IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

The Physiological Study Of Dhatu Poshan Nyaya W.S.R. Cell Metabolism

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ABSTRACT: -

According to Ayurveda the body is an outcome of nutrition. Diseases are the result of Mala & impaired nutrition. The concept of Saptadhatu of Ayurveda refers to the physiology of basic nutritional and structural factor of the body. The Ahararasa (essence part of the food product) is the source for giving nourishment to all the Dhatus and Dhatus nutrients are nourished one after another from Ahararasa to Shukra. Dhatu Poshana Nyaya gives us a simple and clear view about how the Dhatus formed and how the conversion of Ahararasa takes place in Saptadhatus. Dhatus are those entities which actually sustain living body. Even though all three entities, Dosha, Dhatu, and Mala sustain body and for this reason are called "Tridhatu". The physical as well as mental health depends upon the type of ahara taken and metabolic transformation of ahara and their uptake by different cells, as per classical texts this concept is known as dhatu-poshana nyaya. Dhatu indicates sustenance of body and nourishment from only and only Sara portion of Ahara Rasa. Food has to undergo digestion by Pachakagni, Dhatwagni, along with Bhutagni. Dhatu also gets nourished from Dhatu and nourishes another Dhatu. The term metabolism of a food substance is meant by a series of specific biochemical reactions occurring within the living organism from the time of its incorporation into the cell or tissue till its excretion, of which some are concerned with tissue synthesis and others with tissue breakdown what are termed as anabolism and catabolism respectively. In Every dynamic system whether it is a machine or living cell, it loses mass when it is left to itself. Against this persistent destructive –tug, the living cell must pit itself-repair and replace. The structural metabolism based on nutrition, and energy metabolism makes such gains possible. Fuel sources are required from which structural supplies may be procured. The concepts of Saptadhatus of ayurveda refer to the physiology of basic nutritional and structural factors of the body. The same explanation is elaborated in Ayurveda classics by various Acharyas giving their own point of view and which is termed as Dhatu Poshana Nyaya. Theories of Dhatu Poshan Nyaaya are not different all together but these have conjugative sequence or different levels of digestion from ingestion of food to metabolism at cell level or whole nourishment process. In this way all theories are not controvert each other while these theories stand as one set of principle of tissue nourishment. Tissue nutrition is the continuous process which persists throughout the life, but it's different during different phases of life. Acharayas postulated theories of tissue nutrition and transformation of tissue nutrients into bodily element through Dhatu Poshana Nyaya (tissue nutrition and differentiation theory). The theories of tissue nutrition are Ksheera Dadhi Nyaya (Law of Transformation), Khale Kapot Nyaya (Law of Selectivity), Kedari Kulya Nyaya (Law of Transportation) and Ek Kaal Dhatu Poshan Nyaya (simultaneous supply of nutrients to whole body).

KEYWORDS: - Ayurveda, Nourishment, Nutrition, Metabolism, DhatuPoshanaNyaya.

INTRODUCTION: -

The basic theory of Ayurveda is to maintain the state of equilibrium of dosha, dhatu and mala. All these three are nourished initially by the influence of potency of individual Jatharagni and productive nutrients (ahara rasa) are passed respectively into each level of dhatu (bodily tissues) for nourishment. Ultimately, necessary nutrients for the formation and development of tissues are supplied by one stream of pool. In ayurveda ahara has greatest importance among three upasthambhas i.e. ahara, nidra, bramhacharya. Acharyas have given different concepts of dhatu poshana like kshira dadhi nyaya, kedari kulya nyaya, khale kapot nyaya, ek- kal dhatu poshana nyaya in different part of classical text as per need.

