



APPLICATION OF PHYSICS IN NOTION OF AVARANA

Ayurveda

Dr. Parvathy
SreekumarAssistant Professor, Dept. of Roga Nidana, Parul Institute of Ayurveda and Research,
Vadodara, Gujarat.

ABSTRACT

Accepting the principals of *Ayurveda* in terms of Physics, a form of science available to the mankind will help us to acquire an evident depiction of what exactly *Acharyas* wanted us to understand in the process of *Roga Utpatti* and *Chikitsa*. Every particle in this universe is in a state of continuous motion. Rudiments of electromagnetism are responsible for the chemical transformation of fundamental particles. *Avarana* in ayurveda is *Gati* (abnormal movement) of *Vata* due to obstruction by other factors in the body (*Dosha*, *Dhatu*, *Mala*). *Avarana* is one among the distinctive concept of pathogenesis pertaining to *Vata Dosha* in turn leading to diseases. The interrupted *Gati* of *Vatadosha* can be equated and analyzed to disequilibrium of Starling force (through with fluids moves in and out of capillaries), normal laminar flow of blood becomes turbulent flow of blood as it badges any obstruction. There are four primary forces that determines in and out movements of solute and solvents among blood vessel and interstitial space- (1) Capillary pressure (P_c), (2) Interstitial fluid pressure (P_i), (3) Capillary plasma colloid pressure (P_p), (4) Interstitial fluid colloid osmotic pressure (P_o) being compared to *Avarana* that hampers normal blood flow and ends up in pathology. Thus *Avarana* can be well understood by the *Gati Siddhanta* (both *Prakrita* and *Vaikrita*) nothing but motion, there comes the relevance of understanding physics in terms of kinematics and quantum spins. Correlation through modern sciences helps in revalidation of our science globally.

KEYWORDS

Physics, *Avarana*, *Vata*, Starling force, turbulent flow of blood.

INTRODUCTION

Physics has been very influential in field of development of biology and medicine. It has been contributed tremendously in areas of medical diagnostics and therapeutics in form of MRI (Magnetic Resonance Imaging), CT (Computed Tomography), USG (Ultra Sonography), Radiotherapy, etc. From X-ray to laser, application of physics has been successfully translated into medical technologies, these contributions are well treasured and accepted. Reductionist model is hierarchical, with atom is the lowest level forming the basic building block. Atoms make molecules, that in turn forms cells and tissues. A group of tissues working together form an organ and group of organs referred as organ system perform a major function. Pathologies understood and treated at the lowest level of structural hierarchy will be more efficient. Methodological reductionism; medicine from diagnosis to therapeutics is considered to be ideal.

Individuals composed of three bodies:

- 1) *Sthoola Shareera* – gross physical body
- 2) *Sookshma Shareera* – subtle energy body
- 3) *Karana Shareera* – causal body

Doshas are the fundamental and irreducible metabolic principles that administers functioning of body. These *Doshas* are the connections between the human body and the universe on material level. Physics has matter, temperature, energy and mass whereas *Ayurveda* has *Tridosha*, *Panchamahaboota* its *Guna* and *Karma*.

Qualities Of Tridoshas Equated To Elements:

VATA AIR	PITA LIQUID	KAPHA SOLID
<i>Laghu</i> , <i>Ruksha</i> , <i>Chala</i> , <i>Sookshma</i> , <i>Seeta</i> freely moving particles (<i>Laghu</i>), highly unstable (<i>Chala</i>)	<i>Snigdha</i> , <i>Teekshna</i> , <i>Sara</i> , <i>Drava</i> , <i>Ushna</i> unstable (<i>Sara</i>), loosely packed (<i>Laghu</i>)	<i>Guru</i> , <i>Sthira</i> , <i>Snigdha</i> definite mass, volume and shape

AVARANA

The word *Avarana* means *Avarodha* or *Gati Nirodha*, as explained in *Ayurvedeeya Shabda Kosha*, which means obstruction to the movement. Pathology of *Avarana Utpatti* *Avarana* manifests as a result of obstruction or entrapment done by a strong and vitiated *Dosha* to a weak *Dosha*. *Avaraka* and *Avruta* there are two important factors in *Avarana*. That which cause occlusion or hindrance is called as *Avaraka* and that which is getting occluded or hindered is known as *Avruta*. The *Avaraka* should be known as that having *Karma Vrudhi* (increased function), and *Avruta* should be identified with its *Karmahani* (reduced functions)^[1]. But the *Karmakshaya* of *Avruta* is temporary and in due course of time it turns into *Karma Vridhi*. Also the entire pathology occurs inside the *Srotas* (channels). *Avaraka* can be of two types; those which are having a particular structure as like *Pitta*, *Kapha*, *Ama*,

