UNDERSTANDING ‘CONCEPT OF DHATU GATI AND POSHANA’ AS MECHANISM OF TRANSPORT OF NUTRIENTS AND TISSUE FORMATION; IN GENESIS OF METABOLIC DISORDERS.

ABSTRACT
There are different theories described in Ayurvedic texts as Dhatu Gati (transport) and Dhatu Poshana (transformation) Nyaya. Namely 1) Kahirdadhi Nyaya, 2) Kedarikulya Nyaya, 3) Khale Kapot Nyaya for transformation and transportation of nutrients. The mechanism of these theory and their scientific technical terms are explained in the paper. Also, discussions of dhatu gati and dhatu poshana tantra is given. Dhatupradoshajya vikara (Metabolic disorders) is due to Aadalbapraavritta (by chance), shukrashonita sankramanam (inherited). Most metabolic disorders are autosomal recessive in transmission. Because of inherited reasons Dhatuposhana (Growth and development of tissues) gets deranged, by their own quickly by birth or due to external factors as in Prameha (Diabetes); santarpam janya (Excessive feeding) or optarpam (mall nourishment) janya (derived) awastha (conditions). If the clinical disturbance in Dhatu Gati, Dhatu Poshana and manifestations of all saptadhatwagni (transforming factors) studied well with evidence-based researches in collaboration with modern medicine, it will certainly bridge the gap between two the knowledge of Metabolic disorders. Aim is to maintain Sharir dhatu samya (equilibrium of bodily tissue) with Prashasta dhatu (Excellent tissue) for preciousness of health in life.

KEYWORDS : Dhatu, Gati, Poshana, Metabolic, Disorders

The Chronological nourishment (Dhatu amukramena amugat poshah) of Ras-Raktadi dhatu is well defined in Ayurveda[1]. The chyme (aharrasa) is converted into circulatory body fluid (rasa dhatu); then specific enzyme (Dhatuvaganti) acts on the substrates (poshaka dhatu anu) to form particular tissue (poshya dhatu) with integration of many enzymes, co-enzymes and co-factors (dosh -dhatu-upadhau and malagata agnis, panchamasha bhutagnis etc) [2].

As these substrates bathes (avagaha) into body fluid; they are metabolized (upachaya) and transformed (dhatugatiparinati, paka, udhaha upachaya,) and transported (dhatugati- dhatuvyuhana, rasasamvahanaya, absorption and assimilation) to form new dhatu (matrix and tissue). There are different Nyayas (theories) described in Ayurvedic texts as Dhatu Gati and Dhatu Poshana Nyaya. Namely 1) Kahirdadhi Nyaya, 2) Kedarikulya Nyaya, 3) Khale Kapot Nyaya for transformation and transportation of nutrients.

These theories resemble to evolutionary stages of animal kingdom. Life is generated in sea water where the amoeoba like unicellular creature is evolved by complete transsto movement (Sarvatmaparinaman). There after multicellular creature like starfish with open channels evolved with the growth and development. further closed circulatory system is evolved by the formation of various vessels (augmentation). This is reflected in embryonic life of human fetus and continued impression in living state through the life.

1) KSHIRDADHI NYAYA
This theory says that the ahararasa (chyme) is completely transformed into Rasadhatu(bodily fluids)[3]. Rasadhatu is completely converted into Rakta dhatu and so on transformations of dhatu into next dhatu goes on till Shukradhatu (reproductive tissue). This is described as rasoratkattwam murchhati in Arundutta critic[4]. That means the initial molecule loses its form (prachyati- swahhave ksharaana) to transform into another form (samantaram eva). Khirr means milk and Dadhi is curd; as all milk is transformed into curd then butter after that into ghee and liquid form of ghee. Likewise, ahar rasa is converted into Rasa-Rakta- Maamsa- Meda- Asthi- Majja- Shukra and their subtle forms of tissue and waste materials (Upadhatu and Maal) specifically in proportion within specific time (samvak gatya antaram eva). Dhatu transcript, translation and transformation takes place within specific period according to this theory. The time is different in different conditions such as genesis in embryonic life, after birth as per the need gender wise phases of life and whether the individual is in fed or starved state. It is six days or thirty days to form last tissue of Shukra dhatu[5].

