



## Review Article

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### ROLE OF QUANTUM BIOPHYSICS IN EXPLORATION OF FUNDAMENTAL PRINCIPLES OF RASAPANCHAKA IN DRAVYAGUNA: A REVIEW

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#### ABSTRACT

Over last decade, phyto-chemistry has taken a lead in exploration and understanding concepts of *Dravyaguna* including Pharmacokinetic and Pharmacodynamic activity of herbal drugs, finding its way in drug discovery and new drug development systems. But in spite of these advancements, science behind production of phytochemistry, which also runs rationale for exploration of fundamental principles of *Dravyaguna*, is the science of Quantum Biophysics. Hence, a conceptual study was done encompassing literature review from Ancient Ayurvedic texts and Quantum Biophysics and impact of the latter via study of Earth's electromagnetic signaling on plant growth followed by further exploration of concept of *Rasapanchaka* through the language of Quantum Biophysics. The effort of this study is to commemorate, the biophysical approach of electromagnetic signals towards plants which is rightly explicated in Ayurveda as *Praspanda* (Vibrations). Moreover, it helps one to attain knowledge of plant growth with a purview of biophysical phenomenon of Schumann Resonance and Plant Bioacoustics which has been very well documented in Ayurveda as *Lokasanchari Vayu* and attributes of *Vayu* as *Udvahan* respectively. In a nutshell, this study attempts to propose a hypothetical systematic elucidation of growth of plants right from germination till its complete development as explained in Classical texts of Ayurveda through the Bio-physical lens. This theory will have a pivotal role in understanding role of Quantum biophysics in plant growth same being documented in Ayurveda texts, thereby, expounding the concepts of *Rasapanchaka* in *Dravyaguna*, which in turn will be helpful in improving drug development systems and in providing better therapeutic effects.

**Keywords:** *Dravyaguna*, *Rasapanchaka*, Quantum Biophysics, Schumann Resonance, Plant Bioacoustics.

#### INTRODUCTION

Ayurveda is a science which deals with the treatment of *Shaddhatavatamak Purush* which consists of *Panchamahabhoot* (five basic elements and soul) and *Atma* (consciousness)<sup>1</sup>. It is still a matter of mystery as in how matter and consciousness interact with each other to give birth to life. In Quantum physics, these answers are to a certain extent given in the terminologies of energy, frequency and vibrations. When we go into the details of Theory of Vibrations, we come across to the state that entire universe is in a state of certain vibrations<sup>2</sup>. In Ayurveda, similar terminology to describe these vibrations is "*Praspanda*". *Praspanda* literally means that which is pulsating, and this is the attribute of *Vayu*<sup>3</sup>. So precisely, *Vayu* is the responsible entity for all the vibrations of the universe.

As we discuss about treatment options of *Shaddhatavatamak Purush*, in Ayurveda, herbs form the integral part of the treatment. As already aware, plants are *antashchetan* (non locomotory living beings with inner consciousness) and human beings are *bahirantashchetan* (locomotory living beings with inner consciousness), plants are rather incomplete human beings or in other words if we see the evolution of living beings, humans have borrowed consciousness from plants. As everything in this universe is formed out of *Panchamahabhoot*, so are plants and hence, in order to have effective treatment options via plants source, it is mandatory for us to have healthy species of plants.

In today's era, with recent advancements, treatment options via plant source are done by studying the phytochemistry of plants.