Mutra, *Pureesha* etc. (*Murtha Avarana* or *Anyavarana*) Also each subtype of *Vata*, that is having different *Gati* or movement in different direction, ends up in *Avarana*, which constitutes the *Anyonyavarana* (mutual) or *Amurtha Avarana*. This is happening as winds move in a tornado, where the wind from different directions collide each other and moves uncontrollably^[2].

Chakrapanidatta explains that in *Avarana*, the vitiation of *Vata* is the result of the obstruction to spontaneous stimulation for movement^[3]. *Avarana* can also be considered as *Sanga*, as an obstruction, *Samsarga*, the combination of two *Doshas*, and *Vimargagamana* the process of altering the direction of flow. The factor, which obstructs the pathway of *Vata*, is called as '*Avaraka*' and the *Dosha* (*Vata* in general or its components) that is entrapped by *Avaraka* is called as *Avritha*. While naming *Avarana*, the name of the *Avaraka* is used as prefix and the name of *Avritha* is used as suffix.

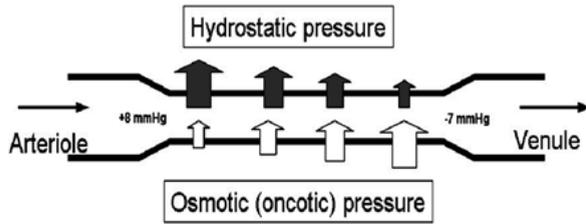
Comparison Of Various Pathologies Of Vata Dosha^[4]

	<i>Avarana</i>	<i>Gata Vata</i>	<i>Vataja Nanatmaja Roga</i>	<i>Ashayapak arsha</i>
<i>Nidana</i>	<i>Nidana</i> favours <i>Avaraka</i> , <i>Murtha</i> or <i>Amurtha</i>	<i>Vataja Nidana</i>	<i>Vataja Nidana</i>	<i>Vataja Nidana</i>
<i>Prakupita Dosha</i>	<i>Avaraka</i> <i>Murtha</i> or <i>Amurtha</i>)	<i>Vata</i>	<i>Vata</i>	<i>Vata</i>
Status of <i>Vata</i>	<i>Kshaya</i> of <i>Avruta Vata</i>	<i>Prakopa</i> of <i>Vata</i>	<i>Prakopa</i> of <i>Vata</i>	<i>Prakopa</i> of <i>Vata</i>
Status of <i>Dosha</i>	<i>Karma Vrudhi</i> of <i>Avaraka</i> and <i>Karma Kshaya</i> of <i>Avruta</i>	<i>Kshaya</i> of <i>Sihanastha Dosha</i> , <i>Dhatu</i> or <i>Mala</i>		One <i>Dosha</i> is in <i>Prakrutha Avastha</i> , another one is in <i>Kshaya</i>

Starling Force

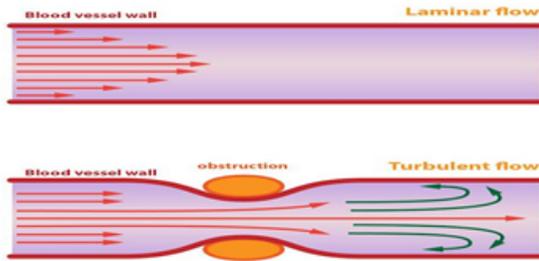
Starling force, theory proposed by E H Starling, states that there are four primary forces that determines in and out movements of solute and solvents among blood vessel and interstitial space- (1) Capillary pressure (P_c) by which tends to force fluids outwards through the capillary membrane. (2) Interstitial fluid pressure (P_i) which tends to force fluid inwards through the capillary membrane when P_i is positive and outward if P_i is negative. (3) Capillary plasma colloid pressure (P_p) which tends to cause osmosis of fluid inward through the capillary membrane. (4) Interstitial fluid colloid osmotic pressure (P_o) which tends to cause osmosis of fluid outward through the capillary^[5] membrane being compared to *Avarana* that hampers normal blood flow and ends up in pathology. Any pressure differences

lead to extravasation of fluids and ends up in edema. This phenomenon can be equated to *Avarana* as there exists an abnormal flow of fluids.



