and increases risk of adverse pregnancy outcome. Thus, only improving nutrition and establishing healthy dietary habits particularly in adolescent girls and women can pave the way for peri-conceptual health and can equip them for future motherhood. Although our progenitors have blessed us with the golden rules of eating, but we have forgotten these rules due to fast paced lifestyle. So, it is the need of hour to revitalize the ancient science of dietetics for the benefit of mankind. The consumption of unhealthy diet on large scale and its impact on menstrual health need to be emphasized and inoculate health education which can greatly contribute to its limited consumption and switching over to healthy eating practices.

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**Cite this article as:**

Thakur Jyotsna and Masand Sameet. An insight into Ayurveda Dietetics to fight the impact of Abnormal Dietary Habits on Menstrual Health: A Critical Review. Int. J. Res. Ayurveda Pharm. 2021;12(4):104-111 <http://dx.doi.org/10.7897/2277-4343.1204115>

Source of support: Nil, Conflict of interest: None Declared

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