The mechanism is well defined by giving the simulation model example of Shobba (sound waves), Archi (light rays) and Jala (water flow) santanvad (like offspring) anu gati (molecular movement). The time of transformation into similar molecule (swa atmabhava) is dependent upon the power of Agni (transforming enzymes and factors). The power of Agni decides rate of metabolism; whether it is manda (low) as jala gati, teeshana (fast) as archi gati or Vishama (irregular) as shobhab gati is described in this reference[6]. The movement of molecules depends upon the dimensions, speed and frequency.

To attain its final specific differentiation form for the maintenance of health and for the prevention of bodily tissue from various disease conditions including Jara (aging) many molecules has to go under specific reactions. The role of various dhatwagni and bhutagni is also important in these metabolic processes[7]. Thus, the theory of tissue formation and differentiation described in Ayurveda is need to be explained in terms of contemporary knowledge.

The saara bhaga (essence) of ahararasa or any dhatu is liable to transform into another. This is called as Dhatusneha Parampara. Sneha means continuous attachment to siblings by binding particular protein receptor; Parampara means inheritance. One dhatu generates similar molecules and cells as in genetic transcription and translation and formation of tissue or organ from stem cells. The stem cells are therapeutically used for rejuvenation. The rejuvenation therapy along with the main treatment is the unique approach of Ayurveda[8].

2) KEDARIKULYA NYAYA-
When Anarrasa reaches the state of dhaturoopap[9] rasa (nutrients for specific differentiation form); it continues to increase rasa by their aumsha (elements) in it. Components of nutrients increases in extra cellular fluid - ECF (kriyataapi aumshena tam rasam vardhayati). Even more rasa by measure goes to turn in blood as the smell and color of red blood cells (Shonitama bhutwa) as per Chakrapani on Charak Samhita[10]. Some elemental part of it similar to red blood cells nourishes (tarpayta) the specific differentiation.
form; the cellular part of blood (dhuturoopam Shonitam) in seven days just like erythropoiesis [11]. Rest of the part nourishes the Maumsa. Meda based on the Kedarakulya (field and cannels) theory as in the case of Shonit formation simultaneously (Ekkadai Dhatu Poshana) [12]. The word ‘Plawaan’ is used for stooping down towards/kind of water; plunging in or bathing by bulk flow. In cannels water moves quickly downwards and absorbed by the nearest (pratyasamanyya) root of plants in the field [13]. Likewise, in human body all dhatu are nourished by cannels by downhill theory passively [14]. The husbandry of circulation must be careful for regional flow through the various parallel circuits. The same pressure for each tissue (dhatu) but the local tissue resistance varies. Therefore, the different time duration may require to nourish them individually.

The functional physiology of this theory is described in some terms as Rasadi margacharita (membrane physiology), Dhatupratigamana (Metabolic pool). Formation of srotas, marga and ayamamukha (cyticulation, capillary bed and arterioles) is described in this theory.

As per Chakrapani Sushruta says that normally three thousand and fifteen Kala (A measure of time of that era) are required to nourish each dhatu [15]. It is about five days period required to change the compound of each dhatu. Total time period required about eighteen thousand and ninety Kala to form last dhatu is approximately thirty days. The functions of blood vessels are described by Sushruta and Dalhona as Kedar eva Kulya (field and water cannels). ECF (Rasa) in tissue matrix (dhatu) diffuses (upshanehna) through cannels like arterioles and venules linked to blood vessels (Sirya) by Metabolic transformation in fed state (samaan vayu). The propagation (pratarpayati) and facilitated Diffusion (adhigamana) of elements through blood vessels and capillaries is done with the lateral pressure of blood (Vyanaya vikshipta rasa) on vessels at a time (yugapat) everywhere (svarato) continuously (ajastram, santatyaya) [16].