Turbulent Flow Of Blood

Blood flows in streamlines in a vessel, if there is a steady rate, with each layer of blood remains the same distance from the vessel wall. This type of flow is known as laminar flow. Opposite to this is a turbulent flow, where the blood flows in all directions and continually mixing within the blood vessel. The turbulent flow is due to the following reasons as: rate of blood of is high, when it passes any obstruction (eg: atherosclerotic plaque), when it makes a sharp turn or when it passes through a rough surface^[6]. This turbulent flow can be equated to *Avarana*, as the normal streamline flow is interrupted, i.e, *Gati* is hampered. Also viscosity of blood is directly proportional to resistance and inversely proportional to flow; thus any conditions that cause viscosity to increase resistance and decrease flow of blood. This can be equated with *Avarana* due to *Ama*. The heaviness of *Ama*, slows down the *Vata*, that means *Gati* will be affected. So, in *Avarana*, *Vata* will be prevented from doing its *Prakrutha Karma* of *Vikshepana* etc there by ends in *Dhatu Shoshana*. The manifestation of these diseases again based on the *Sthana* of *Avarana*. It accentuates that, *Avarana* can happen anywhere in the body, which has to be understood by the non-functionality of the *Vata Dosha* pertaining to that area.



Sludged Blood

The term "sludge" first was applied to the phenomenon of intravascular erythrocyte agglutination by Knisely. Sludge is the cause of toxicity following burns; anemia following infections, burns, trauma and malaria; necrosis of the liver following burns; postoperative pulmonary embolism; senile dementia; post-infectious psychosis; coma; arteriosclerosis; the aging process itself; and several other phenomena.^{[7],[8]}

In the context of progressive shock, one of the underlying mechanisms explained is sludged blood, the mechanism where a block occurs in many small blood vessels leading the shock to progress. As the tissue mechanism continues despite the decreased flow, there accumulates large amounts of carbonic acid and lactic acid, which further increase the acidity of the blood. The reduced blood flow also causes ischemic changes in the affected tissues. The acid and the ischemic tissues causes local blood agglutination, that further results in minute blood clots, leading to very small plugs in the small vessels. Even though the vessels do not plug, there will be an increased tendency for the blood cells to stick to one another making the blood flow more difficult through the microvasculature, finally ends up in sludged blood^[9]. This can be compared to *Avarana* as there occurs the hindering of the normal flow.

DISCUSSION

For every *Dosha*, *Vridhi* and *Kshaya* are the main pathological state. Similarly, in the case of *Vata Dosha*, *Vata vridhi* happens due to *Dhatu kshaya* and *Vata Kshaya* happens in *Avarana*. *Vataroga* manifest based on the *Hethu* and *Sthana*^[10]. *Avarana* can be well understood by the *Gati Siddhanta* (both *Prakrita* and *Vaikrita*) nothing but motion, there comes the relevance of understanding physics in terms of to disequilibrium of Starling force (through with fluids moves in and out of capillaries), normal laminar flow of blood becomes

turbulent flow of blood as it badges any obstruction. Every particle in this universe is in a state of continuous motion. Rudiments of electromagnetism are responsible for the chemical transformation of fundamental particles.

CONCLUSION

Avarana is a clinical condition where the dynamic equilibrium of *Vata* is lost, either due to the impact of other doshas or due to untoward movement of any type of *Vata*. The *Avarana* is least observed diagnosed or goes unidentified due to lack of skills. To understand and analyze *Avarana* meticulous knowledge of *Ayurveda* is essential. If we can trace out the exact *Avruta* dosha and the *Avaraka* factor, it becomes easier to treat the case and the results become more encouraging.

Correlation helps in clear diagnosis and clinical understanding of *Avarana* becomes much clearer and when diagnosed and treated accordingly, it will be a successful one. Birds-eye view of two streams-currently prevalent classical physics based reductionist western understanding and the science based holistic ayurveda. *Ayurveda* as a profound and effective system of healthcare that can be utilized globally.

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