



BASIS OF SYSTEM HOMEOSTASIS AND IMMUNITY – THE *RASADHATHU*

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ABSTRACT:

Ayurveda is a system which has its principles rooted in the subtle aspects of human body. The concept of *Rasadhathu* is central to the understanding of nourishment and growth in Ayurvedic perspective. *Rasadhathu* is responsible for the proper formation of all other structural components (*dhathu*) of body and maintaining a stronger immune system. *Rasa dhathu* also contributes to the psychological development. *Rasadhathu* is depended on the state of digestive factor (*agni*) and diet and lifestyle of a person. State of *rasadhathu* contribute to the morbidity status of a person and hence has a crucial role in treatment approach.

Keywords: *Rasadhathu*, *Agni*, *Dhathu*, Nutrition, Growth, Gut, Immunity, TBW

INTRODUCTION:

Doshas, *Dhathus* and *Malas* are the regulatory functional and fundamental structural components of the human body¹. The equilibrium of these three entities help in the maintenance of the dynamic equilibrium of the body². *Dhathus* does the support and maintenance (*dharana*) of body. In this sense, *doshas* can also be considered as *dhathus*³. Generally, *dhathu* refers to *rasa*, *raktha*, *mamsa*, *medas*, *asthi*, *majja* and *shukra*. *Upadhathus* are supportive structural components which contribute to the maintenance and support of body but not does the function of nourishment (*gathivivarjitha*)⁴. The primary circulating nutrient fluid (*Rasadhathu*) is formed after bio-transformation of food (*aharapaka*) by the action of metabolic factors (*dhathwagni*) on chyle (*ahara rasa*)⁵ which is in microfine form and thus easily reaches every portion of the body⁶.

Conclusively, the essence of food formed after digestion is termed as *ahararasa*. *Ahararasa* get subjected to the action of *rasadhatwagni* and the resultant product is termed as *rasadhathu*.

AYURVEDIC VIEW ON RASA:

Although *Rasa* flows through whole body (*sarvadehanusari*), heart (*hridaya*) is considered as the location of *rasadhathu*⁶. Nutrients after metabolism gets absorbed to blood which reaches heart (*hridaya*) and is circulated all over the body through systemic circulation. This is a continuous process like movement of a wheel (*chakra*)⁷.

The *rasa* is white (*sitha*) fluid (*drava*) which is cold (*sheetha*), sweet (*swadu*), unctuous (*snigdha*), and constantly circulating (*chala*)⁸. It does the nourishment (*preenana*) of *dhathus* and helps in the formation of blood (*raktha*). *Rasa* helps in maintaining the mental health (*thushti*) of an individual⁹. *Rasa* nourishes a person in all stages of life like childhood, middle age and old age (*tharpayathi*), aids in the proper development during childhood (*vardhayathi*), maintains the healthy status and functioning of bodily tissues during middle age

(*dharayathi*) and supporting the bodily tissues during old age (*yapayathi*) as the degenerative changes might have started⁶.

Upadhathus of *rasa* include breastmilk (*sthanya*) and ovum (*arthava*)¹⁰. Breastmilk (*sthanya*) is formed from the properly digested food (*pakwahara nimithaja*)¹¹. *Rasa* forms *shukra* in males and *arthava* in females in a period of one month. Here the term *raja* and *arthava* indicates female gamete (*sthree beeja*)¹² which is capable of fertilisation. This states the significance of maternal nutrition in conception and formation of breastmilk. *Kapha*¹³ and *laseeka*¹⁴ are explained as the excretory products (*mala*) of *rasadhathu*.