The term Dhatu is derived from the Sanskrit verb root (Du-Dhan) which means Dharana or to support, said to make the structural architecture of the body and Poshana means to nourish. Sapta Dhatu exist, as concrete formed entities e.g. the circulating Rasa and Rakta (plasma & blood) etc. The Sapta Dhatus are being continuously formed with necessary materials derived from Ahara and these processes only happen in human beings to maintain a state of equilibrium. These Dhatu is of two kinds – Sthayee or Poshya (stable or to be nourished) and Asthayee or Poshaka (unstable or which nourishes). Sapta Dhatu already existing as stable Dhatu and equal number of metabolically transformed precursor nutrient, substances obtained from Ahara and is meant to be utilized for nourishment, synthesis and maintenance of Sthayee Dhatus respectively. Sthayee Dhatu support the body by providing it with basic tissues and the Asthayee or Poshaka Dhatu are responsible for supporting, nourishing and maintaining the Sthayee Dhatu. Nutrient substances undergo transformation under the influence of their own Ushma (heat) and thereafter transported to the Dhatus through their specific transporting channels. The seven Dhatus that support the body undergo two kinds of transformation (Paka) i.e. Prasada and Kitta, under the influence of its own Agni (heat) Prasada Bhaga of Ahara rasa (digested diet) nourishes seven Dhatus including Ojas. Kitta Bhaga nourishes Sweda (sweat), Mutra (urine), Purisha (stool), Vata, Pitta, Kapha and Malas of eye, ear, nose, throat, mouth, hair follicle and external genitals. Thus, essential Rasas and Malas nourishing the body in a balanced way and responsible for Dhatu-Samya (homeostasis). Due to the above-mentioned points Sushruta has mentioned the Dosha, Dhatu and Malas are the root or base or pillar of the body on which the body is supported and maintained.

Ayurveda is an ancient science with its holistic approach to life. The very object of this science is the maintenance of equilibrium of tissue elements (Dhatu). Because the equilibrium state of tissue element denotes the health of an individual. Dhatu are those entities which actually sustain living body by their functions like viz. Preenanam, (gratifying effect) by Rasa, Jeevanam and Varna prasadanam (livelihood, and glorious complexion) by Rakta, Lepan (stoutness/coating) by Mamsa, Snehanam Drirhatvam (glossiness and firmness) by Meda, Dharana (support the body) by Asthi, Puranam, Balam (filling of the internal cavity of Asthi and formation of the chief source of strength) by Majja, Garbhotpadanam (impregnating principle) by Shukra. These Seven entities under this category are accepted without any debate by Ayurveda. So, the equilibrium of Dhatu is necessary for the maintenance of health, and this equilibrium is maintained by a cyclic process of formed, destroyed and reformed of nutritional elements for tissues after proper digestion of ingested wholesome food. All matters including food articles are constituted of five Mahabhuta. Panchbhautika food contains specific Agni to these five Mahabhuta known as Bhutagni, Which help in digestion of their respective food ingredients and convert the heterogeneous material into homogenous ones.

The basic theory of Ayurveda is based on the state of equilibrium of Tridosha, Saptadhatu and Trimala. Acharya Charaka states that the body is the outcome of Ahara (food). Aahara sustains and supports the Deha- Dhatus, Ojas, Bala and Varna among people. Aahara depends upon Agni to contribute to the nourishment of the body. Sharira Dhatus cannot be nourished and developed when food is not properly digested by Agni. To understand the concept of Aahara Paka in Ayurveda we must know the role of Agni indigestion. The formation and nourishment of Dhatus is a continuing process which is occurred from the embryonic stage of the foetus to death. The Ahararasa essence part of the food product is the source for giving nourishment to all the Dhatus and Dhatus nutrients are nourished one after another from Ahararasa to Shukra. The consumed diet containing all elements first gets digested in Amashaya (stomach) by the action of Jatharagni. Formation of Dhatus (tissues) is possible only by maturation of basic elements by particular types of Agni, i.e.

Dhatwagni. After proper digestion of different forms of Ahara dravya by jatharagni, makes Ahara dravya into two forms like Prasada (Sara) and Kitta bhaga. The Doshas and Dhatus get nourished by Prasada part (nutrients). Kitta part (metabolic waste) is to be excreted from the body.

