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A CONCEPTUAL STUDY OF FUNCTION OJAS W.S.R TO VYADHIKSHAMATVA AND ITS CLINICAL SIGNIFICANCE

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ABSTRACT

In Ayurvedic literature the term Oja is recognised as one of the most important vital and radiant element of the human body .The entire metabolic activities occurring in the human body throughout the lifetime are primarily dependant on Oja. To fulfil these purpose, Ayurveda has mentioned various fundamental principle in reference of Sharir Kriya, Sharir Rachna, Chikitsa etc. Concept of oja and vyadhikhshamatva explained in Ayurvedic text is one among them. Though located in hrdaya,ojas pervades all over body and controls the working of body .by its loss or destruction, the destruction of body is sure to happen and its presence, the body is survive and different state (condition, activity etc) concerned with the body are brought properly. The main function of vyadhikhshamatva.capacity and power of resistant against the disease and harmful external factors is known as vyadhikshamatva.The term is occasionally described to the vital body elements viz.dosha, dhatu.mala according to its peculiar patterns of manifestation and in addition to this tri-phasic behaviour.Oja also manifests itself in the form of radiant energy alone in the human body. In Ayurveda bala ,veerya, shleshma are often considered as synonyms Of Oja.Therefore in this review article attempt is made to understand the concept of ojas and ojasvikruti.

Keywords *:-Ayurveda, ojas, vyadhikhshamatv, hrdya, immunity*

INTRODUCTION

In *Ayurveda*, *Oja*, being one of the most distinctive concepts is a factor of prime importance related to vitality. *Oja* is regarded to be the purest part of the seven *dhatus* and is referred to as *Bala* by *Acharya Sushruta*[1] the innate quality that produces resistance against many diseases. Besides this, *Acharyas* have stated in detail about the types, peculiar characteristics, functions, and the etiology behind its dysfunction that leads in total disruption of the normal homeostasis of the body which is sometimes fatal. This concept persuades to think in deep about the role of *Oja* to the cellular level.

In the past few days, different researchers based on their individual ideas, have given its modern parlance with immunity and stem cell, etc. The views differ in explanation of *Oja* namely it is quoted to be a factor related to immunity in the physiology text of Dr. Ranjitraya Desai [2] whereas referred as a part of vitamins, albumin, glycogen, internal secretions of testicles, ovary, prostatic secretions by Dr. Ghanekar.[3] These aspects focus on only certain physiological aspects of *Oja*. However, still, the location wise variation and types of *Oja*, the role of *Bala*, etc., are untouched. A thorough deciphering of each and every aspect of *Oja, as reported in the classical texts,* is necessary.

In spite of thorough research on the etiology aspects of a disease, scientists still ponder over the concept of vitality. Past scientific researchers have highlighted the role of different cellular organs in controlling bodily functions. Role of endoplasmic reticulum (ER), Golgi apparatus etc., have been reported and recently, more emphasis is being laid on their participation in maintaining cellular homeostasis, which is in close line

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with normal *Oja* function. On a deep thought, an organelle named "ER" is present in every cell and regulates cellular homeostasis. *Oja* is debated not to be a *dhatu* as it does not possess nutritional property (*poshaka guna).*[4] The ER too participates only in the maintenance of homeostasis. In the present article, an attempt to correlate its typical location and types and functions with *Oja* has been done by making a thorough review on *Oja* about its constitution, functions, etc., from various classical texts and recent texts related to *Ayurveda*.

Oja has been accredited with two synonyms that is, *Bala* (overall body strength), *Prakrit Shleshma*, in the traditional texts of *Ayurveda*.[5] Based on the prime site of function, *Oja* has been classified as two types, namely, *Para Oja* and *Apara Oja. Para Oja* is present in heart and its function is mainly associated with the heart. *Apara Oja* is present in *Ojovahi dhamanya*[6] and functions all over the body. Chakrapani, a celebrated commentator of Charak Samhita7, has also highlighted the presence of Oja during the formation of zygote after fertilization and during the formation of heart and in organogenesis

ENDOPLASMIC RETICULUM

The ER is a vital organelle present in all eukaryotic cells. It consists of interconnected, branching membranous tubules, vesicles, and cisternae that provide a distinct subcellular compartment with a number of functions. The rough ER is studded with ribosomes on its outer surface and plays a key role in protein synthesis and secretion. Smooth ER is central to the synthesis of fatty acids and phospholipids, assembly of lipid bilayers, metabolism of carbohydrates, and regulation of calcium homeostasis [8]. One of the significant functions of ER is protein folding and processing.