The continuous streaming of nutrients from one end to other (Viduradhatu poShaNa Gati) transport nutrients to deeply situated tissues by Kedarakulya Nyaya. This is described as KoShtha- Shakha-Marma-Asthi- Sandhi (organs-walls-vaal places-bones-jointe) Gati. Another type of theory is shabda-archi-jala santanvad gati (by ligand- gate ion channels) to all places in the body. Shabda gati if multiport action in any places-bones-joints) Gati. Another type of theory is shabda-sayandana (by ligand-gated ion channels) to various sites situated tissues by Kedarikulya Nyaya. This is described as sarvato sarvatojaanana (by ligand-gated ion channels) to every channel. Less amount of nutrients from diet or less down flow of blood and plawana in ECF is the cause (Rasa nimitta) of the later dhatu (Vidoordhatu) is due to action potential generated from the dhatu elements (poshakaunsha/poshka bhaga - ions) available through pores opened (samvrutta) generated from the dhatu elements (poshakaunsha/poshka bhaga - ions) available through pores opened (samvrutta) in different channels (srotas/marga) of different directions (bhinna dig gaminam) within specific duration. Nearest dhatu (pratyasanna) is nourished quickly and the far (viprakrushta) situated is fed later on (Chirena) in different cycles (sweyasweya margena gacchati). Anduttta said that all dhatu are nourished at a time (Ek-kaal dhatu poshana) as rasaraktta spreads (dhatu yugapat pravesh sarvatram) at a time in all channels. These theories are also called as ‘Tridha dhatu poshan krama’.

The kshaya (decrease) and Vruddhi (increase) in dvyra (quantity), guna (quality) and karma (function) of any dhatu is affected due to disturbance in metabolic pathway. If initial (Poovra) dhatu is increased next (uttar) analogous dhatu is also increased and so the next (paramparaya vardhytavya). If initial dhatu decreases the next analogous is decreases in every channel. Less amount of nutrients from diet or less down flow of blood and plawana in ECF is the cause (Rasa nimitta) to reach in less amount to the systemic binding area (prati srotas to bandha sthala) sooner or later; described by Dalhona. If anyhow the channels are closed (vibaddha marga); the uttar dhatu (next dhatu) cannot be formed as in the case of Rajyalakshma (tuberculosis or Aids like diseased conditions).

Dhatojohi dhautvahhaara (Metabolic transformation of reserve nutrients in fasting state) Doshai Dhautvagni Samata (state of equilibrium/homeostasis) [17]. Dhauturupa grahaNa (absorption in specific form of nutrient-specific protein bound complex). Avayava janakatwam (organ formation), Sadayarpama (immediate nourishment) of VruShya draya (Aphrodiasis). Indriya draya poshana (supplementation of biosensors) is possible according to this theory by Direct or Indirect transport.

Dhoutpradoasha (spoiled dhatu) vikaara (diseases) is due to

3) KHALEKAPOT NYAYA

In Khalekapot Nyaya the first or nearest dhatu is nourished quickly and the far or later one gets late nourishment. To overcome this situation the impression of late evolutionary stages shows the upgraded channels of metabolism by active transport. Generation of action potential and selective absorption in membranous transportation of nutrients is described by this theory of Khale (pots or compartments as observed in bone remodeling) and Kapot (birds) as they collect grains from the pots situated near or at a far distance. Sookshma mukha srotasa (channels of tiny openings) and deergha (long) srotasa (systemic paths) are defined in this theory.

While circulating ahararasa, rasadaha and Rakta all over the body (sarvadehachari) a chronology is usefully maintained as rasad raktam (Rasa to Rakta) and so on that means dhatu poshana (growth and development) is done one after the other as described in Kahiradhi Nyaya and Kedarakulya Nyaya. But where the nutrients cannot reach there this third Nyaya applies.