The nutrition and differentiation of tissue is different during different phases of life. During intrauterine life, initially (before 8th week of gestation) the nutrition of embryo is histotrophic, whereas after formation of placenta nutrition is haemotrophic. Histotrophic nutrition under a low concentration reduces the risk of free radical mediated damage. Later on, when fetal requirement of O2 rises, transition to haemotrophic nutrition as establishment of maternal placental circulation occurs. And after birth nutrition is totally enteral means i.e., nutrients are taken in the form of food via mouth. In the same way the tissue differentiation is not same during all phases of life, it follows a certain rule of differentiation. So, this article is an attempt to understand the differentiation of tissue by means of Dhatu Poshan Nyaya. The body, according to Aurveda is the result or an outcome of nutrition. Diseases, on the other hand, are the result of mal and or impaired nutrition. The manner in which the nutrition ingested is digested: the way in which its various components are metabolized in to appropriate dhatu or tissue elements, and how some of its constituents are broken down for being utilized for the production of energy required for vital activities. The concepts of Saptadhatus of ayurveda refer to the physiology of basic nutritional and structural factors of the body.

MATERIAL AND METHODS: -

How ingested food is digested and being homogeneous for tissue elements to provide proper nutrition and maintain them, is scientifically described in the Ayurvedic text as Dhatu Poshan Nyaaya. These Nyaaya are-

1) Ksheera Dadhi Nyaaya (Total transformation as nutrients)

2) Kedari Kulya Nyaaya (transportation of nutrients)

3) Khale Kapota Nyaaya (selective uptake)

4) Ek Kala Dhatu Poshan Nyaaya (simultaneous supply of nutrients to the whole body).

KSHEERA DADHI NYAYA (METABOLIC LAW OF TRANSFORMATION): -

Also known as the Law of Transformation, or the Sarvatmana Parinama Paksha, the Ksheeradadhi Nyaya has been the first of the theories placed forward towards the understanding of the Dhatu Poshana. According to this Nyaya, the one Dhatu transforms into the other successive Dhatu just as the milk transforms into the curd so is the term “KsheeradadhiNyaya”. As per this Nyaya, one Dhatu becomes the nutrient for the other. This implies the transformation of the Rasa into Rakta, Rakta into Mamsa, and Mamsa into Meda and so on. Thus, the previous Dhatu acts as a substratum for the successive one. The time taken for transformation of Rasa into the Shukra as per this Nyaya is explained in various ways by the seers of yore. As per the strength of the Dhatavagni and the Bhootagni, the RasaDhatu undergoes transformation into the successive Dhatus. Some Acharyas say that the Rasa transforms into the Shukra in six days. Parashara says that the AharaRasa transfom in to the RasaDhatu in 24 hours, RaktaDhatu is formed on the third day, Mamsa forms on the fourth day, Meda on the fifth, Asthi on the sixth, Majja on the seventh and the Shukra is formed in the eight days. Sushruta is of the view that the Rasa stays in each Dhatu for a period of 3015 Kalaas, approx. 5 days. Thus, in about a month the Shukra and the Artava are formed in the Male and Female respectively. Thus, from the above difference of opinions it is hard to pinpoint the time required for the transformation of the Dhatus. This means that the DhatuPoshana process continues continuously without any pause. Explaining this with an example of the person drawing out water from a well using a wheel; it is found that the strength of the person turning the wheel is responsible for speed of drawing the water out of the well. The more the strength of the person the more is the speed of drawing the water. Similarly, the strength of the factors like Agni decides the time for the formation of the Dhatus. Raising the doubts in the authenticity of the KsheeradadhiNyaya, AcharyaChakrapani contends that if this Nyaya is accepted then, if a person performs fast for 3-4 days, the rasadhatu of this individual should be depleted. Similarly, a fast of a month shall make the body devoid of all the six Dhatus and only the Shukra will remain. Clarifying these doubts Vagbhatta and Dalhana say that

after the digestion of food the food gets divided into two parts viz. the Sara (potent part) and the Kitta (Excretory part). The Sara is acted upon by the Dhatavagni that again divides this part into two parts, one Sthoola and other Sookshma. The Sthoola part nourishes the Dhatu while the Sookshma part nourishes the Upadhatu and the successive Dhatu. The Sookshma part of the preceding Dhatu is acted upon by the Agni of the successive Dhatu which produces three parts viz. Sthoola, which nourishes the self (Dhatu); Sookshma, which nourishes the Upadhatu and consecutive Dhatu; Mala which nourishes the excretory portion.