DISCUSSION

Prime site

Para Oja is located in the heart. In case of ER, a specialized type of sarcoplasmic reticulum (SR) is present predominantly in the heart having the function of calcium metabolism regulation in cardiac myocytes.[10] Even, in relation to the presence of *Oja* in cardiogenesis.[11] It is postulated that the shuttle of free $Ca2^{+}$ in and out of the ER is essential for a proper generation of pacemaker activity during early cardiogenesis and fetal life.[12] The ER also has been to possess a role in the formation of zygote from oocyte, the necessary RNA molecules are directed by ER through a novel protein Vera (VgLE binding and ER association). Thus, ER has a role in organogenesis.[13]

For *Apara Oja*, *Ojovahi dhamanya* can be possibly correlated with the cisterns and membranes (MAMs) of ER as it refers the network and channels present in all eukaryotic cells through which the ER functions.

Physiological functions

Kritsna dhatu Sneha

Oja has been quoted as *Kritsna dhatu Sneha.*[14] On closely reading between the lines, we can correlate this with the lipid biogenesis function of ER. [15] Unctuous component of all *dhatus* can thus be probably the de novo (new) lipid component synthesis and inter MAM transport which is a prime function of ER. Lipids, especially phospholipid bilayer is important for MAM integrity and also aids in absorption of certain components. Here, we see that, "*Prakrit Shleshma*0" synonym also suits for functional action of ER as the *Shleshma* deals with maintaining stability at cellular level.

Pranayatanam-Agnishomiya

Sushruta [16] has termed *Oja* to be *Pranayatana* [17] and the purest form derived from *Shukra dhatu* which is further referred as *Teja* and then *Bala*, the innate immunity. *Dalhana* (commentator of *Sushruta Samhita*) [18] is of the opinion that *Pranayatana* is an entity which possess *Agni* as well as *Soma*[19] In case of varied functions of ER, we see it depicts both stability and synthetic functions. A scientific reference suggests that the mitochondria-associated ER MAM is a specialized sub-domain of the ER MAM that regulates ER-mitochondria communications. The importance of inter-organelle communication in the innate immune response to virus infection and in the pathophysiology of neurodegenerative/neurodevelopmental disorders is coming up. [20] Thus, the role of ER in immunity satisfies even the complex dual *Agni-Soma* nature of *Oja*.

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Bala

Sthiraupachitmamsata (well-developed muscle tissue and mass as well as the upachita sharira) is one of the functions of *Bala* as per *Sushruta.*[21] ER; both smooth and rough are important in case of protein synthesis, carbohydrate and lipid metabolism, exchange of ions, and detoxification. These processes are needed to maintain the overall equilibrium. Among the smooth ER, a modified part of it named SR present in skeletal muscle has a role in coupling of excitation and contraction, [22] which helps in proper muscle contraction. The SR of heart differs structurally from skeletal muscle.

Dysfunction

Causal similarity

Oja dushti : *Ojo dushti* is quoted in *Sushruta Samhita*[24]to be caused due to *Abhighat* (infliction of injury), *Kshaya, Kopa, Shoka,* etc.

Effect of *Ojo dushti* (*Oja dysfunction*)

The effect of *Ojo dushti* has been described by *Sushruta* in three stages [26] among which last is fatal. In the first stage (i.e., *Visramsa*), he has stated symptoms such as *Sandhivishlesha, Gatrasadana, Dosha chyavana, kriyasannirodha,* etc., In the second stage (*Vyapanna*), symptoms such as immobility in the body, *Vatashopha* (acute inflammation), discolouration of skin, lassitude, *tandra, nidra* while in the third stage (i.e., *Kshaya*) symptoms such as fainting, muscle wasting, stupefaction, delirium, and death.