During absorption, diffusion and assimilation of the nutrients following the circulating (rasanussati) blood is divided into Sthaye (stable form), asthayye (unstable form) and mala bhoga (By-products and waste material) of each dhatu. Similar elements (Dhatu poshaka saman bhag) of formed elements (sthaye dhatu) are bind to the similar elements of the same dhatu by protein binding capacity (samam sambandha amukhavati) [18]. These srotasa chronologically or directly in need (sadyah sarva). These srotasa may be long channels (deergha) or tiny pores (suksha mukha) and samvrutta-asyasamvrutta (open wide and close or tight). The metabolism to the later dhatu (Vidoordhatu) is due to action potential generated from the dhatu elements (poshakaunsha/poshka bhoga - ions) available through pores opened (samvrutta) in different channels (srotasa/marga) of different directions (bhinna dig gaminam) within specific duration. Nearest dhatu (pratyasanna) is nourished quickly and the far (viprakrushta) situated is fed later on (Chirena) in different cycles (sweyasweya margena gacchati). Anduttta said that all dhatu are nourished at a time (Ek-kaal dhatu poshana) as rasaraktta spreads (dhatu yugapat pravesh sarvatram) at a time in all channels. These theories are also called as ‘Tridha dhatu poshan krama’.

The kshaya (decrease) and Vruddhi (increase) in dvyra (quantity), guna (quality) and karma (function) of any dhatu is affected due to disturbance in metabolic pathway. If initial (Poovra) dhatu is increased next (uttar) analogous dhatu is also increased and so the next (paramparaya vardhytavya). If initial dhatu decreases the next analogous is decreases in every channel. Less amount of nutrients from diet or less down flow of blood and plawana in ECF is the cause (Rasa nimitta) to reach in less amount to the systemic binding area (prati srotas to bandha sthala) sooner or later; described by Dalhona. If anyhow the channels are closed (vibaddha marga); the uttar dhatu (next dhatu) cannot be formed as in the case of Rajyalakshma (tuberculosis or Aids like diseased conditions).

Dhaojohi dhaatvahhaara (Metabolic transformation of reserve nutrients in fasting state) Doshai Dhautvagni Samata (state of equilibrium/homeostasis) [17]. Dhauturupa grahaNa (absorption in specific form of nutrient-specific protein bound complex). Avayava janakatwam (organ formation), Sadayarpama (immediate nourishment) of VruShya draya (Aphrodiasis). Indriya draya poshana (supplementation of biosensors) is possible according to this theory by Direct or Indirect transport.
Formation of sickled red blood cells \(^{(1)}\) may be due to deficiency of folic acid in the diet or due to derangement in physiological growth and development as per Kshirasiddhi Nyaya by birth and continue in fetal life and adult life. Further clogging of blood cells may be due to disturbance in circulation physiology as per Kedarikulya Nyaya.

Because of inherited reasons (prakrutastu swaroopas hchclanti) Dhatu pashana gets deranged on their own (swa shakhitiva bala pramaana) quickly by birth or due to external factors as in Prameha (Diabetes); sanantarpan janya (over fed) or aptarpan (less fed) janya (Metabolic disorders affect amino acids and proteins, carbohydrates and lipid metabolism).

Early detection and treatment are essential to prevent irreversible cognitive impairment and early death.

Some Dhatu pradoshaja vivkara (disorders due to true deterioration of dhatu / spoiling dhatu in reality due to influx of bad karmas - lifestyle) are as follows.

- The dhatu are damaged slowly by repeated diseases, thus treatment of transient disorders, auto immune disturbances and environmental changes. Over the period: the younger or older people fall seriously ill or may die within few days, months or year. In elderly above the age of 40-60 metabolic disorders get established. Example of spreading Sarpa visha (snake poisoning) in dhatu is given in the text \(^{(20)}\).