Different physiological concepts: -

Theory of sequence of replenishment of Dhatus. Commentator Chakrapanidatta explains how this sequence is managed in his commentary he states about sequence and time factor of replenishment of seven Dhatus. Rasa is digested by Swaagni and is bioconverted into Rakta, due to Swaagni Rakta is bioconverted into mamsa, in such fashion previous dhatu generates next dhatu due to bioconversion by swaagni. This is comparable to milk bioconveretd into curd and curd into butter were butter into ghee. This is complete conversion of one entity into another. When milk is bio converted, entire butter is turned into ghee. This is also called Sarvatma Parinama Paksha. This hypothesis was neither rejected nor accepted universally by scholars in that era. Few reasons for acceptance are, time factor should be taken as directed by Sushruta. It should be taken as twenty-four hours for replenishment of Rasa Dhatu and five days each for next Dhatu. It even explains event in diseases Rajyakshama, where due to obstruction in Rakta causes waning of Mamsa Dhatu. And the reasons for rejection are, Milk is supposed to replenish Shukra Dhatu immediately after consumption. This cannot be explained if this law is totally accepted. It will take one month to do this work. In practice result is observed immediately even in increased Meda, Asthi should increase in response to this law but in practical it is not observed so.

KHALE KAPOT NAYAYA (THEORY OF SELECTIVITY): -

Khale is the termed used for the place where grains are kept when they are recovered from the field and the term Kapot means pigeon. Just as pigeon from the far and near come to the heap of corn which is stored at one place, pick up their requirements and go back to their dwellings, in the same way each Dhatu picks up its requirements from the pool of Rasa Dhatu, the Ahara Rasa contains the nutrient factor for all the Dhatu in the body just as pigeon coming from different direction and distances to the heap of the grain and fly away to their native places, dwelling either late or early depending upon the distance and direction they need to travel. This Nyaya means the selection of individual requirements by the individual Dhatwagni from the same Anna rasa which contains all Dhatus nutrient part. Because of different distances of Dhatuashaya, the length of the respective Srotas also varies. Nearer the Ashaya smaller the length of Srotas and further the Ashaya longer the length of Srotasmand time taken by the rasa to reach that Ashaya will also be longer. From Rasa Dhatu directly all the Dhatu Poshana takes place none of the Dhatu are inter connected for the Poshana from Poshaka Ansha of previous Dhatu.

Different physiological concepts: -

Same is explained by Chakrapani, says this is one way of thinking about verse. He suggests there is another way to think. This opinion is in context to sequence and time taken for replenishment of seven Dhatus. Nourishing fluid Rasa replenish Rakta in the beginning. Whatever part of Rasa is necessary for Rakta is offered to Rakta Dhatu in Rakta Vaha Srotas when Rakta takes out its own replenishment, Rasa replenishes Mamsa. In Mamsavaha Srotas it lets Mamsa Dhatu take out its necessary portion and after replenishment of Mamsa, Rasa replenishes Meda and it goes on till shukra dhatu. Again, this law was neither rejected nor accepted universally by scholars in that era. Reasons for acceptance can be, as it explains uniform sequence of replenishment of Dhatu is stated, this law is able to explain immediate action of milk on Shukra Dhatu and it explains that it is not necessary that increased Meda should increase Asthi as well. The reasons for rejection can be due to circulation and direct replenishment of Dhatus, sequence to replenish Rakta after rasa, Mamsa after Rakta cannot be demonstrated well. Yet in commentary this is explained that it runs through each channel of Dhatu hence action of Agni in each channel should be taken.

KEDARA KULYA NYAYA (THE LAW OF TRANSMISSION / TRANSPORTATION PROCESS): -

Meaning of Kedara Kulya is paddy field and Kulya means canal. This Nyaya says that the nourishment of the Dhatu by transportation process as different fields are irrigated by the same channel, but the field which are nearer to channel are nourished first and distant fields are later. Explaining this theory of Dhatu Poshana, Chakrapani has stated that Ahara through the process of digestion get changed into Rasa Dhatu and nourishes it, the remaining part of the Anna Rasa now present in the circulation proceeds to nourish the Rakat Dhatu while passing through the places of Yakrit, Pleeha in the body and attains the Gandha Varna of Rakta Dhatu. Likewise, Ahara rasa does Uttara Uttara Dhatu karma Poshana.