Rasavaha srothas is closely related to psychological status of a person. Channels through which the *rasa* circulate has its origin in heart (*hridaya*) and major blood vessels (*dhamani*)¹⁵. The body as a whole is closely interrelated with mind and changes in any one entity can in turn affect the other¹⁶. Impairment in state of mind will have an impact on the physiological process of the body. Anatomical seat of channels carrying *rasa* is same as the seat of mind¹⁷ and channels carrying flow of thoughts (*manas*)¹⁸. So, minor changes in psychic factors (*manas*) easily affects *rasadhathu* and the channels through which it flows. One of the major causes for the vitiation of channels carrying *rasadhathu* is excessive thinking (*athichinthana*)¹⁹. The food which is taken when a person is disturbed psychologically, will not get digested properly²⁰. Improper digestion causes the vitiation of *rasa* and thereby vitiation of the channels through which it flows. Another factor which vitiates the *rasavaha srothas* is improper diet which include combination of unctuous (*snigdha*), cold (*sheetha*) and heavy (*guru*) food in excessive quantity (*athimathram*)¹⁹. *Snigdha guna* in association with cold (*sheetha*) makes the accumulation of *kapha*²¹ which is also added by intake of excessive and heavy food. It intervenes with proper digestion which can further cause the vitiation of channels carrying *rasa* (*rasavahasrothas*) which is then reflected in the mental status of a person as disinterest (*ashradha*)²².

ANALYSIS OF DIFFERENT ASPECTS OF RASADHATHU:

Rasa and Nutrition

Nutrition is critical in health and development. Better nutrition contributes to a stronger immune system, lower risk of non-communicable diseases and a better quality of living. Malnutrition is a significant threat to health. Currently, there is a double burden of malnutrition in the form of undernutrition and over nutrition. Undernutrition including vitamin and mineral deficiencies, accounts for about one third of all child deaths, and impairs healthy development. Over nutrition leading to obesity results in increased risk of development of chronic diseases²³.

As per Ayurvedic texts, *rasadhathu* is responsible for the nourishment of the body. It is the first *dhathu* formed after digestion. All other tissues (*dhathus*) are formed from the *rasadhathu*. It is the primary factor responsible for the nutrition and pathology. Status of the *rasadhathu* in the body mainly depends upon the diet (*ahara*) and the digestive power (*agni*). Food after proper digestion is converted to an essence (*ahara rasa*) and is absorbed which is further acted upon by metabolic fire (*rasadhathwagni*) to form the *rasadhathu*. The *rasadhathu* gradually nourishes all the other six *dhathus* from *raktha* to *shukra* in between covering all the major tissue systems like muscle (*mamsa*), adipose tissue (*medas*), bone tissue (*asthi*), bone marrow (*majja*) thus contributes to the proper growth and development of the body. If there is any hinderance in the proper digestion leading to the improper formation of *rasa* including its low levels (*kshaya*), high level (*vridhi*) or vitiation (*dushti*), it will lead to a condition of malnourishment.

Undernourishment can be caused by either decreased intake of nutritious food or by the improper digestion leading to the decreased uptake of nutrients from the ingested food. If there is any defect in the digestive factor like hypo functioning (*mandagni*) or irregular digestive factor (*vishamagni*), the digestion will not be proper and the resultant *rasadhathu* formed will be vitiated. Reduced formation of *rasadhathu* (*kshaya*) can occur when the food intake is reduced or when there is intense state of digestive factor (*theekshnagni*) causing depletion of *dhathus*. Conditions like *parigarbhikam*²⁴ and *garbhaja phakka*²⁵ are caused due to nutritional deprivation. Properly ingested and digested food forming *rasadhathu* may not nourish the body tissues due to the obstruction in the channels (*srothorodha*). In such conditions, there may be formation and accumulation of *rasadhathu*, but it may not reach the body tissues and nourish them, thus causing symptoms like emaciation (*karshyam*). Such a pathology is seen in diseases like *kumarashosha*²⁶ and *ksheeraja phakka*²⁷. Protein energy malnutrition which comprises of Kwashiorkar and Marasmus are the two severe forms of under nourishment. Kwashiorkar is a condition when the child is abruptly taken off breastmilk which is the main source of protein and is initiated cereal feeding. The child so used to breast feeding does not take sufficient quantity of cereals. So, the child become deficient in both protein and calories. But the protein deficiency will be much more pronounced. The events are acute and body hardly gets time for proper adaptation. There will be presence of oedema due to hypoproteinaemia.