The leading compounds with the plants are fractionated via different analytical methods and are tested for their clinical efficacy through various research trials. Pharmacokinetics and pharmacodynamics of these compounds are studied via *in vitro*, *in vivo* studies and thereafter followed by clinical trials of drug research. These studies have enriched the area of *Dravyaguna vighyan* (branch of *Ayurveda* which deals with study of materia medica of medicinal plants used for health benefits along with study of its Fundamental principles of actions) with the enhanced knowledge of pharmacological activities of the herbs. Hence, along with all the allied sciences like Botany, Plant Anatomy, Plant Physiology, Plant Toxicology etc. drug research in view of its phytochemistry in order to study its pharmacological activities has found its own way in the studies of *Dravyaguna vighyan*. Moreover, studies of drug interactions have paved its way to study the synergistic as well as antagonistic activity with allopathic medicines for example, Piperine isolated from *Pippali* (*Piper longum*) acts as a Bio enhancer giving rise to increased drug bioavailability of Rifampicin given as anti-Koch's Treatment<sup>4</sup>. But while looking for the pros of the phytochemical analysis, we also come across the limitations of the study like as the established example of Reserpine isolated from *Sarpagandha* (*Rauwolfia serpentina*) causing extra pyramidal side effects when this fractionated compound is given alone<sup>5</sup>; on the contrary, no side effects are observed when *Sarpagandha* is given as an entire herb. Hence, it is known that despite advancement of sciences and incorporation of phytochemical studies in the subject of *Dravyagunavighyan*, Ayurveda believes in holistic approach of usage of herbs.

Furthermore, when we come across the details of reasons of production of various phytochemicals, plant prepares this chemistry within themselves only in response to environmental signals. In other words, it can be put forward that phytochemistry is the offshoot of the science of biophysics. So, in order to study the *dravya* (an entity encompassing the attributes of quality and action), right from its germination, production of phytochemicals and to its *karmukta* (action of drugs) through its *Rasapanchaka* (*Rasapanchaka* consists of *Rasa* meaning taste, *Guna* meaning attributes, *Vipaka* meaning bio-transformed taste, *Veerya* meaning its Potency, *Prabhava* meaning which is an exceptional activity or inconceivable potency), we need to peep into the basic science of Biophysics which forms the rationale behind the entire study. Therefore, this conceptual study is an attempt to provide a systematic elucidation of the importance of Biophysics in the study of subject of *Dravyaguna vinyan*.

#### Literature review

#### Concept of *Lokasanchari Vayu* (Geomagnetic Field - Schumann Resonance) on Plant Growth

The Geomagnetic field is the magnetic force field that surrounds the Earth. These are Earth based frequencies which protects the planet from solar flares. Every life on this earth is immersed throughout its lifetime in Earth's electro-magnetic field<sup>6</sup>. These global electromagnetic resonances are called as the Schumann resonances (SR) which are a set of spectrum peaks in the extremely low frequency (ELF) portion of the Earth's electromagnetic field spectrum<sup>7</sup>. Thus, plant kingdom cannot escape the effect of Geomagnetic effects upon them. Plants respond to this magnetic field which is well documented in various research papers<sup>8</sup>. These researches reveal the perception of plants to these signals and respond quickly to varying magnetic fields which alter their gene expression and phenotype. The magnetic field acts on the cryptochrome of the plants which is responsible for various aspects of growth and development<sup>9</sup>. Moreover, inflorescence is also governed by electromagnetic fields<sup>10</sup>. This science of Physics is well noted in Ayurveda contemporary text of Charak Samhita which states that *Lokasanchari Vayu* is responsible for *Beejaabhisanskar* (germination of seeds) and the same *Lokasancharivayu* is responsible for *Udbhedanamchaudbhidanam* (growth of the plant beyond the earth surface) and *Pusphafalanamchabhivartanam* (responsible for production of flowers and fruits)<sup>11</sup>. With these explorations of concepts, it can be documented that the *Lokasanchari Vayu* is nothing but the Geomagnetic Field or the Schumann Resonance which governs the germination, growth and development of the plants.

#### Concept of *Udvahan* and Plant Bioacoustics and Plant Perception

Plant Consciousness was first noted by the great Biophysicist Sir J. C. Bose who documented his various experiments about Plants. The action of microwaves in plant tissues and the equivalent changes in plant cell membrane potential were first documented by him<sup>12</sup>. He also has documented of plant responding to sound waves which is also demonstrated by series of experiments carried out thereafter after His discovery. The terminology of Plant Bioacoustics deals with variance in germination and growth rates and behavioral modifications of Plants in response to sound. The theory proposed in Plant Bioacoustics states that environmental signals cause mechanical vibrations within the cells due to charged membranes. The overall nanomechanical oscillations of cytoskeletal components within the plant cells; which probably generates both low and high frequency vibrations<sup>13</sup>. These concepts of perception that is *Udvahan*

(perception and transmission of signals) is again the attribute of *Vayu* as referred in classical texts<sup>14</sup>.