Different physiological concepts: -

Same is explained by Chakrapani, his opinion is in context to sequence of replenishment of seven Dhatus and time factor. It is hypothesized that Ahararasa is like storage. Sequence of replenishment of Dhatus is same. Ahara rasa travels through all channels nourishing Dhatus. Nearest Dhatu gets replenishes immediately, the farther the Dhatu, lengthier is the channel. It takes more and more times for Ahararsa to reach sequentially all Dhatus till last Dhatu Shukra. This opinion is capable of explaining immediate replenishment of Shukra Dhatu with milk. It also explains healthy condition of rest of Dhatu when previous Dhatu due to some reason undergoes disease condition. Again, this law was neither rejected nor accepted universally by scholars in that era. Reasons for acceptance can be as it explains uniform sequence of replenishment of Dhatu is stated, this law is able to explain immediate action of milk on Shukra Dhatu and it explains that it is not necessary that increased Meda should increase Asthi as well. The reasons for rejection can be due to circulation and direct replenishment of Dhatus, sequence to replenish Rakta after rasa, Mamsa after Rakta cannot be demonstrated well.

EKAKALA DHATU POSHANA NYAYA: -

This theory is propounded by Arunadatta, the commentator of Astanga Hriday. According to this theory after proper digestion of Ahara druvyas with the help of Jatharagni this Ahararasa enters into the all Dhatu vaha srotas at a time uniformly it can be presumed that all the Dhatus are nourished simultaneously without any time gap.

Different physiological concepts: -

In this connection Acharya Charaka has mentioned that after proper digestion this Ahararasa get mixed with the plasma of the body and due to the contraction and relaxation of heart by the Vyana vayu takes this rasa to distribute all over the tissues of the body. According to Acharya Sushruta with the help of Vyana vayu, Ahararasa nourishes all Dhatus at a time without interruption throughout life. It deals with circulation of nutrients (end product of digestion after absorption) through blood by the heart. It reaches all the tissue with each systolic function of heart and nourishes all the tissues at the same time.

DISCUSSION: -

The Anna Rasa or Ahara rasa i.e. the nutrient fraction of the food, the final outcome of the food, the final outcome of the Jatharagni Paka, which is absorbed from the Amapakwashaya represents the basic nutrients required for the nourishment and building up of the seven dhatus. These substances should be homologous to the Sthayi dhatu because they cannot be utilized as such for the nourishment of the Dhatu in view of their Vijatiyata to the body. These Vijatiya or foreign substances to the body should be modified or rebuilt as swajtiya or organism specific substances before they are utilized by Dhatwagni. The required transformation of Vijatiya nutrients into Swajatiya Dravyas is the function of Bhutagni. Therefore, Dhatwagni Paka begins only after the completion of the Bhutagni-paka. The poshaka dhatu, which are capable of nourishing the Sthayi Dhatu, are produced in the Prasada Paka of the Dhatwagnis. Both the Dhatu Parinama and Dhatu Poshana are conducted through the Poshaka Dhatu only and these two functions begin with Rasa Dhatu. The different food materials (mostly complex and unsuitable for absorption) are transformed into their simple and soluble form by digestion prior to the entry from the lumen of the intestine into the body through its gateway (absorption). After their entry into the body, they undergo a series of biochemical reactions in different organs catalyses by enzymes, co-enzymes, catalyst and governed by hormones and vitamins to serve

the purpose of anabolism (synthesis) and catabolism (analysis). The term metabolism of a food substance is meant by a series of specific biochemical reactions occurring within the living organism from the time of its incorporation into the cell or tissue till its excretion, of which some are concerned with tissue synthesis and others with tissue breakdown what are termed as anabolism and catabolism respectively. Although both anabolism, and catabolism are reversible.