Marasmus is a condition where there is protein and calorie deprivation over a prolonged period of time. Calorie deprivation leads to the mobilisation of fats and muscle proteins for production of energy. The part of proteins mobilised will be available for the maintenance of serum albumin level thus preventing the development of oedema. The loss of fat and muscle mass lead on to extreme emaciation with redundant folds of skin²⁸. The clinical picture of Kwashiorkor like emaciation with shining and pale face (*snigdha shukla muksheshkana*)²⁶ may relate it to *kumarashosha* and marasmus to *parigarbhika* relating to its symptoms like extreme emaciation (*karshyam*), distended abdomen (*koshtavidhi*)²⁴ but exact correlation may not be possible.

Obesity is another form of malnourishment. As per Susrutha, the physique of the body is determined by *rasa*. Susrutha explains that, in obesity, the *rasa* formed after digestion is not properly formed (*amarasa*) due to various reasons like intake of food which increases the *kapha*, and which is difficult to digest (*ajeerna bhojana*), sedentary life style (*avyayama*), day sleep (*divaswapna*) etc²⁹. Food which increase *kapha*, also increases the fluid element in the body because *kapha dosha* is predominant in water element of five basic constituents (*panchamahabhootha*)³⁰. Sedentary life style and day sleep also contributes to the increase in *kapha*³¹. Generally, the metabolic factor (*dhathwagni*) present in structural components of body is proportionate to the digestive factor (*kayagni*), i.e. if the digestive factors are weak, the metabolic factors in the body tissues will also be proportionately reduced because it is a portion of the digestive fire (*kayagni*) that is situated in the tissues³². But in obesity (*sthoulya*), the digestive factor is good (*deepthagni*), but there is weak state of corresponding part in the body tissues²⁹. The diet and habit which increases the *kapha* may directly reduce the metabolic factor present in body tissues especially *rasa* (*rasa dhathwagni*) as there is similarity in properties of *kapha* and *rasa*. That is the reason why *rasa* is not formed properly even though there is good digestive fire. A disturbed lipid metabolism in obesity is capable of inducing a pro inflammatory stage³³. Pro inflammatory cytokines have been suggested to cause insulin resistance in liver and adipose tissue by interfering with insulin signalling. Insulin resistance is principal to metabolic syndrome, especially lipid metabolism, mitochondrial dysfunction, white matter atrophy, and synaptic loss and neuro-inflammation³⁴. Primarily affected entity is *rasa*. As improperly formed, it is termed as *amarasa*. The presence of improperly digested elements (*ama*) causes obstruction in the channels (*srothorodha*) through which nourishment usually takes place. In obesity, nourishment of body elements other than adipose tissue (*medas*) does not take place due to this obstruction. Increase in adipose tissue may be due to the nature of diet as similar qualities enhance an entity.

Rasa and Immunity

As per Ayurvedic literature, the factors included under the '*bala*' is told to be physically stable with properly formed muscle mass (*sthiropachitha mamsa*), proper execution of physical (*kaya*), mental (*mano*) and verbal (*vak*) functions, clarity of voice (*swaraprasadam*) and complexion (*varna prasadam*), proper functioning of motor activities and evacuation of waste (*bahyakarana*) with intact higher mental functions and sense organs (*abhyanthara karana/budhindriya*)³⁵. These conditions indicate a proper functioning system without any affliction of disease and the factor behind this maintenance of a stable and healthy state of body, preventing it from diseases may be related to immunity. The concept of immunity is explained in classics in terms of *kapha* and *ojus* and both are invariably related to *rasa*. *Kapha*, when in its normal form can be considered as the base of immunity of the body³⁶. *Kapha* is closely related to *rasa* in its physical properties as both have similar *panchabhouthika* combination. It is also considered to be same as *ojus*³⁶.