#### Concept of *Sharigata Vayu* (Vibrations in Human Body)

Latest discovery of Quantum Vibrations states that there is presence of "microtubules" inside the brain neurons and it is these vibrations within the microtubules which are recorded by EEG<sup>15</sup>. This instance just illustrates that matter is just a projection of these vibrations. In Ayurveda, the concept of vibrations within human body is well acquainted with the concept of *Vata dosha / Sharigata Vayu* (principle described in *Ayurveda* which controls movements within the body) as it is the only *Dosha* which possesses the ability to move "*Gati*"<sup>16</sup>. Moreover, it is also known to be responsible for all "*cheshta*" (actions) as it possesses the attribute of producing vibrations within the body in combination of other substances<sup>17</sup>. Hence, also rightly attributed as *Pravartakchestanaamuchvachananam* (the one who is responsible for causing of all action), *Niyanta praneta ch manasa* (the one who controls mind), *Sarvindriyanamudujoka*, *Sarvaidriyarthanaamabhivodha* (the one responsible for perception of all sensory actions to the brain)<sup>18</sup>.

#### Concept of Vibrations in *Dravya*

Ayurveda recognizes *Dravyakarmukta* (pharmacological action of Drugs) through *Rasapanchaka*. The basis of *Rasapanchaka* in terms of Vibrations can be understood by the instance of *Katuveera* (*Capsicum annum*) which produces various effects on the body and mouth with its ingestion of as *Katu Rasa* vibrations are perceived via tongue. Moreover, the *ushna* (hot) and *tikshna* (penetrating) *gunas* of *Katuveera* are also perceived despite *dravya* only being in contact with the tongue. Moreover, the *Ushnaveerya* of this *dravya* is also perceived via the *gunas*. These vibrations arising post digestion effect of *Katuveera* (*pachan*) is perceived via its *Vipaka*. In a nutshell, if we look deeply into *Rasa*, *Veerya*, *Vipaka* entire concept revolves around *Agnimahabhoot* (in this example of *Katuveera*) and on its attributes that is the *Gunas* of the *Mahabhoot*. The *gunas* (attributes) of all *dravyas* (matter) with their specific composition of that *Mahabhoot* (Basic five elements – Earth, Water, Fire, Air, Ether) as per the law of *Vyapdeshastu Bhuyasa* (predominance of one element in amalgamation with other elements)<sup>19</sup> have the potency of generating the respective vibrations which are present in the *dravya* and the same action in generated in the human body on ingestion. The concept of *Prabhav* again can be understood by the production of specific vibrations from the *Dravya* and within the human body and accordingly, the therapeutic action of the *Dravya* is seen as for illustration, *Virechan* activity of *Chetaki Haritaki* even by standing below the tree<sup>20</sup>. All these vibrations within the *Dravya* exert their actions through *Rasapanchaka* which are nothing, but vibrations and same signals of vibrations are again perceived through *Vata Dosha* as it is known as *Prasapanda*. After citing of examples and understanding the concepts of *Rasapanchaka*, concisely, it can be stated that *Rasa*, *Veerya*, *Vipaka* and *Prabhav* are all *Gunas* lying within the *Dravya*.