Stages of ER stress response

Under ER stress conditions, unfolded proteins accumulate in the ER, and this eventually induces the perturbation of cellular activities. The fate of the cell is either survival or apoptosis in ER stress conditions. These results in accumulation of misfielded proteins in the cell triggering the self-protective mechanism in the cell itself named unfolded protein response (UPR).[27]

DISEASES DUE TO *OJA* DYSFUNCTION

Diabetes

Acharya Charak.29eing Apara Oja Kshaya has reported Oja Kshaya that is, (Apara Oja) in Prameha; it renders the disease to be nonfatal. In contemporary medicine, we get evidences where diabetes is caused due to ER stress. This is the major area where research is being focused. Accumulating evidence suggests that ER stress plays a role in the pathogenesis of diabetes, contributing to pancreatic β-cell death, and insulin resistance.[30]

Viability issue of fetus in 8 th month

During the 8 months of pregnancy, *Ayurveda* states that the fetus in case, if delivered, is not viable as the *Oja* is not stable. [31] In the modern medicine, the viability issue is said to be due to respiratory distress because of fetal lung immaturity.[32]The production of surfactant starts around 28-30 weeks (in ER), when lung is immature and hence, birth of infants in this period leads to infant respiratory distress syndrome.

Again evidences show that the ER has a central role in the production of surfactant proteins which are responsible for maintaining surface tension in lung and preventing lung collapse. Any sort of mutation in the ER function leads to ER stress leading to UPR thereby hampering surfactant mechanism and fetal distress is set in due to immaturity of fetal lung.[33] In *Ayurveda*, antenatal care [34] includes *Ojaskar dravyas* such as ghee, milk, butter which may have a role to facilitate ER function and prevent ER stress because all these possess natural lipid and steroidal source which are major in formation of the thin film during maintenance of surface tension. Besides this, glucocorticoids are often started in 7 th month if fetal lung immaturity is observed.

Cancer

In case of cancer, many physicians of *Ayurveda* consider *Oja Kshaya* and hence, switch the treatment to enhance *Oja* by prescribing *Rasayana* drugs. Herein, we find the role of chronic ER stress in inducing carcinogenesis. The reports on usage of medicinal plants suggest that these plants develop ER stress in cancerous cells but not in normal cells. Thus, their action seems to be target-

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specific. We can say that in treating cancer, *Oja Kshaya* is caused in cancer cells by creating ER stress in them thereby protecting the *Oja* function of normal cells.

A good illustration is of curcumin induced apoptosis in cancer cells.[35]

Cardiovascular diseases

In case of SR stress, it disrupts the calcium function thereby leading to abnormal contraction and signaling in myocytes which is the root cause of cardiac dysfunction. **[36]** Pressure overload is thought to activate ER stress-mediated apoptosis in the mouse myocardium and ER stress was shown to contribute to ischemia-induced apoptosis in cultured cardiac myocytes. In cardiac myocytes, the ER MAM network is potentially more expansive than many other cell types, due to the role played by the SR in contractile calcium handling. The potential overlap in function between the SR and the ER in terms of protein synthesis and folding, as well as ER stress and mTOR signal transduction, suggests that the SR and ER MAM system is a macro-organelle that plays critical roles in cardiac myocyte contraction, growth, and metabolism, all of which are dominant contributors to myocardial function.[37] Thus, in *Oja Kshaya*, we can say that the *Bala Kshaya* and *Maranam* correspond to the cellular apoptosis and this can be fatal in case of heart.

Other diseases

ER stress roles are also reported in production of many neurodegenerative disorders such as Alzheimers, Parkinson's disease, etc.; also in atherosclerosis, hypertension, obesity, and many more chronic disorders.

DISCUSSION:

Oja and ER possess functional similarity. ER stress can be used as a pathological marker for *Ojo dushti*. The *Vayasthapana*[38]drugs are thus concerned with the correction of early aging of cells due to environmental stressors and can be used as *Ojaskar dravyas* in the management of *Oja* dysfunction.

For further scope, the various *Rasayana* drugs, *Jivaniya,* and *Vayasthapana* category drugs can be screened to assess their function in the alleviation of ER stress thereby proving the *Ojaskara* activity. The enzymes used to assess endoplasmic reticular stress can be used for further assessing *Ojo* dysfunction

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