- Rasanimittajja shalya (Obesity) Karshya (thinness), Raktrapitta (hemophilic disorders), Pandu (anemia) due to Rakta, manifestation of Mansa (shankha), Mansavruthi and Mansavaha strotas dushti (vitiation) in Fibromyalgia, muscular dystrophy, myasthenia grevis, gangrene, myoma, myom alacria, myopathies. Medodushi like granthi (glandular growth), vrudhhi (hermia), galagandha (Goiter), arbudha (Tum or), madhumeha (Diabetes mellitus), atishthoalya (Obesity), atisveda pravrutti (profuse sweating). Athi saha hirya (Osteoporosis) is a degenerative physiology of bone due to vata prokopa as in a senile osteoporosis. Osteogenic, paget's disease (excessive bone remodeling may result in soft bone formation), Sandhivaata (osteoarthritis, osteopenia) are the disease manifestations of each saptadhatvagni (seven types of locally related to kesha (hair), nakha (nail), roma (bread) are described in asthi pradoshaja roga (bone deformity). This is a special area for research in ayurveda. Disturbance in growth and development of majadhathu may lead to parvasamadi shool (Gout). Bhrama (Vertigo), moorchha (Faint), tamodarasha (coma), arusha (Big boils), shoora, mula (Bunion toe), dauryaba (weakness), laghuta (lightness in body), sarvanya netra gauravam (heaviness in eye).

Rasanimittajja shalya (Obesity) Karshya (thinness), Raktrapitta (hemophilic disorders), Pandu (anemia) due to Rakta, manifestion of Mansa (shankha), Mansavruthi and Mansavaha strotas dushti (vitiation) in Fibromyalgia, muscular dystrophy, myasthenia grevis, gangrene, myoma, myom alacria, myopathies. Medodushi like granthi (glandular growth), vrudhhi (hermia), galagandha (Goiter), arbudha (Tum or), madhumeha (Diabetes mellitus), atishthoalya (Obesity), atisveda pravrutti (profuse sweating). Athi saha hirya (Osteoporosis) is a degenerative physiology of bone due to vata prokopa as in a senile osteoporosis. Osteogenic, paget's disease (excessive bone remodeling may result in soft bone formation), Sandhivaata (osteoarthritis, osteopenia) are the disease manifestations of each saptadhatvagni (seven types of locally related to kesha (hair), nakha (nail), roma (bread) are described in asthi pradoshaja roga (bone deformity). This is a special area for research in ayurveda. Disturbance in growth and development of majadhathu may lead to parvasamadi shool (Gout). Bhrama (Vertigo), moorchha (Faint), tamodarasha (coma), arusha (Big boils), shoora, mula (Bunion toe), dauryaba (weakness), laghuta (lightness in body), sarvanya netra gauravam (heaviness in eye).

If the clinical disturbance in Dhatu Gati, Dhatu Poshana and manifestations of each saptadhatvagni (seven types of locally acting transforming factors of seven tissues specifically) can be studied well with evidence-based researches in collaboration with modern medicine, it will certainly bridge the gap between the two knowledge of Metabolic disorders. Aim is to maintain Sharir dhatu samya (Homeostasis) with Prabhras (excellent) dhatu for preciousness of health and happiness in life. \(^{(21)}\)

Oja is sarabhoot aumsha (essence) of shukra \(^{(19)}\) and all dhatus, different than aig as immunoglobulin. Oja isha (decreased immunity), Ojaryapada (complications in diseases conditions due to vitiation of Oja) and Oja virauma (dislocation of Oja) are the situations in hampered immunity in Metabolic derangements and infections.

Following Scientific technical terms of Dhatu Gati /poShaNa (Transport / Transformation of nutrients) are generated from above review and discussions.

1. Scara bhaga vivechana and shosa (Assimilation and Absorption of nutrients)
2. Dhaatusthena paramparata (Genetic transcription and translation as in embryonic growth)
3. Vikshepana (Pumping out / Stimulation and cessation)
4. Avaha (bathing), Plaawana (stooping down for diffusion), Tarpana (simple diffusion), Grahana (drinking), Munchana (Propagating)
5. Rasadi margachaarita (membrane physiology), Dhatupratigamana (Metabolic pool).
6. Rasa adhigamana (filtration and facilitated diffusion)
7. Ayana gamana (Permeability)
8. Apyayaana – (Change in molecule - glycolysis, proteogenic activity)
9. Ayana mukha unnmitam / udvahana (micropinocytosis / opening of pores / upward movement)
10. Dhatu Poshana (Unchanged molecule transport)
11. Yaapana (Maintenance of tissue)
12. Murchana (Change in molecular state)