#### DISCUSSION

The phytochemistry developed as secondary metabolite in plants is in response to environmental signals which the plants receive. But the effort of this study is to commemorate, the Biophysical approach of electromagnetic signals towards plants, phytochemistry only being the offshoot, which is rightly explicated in Ayurveda. Right from Germination of seeds, till plant growth and development including the inflorescence, Geomagnetic field or the Schumann Resonance is responsible

which is narrated as *Lokagata Vayu* in development of *Rasapanchaka* of *dravya*. Moreover, it helps attain knowledge of plant growth with a purview of Biophysical phenomenon of Schumann Resonance and Plant Bioacoustics including the production of phytochemicals in response to environmental signals. The science of Plant Bioacoustics helps us to understand the *udvahan* that is perception of signals via sound emissions by the plant cells is also an attribute of *Vayu*; Moreover, the concept of all the *Dravyas* in the universe being *Panchbhautik* in nature, the vibrations of the specific *Mahabhoot. Rasa, Veerya, Vipaka* and *Prabhav* are all *Gunas* (attributes) lying within the *Dravya*. Material things are modifications of *Panchmahabhuta* (5 basic elements) and the aspects perceived are the *Gunas*. Accordingly, as all *dravya* are *Panchbhautik*, *Vayu Mahabhuta* is attributed with *Chalatva* and *Praspanda* (vibrations), which are *Praspanda* within the *dravya*. This attribute of *Praspanda* of *Vayu* is in the environment as *Lokasanchari Vayu* and in human body perceived as *Sharigata Vayu (Vata Dosh)*. This *Lokasanchari Vayu* {Earth's Geomagnetic Vibrations (SR)} acts on the plants thereby regulating their growth and preparation of phytochemistry due to *Udvahan* (Plant Bioacoustics). These same vibrations are perceived by human body which is the attribute of *Sharigata Vayu* which is rightly narrated as *Pravartakchestanam* (the one who performs all actions of Body), *Sarveindriyanam Udyojakaha* (the one who carries sensory signals), *Sarveindriyanamabhivodha* (the one who perceives afferent stimulation). Microtubules Vibrations in the Neurons, throbbing of Heart, Pineal Gland and its Photo neuroendocrine activity are just examples of this attributes of *Sharigatavayu*.

The *lokasanchari Vayu* and *Sharigata Vayu* works with principles of Quantum Entanglement of Particles. With the lens of Quantum Physics, it is stated that entangled particles remain connected so that actions performed on one affect the other, even when separated by great distances which was referred as "Spooky action at a distance" by the Physicist Albert Einstein<sup>21</sup>. This theory explains the mode of action of *Prabhav* of *Dravyas*. Whereas, when we come to narration of *Rasa, Veerya, Vipaka* and *Gunas* of the *Dravya* the particles are initially un-entangled before encounters the body. The energy transfer or the perception of vibrations can happen in between two un-entangled particles only if there exist a causal relationship (*SamvayiSambandh*) in between the two particles<sup>22</sup>. *Rasa, Veerya* and *Vipaka* work via the attributes of the *Gunas*, as the latter are being the source of generating vibrations. As *Dravya* and human body are both composed of *Panchmahabhoot*, there exists a causal relationship between them and with the principle of *Vyapadeshasthubhuyasa* of *Panchmahabhuta* it is best understood that entanglement of particles occur followed by perception and transfer of the attributes or energy patterns (*Gunas* which includes *Rasa, Veerya* and *Vipaka*), and thus, through Virtual Photons the pharmacological actions of the *Dravya* to human body that is *Dravyakarmukta* is exhibited.

## CONCLUSION

In a nutshell, this study attempts to propose a hypothetical systematic elucidation of growth of plants right from germination till its complete development as explained in *Charak Samhita* through the Bio-physical lens. The concepts of Quantum Physics and entanglement of particles helps us to understand the mechanism of *Prabhav*. The concepts of vibrations and actions of *Dravya* with *Rasa, Veerya, Vipaka* owing to the attributes of the *Gunas* can be explained via the existence of casual relationship of un-entangled particles of the Quantum Physics. Right from Geomagnetic force / Schumann Resonance, Plant Bioacoustics and the Laws of Quantum Physics which is rightly attributed to *Lokasanchari Vayu* and *Sharigata Vayu* and hence, the

importance of *Praspanda* (Theory of Vibrations) narrated in Ayurveda can be precisely understood. Thus, understanding the role of Quantum Biophysics have a pivotal role thereby, expounding the concepts of *Dravyaguna*, which in turn will be helpful in improving drug development systems and in providing better therapeutic effects.

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