Agni has a crucial role in maintaining the balanced state of body (*swasthyam*)³⁷. All energy required activities have a role of *agni* in it³⁸. The transformation of *rasa* through all the *dhathus*, finally reaching *shukra* is by the action of metabolic factor (*dhathwagni*) in the respective *dhathu*. Innate immunity is seen maximum in cold season (*hemantha* and *shishira*), least in summer (*greeshma*) and rainy season (*varsha*) and moderate in spring (*vasantha*) and autumn (*sharath*)³⁹. Metabolic factors (*agni*) are very active during the cold climate which implies proper formation of *Rasadhathu*⁴⁰. *Rasa* is the connecting bridge between *agni* and the body tissues. *Ojus* is the essence of all the *dhathus*³⁵. So a proper formation of *rasadhathu* is adequate for the proper formation of *ojus*. Also, *rasa* and *ojus* share the same physiological seat in the body i.e. heart (*hridaya*) hence any vitiation of *rasa* can in turn affect the *ojus* thereby affecting the immunity.

The ability of the body to defend itself against specific invading agents such as bacteria, toxins, viruses and foreign tissues is called immunity which is also called specific resistance. Lymphocytes namely B cells and T cells are responsible for the development of immunocompetence which acts differently upon the invading pathogens⁴¹. Antigen antibody reactions are supposedly taking place in body cells not apparently having any relation to the digestive system. But according to recent studies there is some involvement of gut in the immune

system of a person augmenting the Ayurvedic textual references regarding the relation of *agni*, *rasa* and immunity (*bala*).

The human intestine host a diversity of microbes which are collectively called gut microbiome which form complex ecosystems capable of performing various functions that have a wide spectrum of effects on their host's physiology and hence health. Apart from functions associated with digestion and nutrition, gut microbiome also have effects on the immune system. Much of the gut microbial action is known to be about maintaining the mucosal immune response, like supporting epithelial barrier function, they also influence cell mediated immune responses⁴².

Driving force which is responsible for all the processes taking place in the gut (*koshta*) is *agni*. As childhood is a period where there is predominant *kapha*, and it is the base of immunity, it is a period of developing immunity. It is stated that, due to the introduction of several new food items (*ahara sankara*), the *agni* in the children, especially who are in the initial period of growing, have a very unstable digestive fire (*aniyatha vahni*)⁴³. Recent studies suggest that the infant gut undergoes important developmental stages that are entirely dependent upon the colonization with microorganisms, beginning at birth. The behaviour of children in the first 3 years of life provides significant exposure to microbes such as feeding directly from maternal skin, constant introduction of hands, feet, and other objects to mouth, and contact of hands onto floor surfaces during crawling and early walking stages. The microbiota in children under 3 years of age fluctuates substantially and are more depended on environmental factors than the adult microbiota⁴⁴. The term '*ahara sankara*' may denote new and different kind of substances which are introduced in to the digestive fire (*agni*) which makes it instable which may be related to the fluctuating microbiota in the child gut. Also, the evidence suggests that such systemic effects of the microbiome are linked to both early life development of appropriate local gut mucosal immune responses towards the microbiome and their subsequent maintenance throughout the life. In the light of this early formation of gut microbiota and its influence on lifelong immunity, and its dependence on the feed, the diet and regimen mentioned for newborn and infants can be explained. For example, ghee (*ghritha*) and honey (*madhu*) is advised to give to new born immediately after birth which is an incompatible substance (*virudha*) directly causing *rasadushti*⁴⁵. But it may be considered as evoking an allergic response. Pollen from which honey is made, is an allergen and ghee which is a milk product and honey being a plant product might be carrying a large number of microbiomes which are introduced to the infant gut.

CONCLUSION:

Gut (*koshta*) is considered as the seat of digestive factor (*agni*) and it is the prime location of digestion. *Rasa* may be a metabolic by product acting as a carrier of energy nourishing the body or a fluid medium necessary for the functioning of body as a system. Although *agni* is the factor which can be manipulated through various factors, the effect is reflected in the body functions through *rasa*. *Rasa* is the connecting link between digestive factor (*agni*) and body tissues. Current spectrum of nutritional problems like deficiencies and obesity has its root in defective *agni* and vitiated *rasadhathu*. Immunity is also depended on normal *agni* and *rasadhathu*. Improving immunity should be focused on correcting the diet, enhancing digestive factor (*agni*) and adopting practices to maintain a proper digestion so that unvitiated *rasadhathu* is formed.

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