**YANTRA/ SROTAS/AVAYAVA RELATED TO DHATU OSHANA (MEDIUM OF TRANSPORT)**

1. Annavaha (GIT), Grahan and Pakwashaaya (Small and large intestine), ShoShyamaan Aahaara Rasa (state of absorption of Chyme)
2. Garbhanaacadi (fetal circulation),
3. Hridaya (Heart), Dhaatuvaha srotasa (circulatory system), Raso- Rakta vaha, Doshavaha Naadi(blood vessels), Dhamani and Sirha (blood vessels).
4. Srotasamugamita (systemic absorption)
5. Sukshma srotoccharan through Ayana and Ayana mukha, Chhidra (cellular transport from ECF to ICF, various metabolic cycles)
6. Poshya Rasa dhatu (ECF/ICF)
7. Poshya Rasa through Sira mukha (plasma through arterioles)
8. Anu srotomukha (cellular membrane pores)
9. Dhaatuvaha srotasa rasa of respective srotasa (Dhatu in systemic circulation)

**SAMPRAPTI OF DHATU GATI (MECHANISM OF TRANSPORT)**

1. Dhamani Propadya (by Hepatic portal system)
2. Kshirasiddhi Nyaya (complete transformation)
3. Kedarkulya nyaya (Downhill passive transport), yugapat (bulk flow)
4. Upasmeena (diffusion) through Pratyasannan srotasa (system near to nutrients)
5. Kedarkulya (passive transport)
6. Viduradhantu poshana by kedarikulya to KoShtha-
**KRIYANAM ANULOMYAM (PHYSIOLOGY RELATED TO DHATU POSHAN)**

1) Tejabhoota (ionic form), parama sukshma (minute), dwividh veerya (dual potent), ashtavidh veerya (octo potent) vaa (or) aneka guna (of multiple properties)
   
   upayukta (having) Saara grahaNa (essential nutrients of diet) does Rasa poShaNa (gives Plasma substrates)

2) Rasaadraktam-------Shukra (Embryonic tissue formation - complete transformation by stem cells)

3) Rasaadi dhaatu poShaNa (tissue maintenance)

4) Uttarottar dhaatu poShaNa (anabolism)

5) Tridha pariNamana (metabolic products of three types)

6) Shabda-archi- jala santaanvad aNunaa (gaited / non gaited channels)

7) Sayandana / nisyandana (Osmosis)

8) Visarga/vikshepa- (circulation, exocytosis and endocytosis)

9) Dhaatvohi dhaatvaahaara (Metabolic transformation of reserve nutrients)

10)  Dosha Dhatvagni Samata (Homeostasis)