According to Kshira Dadhi Nyaya the whole Rasadhatu is converted into Rakta and the entire Rakta into Mamsa and so on upto Shukradhatu. Medavriddhi should result into Asthivriddhi by this law but in practice, it is not seen so. Kshira Dadhi Nyaya can be correlated in modern with transformation of tissue or denovosynthesis of tissue. This theory cannot be applied in case of certain aphrodisiac, anti-toxic and Rasayan dravyas as they directly act on particular tissue. According to Kedari Kulya Nyaya the process of nourishment of tissue can be linked to irrigation of different field by water from a canal. It is clear that Madavridhi can not necessarily cause Asthivriddhi. According to Khale Kapota Nyaya process of nourishment of Dhatu takes place by selection. According to this law it is not necessary that vitiate Rasadhatu should lead to vitiate further Dhatus. According to Ekakala Dhatu Poshana Nyaya, Ahararasa percolates into all Dhatuvahasrotas at a time uniformly.

All the Nyaya s is correct in their approach and there is not much of a difference among them. The entire three Nyayas act as a unit and it is not possible to explain Dhatu - Poshana with the exclusion of any of them. Thus, all the three act in full harmony to show the complete process the Dhatu-Poshana. The Ahararasa first nourishes the Rasadhatu by the Ksheeradadhi Nyaya. The Rasadhatu accepts the nourishment from the Rasa and the remaining portion by the application of the Kedari KulyaNya ya nourish the Rakta by behaving like the Rakta. The remaining portion moves ahead in the Mamsavaha Srotasa to nourish the Mamsadhatu. Thus, all the three act together to nourish the Dhatus. In this way the Dhatu s nourish each other and so the increase in one lead to the increase of the other and vice versa proving the principle "Poorvahpoorvoati vriddh atvatvardhayeddhiparam. The Ksheeradadhi Nyaya emphasizes on the Dhatavagnipakajan ya prasadamsha while the KedariKulyaNyaya stresses on the Rasa samvahana and the KhaleKapota on theSrotasas /Channels.

CONCLUSION: -

One should take all these Nyayas are equivalent to each other. They do not interfere with each other nor do they oppose each other, it is therefore needed to accept all laws together and interpret replenishment of seven Dhatus in a fashion where all laws become applicable. Dhatu indicates sustenance of body and nourishment from only and only Sara portion of Ahara rasa, food has to undergo digestion by Pachakagni, Dhatwagni, along with Bhutagni. Dhatu also gets nourished from Dhatu and nourishes another Dhatu and this is the basic concept which each Nyaya has tried to portrait. Theories regarding the nourishment of the Dhatu are termed as “Dhatu Poshana Nyaaya”. These theories altogether elaborate process of nourishment. If we go through whole process, we can classify it into 4 conjugative sequences: 1. Transformation (Ksheerdadhinyaaya) 2. Transportation (Kedarikulyanyaay) 3. Selectivity (Khale-Kapota Nyaaya) 4. Nutrition (Ek-kaladhatuposhannyaaya) These all theories which were given by different Acharya at different period of time can be understand in two senses – ✓ First one is that all theories are entirely different. ✓ Second one is that these theories are not different all together but these have conjugative sequence by that we can make an understanding that these theories are different levels of digestion from ingestion to metabolism or whole nourishment process. In this way all theories are not controvert each other while these theories stand as one set to form principle of tissue nourishment. They do not interfere or oppose each other, so it can be stated that Ahararasa reaches to specific channel according to Kedari Kulya Nyaya. Nutrients in Ahararasa are selected as per tissue requirements according to Khale Kapota Nyaya and finally Dhatuposhakamshas i.e. nutrients are transformed into Dhatus according to Kshira Dadhi Nyaya. Ekakala Dhatu Poshana Nyaya is universally accepted without any criticism. Different bio- chemical transformational processes like Glycolysis Pathway, Kreb’s cycle etc supports kshira dhadhi nyaya. Any process that requires energy (Active Transport) to maintain the homeostasis of our body supports khale kapot nyaya. Passive transport like diffusion, facilitated diffusion, filtration and osmosis etc supports kedari kulya nyaya. According to ek-kala dhatu poshan nyaya dhatu’s get nourishment by all three processes i.e. kshira dhadhi nyaya, khale kapot nyaya, kedari kulya nyaya at same time. So, it can be concluded that the classical concept of nyaya is

equivalent to different physiological processes described in metabolic transformations of food, hence, the classical principles in the present scenario are still noteworthy.

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