**Applied Physiology Table 1.1**

<table>
<thead>
<tr>
<th>Functional terms of Dhaatu poShaNa tantra (Transport of nutrients)</th>
<th>Vyantra/ Srotas/Avayava/ (Medium of transport)</th>
<th>Samprapti of Dhatu Gati (Mechanism of transport)</th>
<th>KriyaNam anuloyam (Physiology)</th>
<th>Dosha-Dhatu-Agni samata vikriti (Applied Physiology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saara bhaaga vivechana and shoShNa (Assimilation &amp; Absorption)</td>
<td>Annavaha (GIT), Grahani and Pakwashaya (Small and large intestine), ShoShyamaan Aahaara Rasa</td>
<td>Dhamani Prapadya by Samaan vaayu (by Hepatic portal system) into tissue matrix.</td>
<td>Tejabhoota, parama sukshma, dwividh veerya, ashtavidh veerya vaa aneka guNa upayukta Saara bhhaga avagah and grahaNa (essential nutrients), Rasa poShaNa (Plasma substrates)</td>
<td>Dushta Rasa poShaNa leading to samata, kshya or vruddhi (Abnormal profile of Plasma substrates)</td>
</tr>
<tr>
<td>Dhaatusneha parampara (Inheritance)</td>
<td>Garbha (Embryo), Stem cells</td>
<td>Khirdadhi nyaya (complete transformation)</td>
<td>Rasaadraktam--------Shukra. (transcription and translation)</td>
<td>ShoSha (Malformation, growth retardation)</td>
</tr>
<tr>
<td>VikshepNa (Pumping out),</td>
<td>Hridaya, Dhaatuvaha srotasa, Rasa- Rakta (Heart, blood)</td>
<td>Kedarikulya nyaya (Downhill passive transport), yugapat (bulk flow) by vyaan vaayu</td>
<td>Rasaadi dhaatu poShaNa (tissue formation)</td>
<td>Rasa nimmitta sthaulya / kaarShya (disturbed fat metabolism)</td>
</tr>
<tr>
<td>Plawana, Aplawana, PuraNa,Grahana, Munchana (supply and availability of nutrients)</td>
<td>Respective srotasa (systemic absorption)</td>
<td>upasnehana through Pratyacchanna srotasa (system near to nutrients)</td>
<td>Uttarottar dhaatu poShaNa (anabolism)</td>
<td>Rajayaskmaa</td>
</tr>
<tr>
<td>Rasa adhigamana (facilitated diffusion)</td>
<td>Rasa (ECF)</td>
<td>SrotopreeNana (capillary circulation, assimilation)</td>
<td>Shabda-archi- jala santsaanvad aNunaa (gaited / non gaited channels-)</td>
<td>Ati pravritti, (accumulation)</td>
</tr>
<tr>
<td>Ayana gamana (Permeable)</td>
<td>Rasa through sira mukha (arterioles)</td>
<td>Kedarikulya (passive transport)</td>
<td>Sayandana / nisyandana (Osmosis)</td>
<td>Sira sanga (block)</td>
</tr>
</tbody>
</table>

**PLEASE SEE APPLIED PHYSIOLOGY TABLE 1.1 VYADHI AWASTHA DUE TO DOSHA-DHATU-AGNI SAMATA VIKRITI AFFECTING DHATU POSHANA**

1) Dushta Rasa poShaNa (Abnormal profile of Plasma substrates)
2) ShoSha (Malformation, growth retardation)
3) Vaaatrakta(Gout)
4) Raktapitta (Hemophilic disorders)
5) Rasa nimmitta sthaulya / kaarShya (disturbed fat metabolism)
6) Rajayaskmaa (Tuberculous like disorder)
7) SrotoduShiti- vimargamagama (changed membrane potentials)
8) Ati pravritti, (accumulation debility) Sira sanga (block)
9) Granthi (glandular growth in channels)
10) Dhamani pratichaya (Atherosclerosis)
11) Dhamaniupalepa (Arterio sclerosis)
12) Dhamanikathinya (Hardening of vessels)
13) Shukrashmari (prostate),
14) Baadhirya (deafness),
15) Ojakshaya (general debility)

**FUNCTIONAL TERMS OF DHATU PO SHA NA TANTRA (TRANSPORT OF NUTRIENTS)**

- **Yantra/**
- **Srotas/**
- **Avayava/**
- **(Medium of transport)**

- **Samprapti of Dhatu Gati (Mechanism of transport)**

- **KriyaNam anuloyam (Physiology)**

- **DOSHA-DHATU-AGNI SAMATA VIKRITI (Applied Physiology)**
REFERENCES

2. Dr. Ambika D.S. Sushrut Samhita with Ayurveda tapa sandipika Hindi; vyakhyya Sutrasthana 14/14- Varanasi reprinted in 2016 published chaukhamba Sanskrit Samsthana Varanasi page no.129.
7. Akash Kumar Agrawal, C. R Yadav, MS Meena; Physiological aspect of Agni; AYU 2010/13/5/395/77195; cited on 29 Aug. at 10:22 am and Prof. Dr. sathya K. D. "Location of physiological activities of Dhatwagni and Bhautikagni’ – International journal of Recent Scientific Research – ISSN: 0976-3031; volume7 (2)February-2016.
12. Dr. Anna Moreshwar Kunte with Kriyanadi Samhita and Dr. Ambika D.S. Sushrut Samhita with Ayurveda tapa sandipika Hindi; vyakhyya Sutrasthana 14/14- Varanasi reprinted in 2016 published chaukhamba Prakshana Varanasi page no.397.