EXPLORING THE SCIENCE OF *AUM* CHANTING THROUGH AYURVEDA, PHILOSOPHY OF UPANISHADS AND QUANTUM PHYSICS: A METICULOUS REVIEW

Pradnya Dundappa Chaugule¹, Shraddha Umesh Nayak², Rajkumar Gupta³,

 ¹Ph.D. (Scholar) Associate Professor, Department of Dravyaguna School of Ayurveda, D Y Patil deemed to be University, Nerul, Navi Mumbai, India.
 ²Associate Professor, Department of Dravyaguna School of Ayurveda, D Y Patil deemed to be University, Nerul, Navi Mumbai, India.
 ³Professor, Department of Dravyaguna, Ram Krishna College of Ayurveda and Medical Sciences, Bhopal, India.

Corresponding author:

Pradnya Dundappa Chaugule Email - pradnya.chaugule@dypatil.edu

Abstract:

Ayurveda is a holistic science which encompasses treatment protocols, categorized as Daivyapashraya chikitsa (spiritual or energy medicine), Yuktivyapashraya chikitsa (dynamization of drugs or logic based treatment) and Satvavajay chikitsa (counseling). Out of these three, as per the commentary of Ayurved Dipika, classical text of Ayurveda, Daivyapashraya chikitsa includes use of yantra (cymatic geometry), aushadhi (medicines) and *mani* (gems) after exposing and imparting them with certain vibration energy of a particular resonance through chanting of Mantra and other techniques. Further exploration about Mantra primes us to AUM which is the primordial sound of the Universe. The aim of this study was, to bring into light, the science of quantum physics behind AUM Chanting through the discussion of Schumann Resonance, its effects on the body and the concept of energy, frequency and vibrations mentioned as LokagataVayu (Earth's Geomagnetic field) and *Sharirgata Vayu* (neuronal impulses in human body) via Praspanda (vibratory impulses) respectively in Ayurveda. Furthermore, this conceptual study will also embark to perceive the importance and role of AUM chanting as mentioned in Upanishads, as a healing tool through the wisdom of Ayurveda and Quantum Physics. Sacred texts of Hindu Philosophy of Upanishads, ancient Ayurveda texts and Quantum Physics were reviewed to explore the science of AUM chanting as a means of energy healing. Various databases like PubMed, Scopus, Web of Science, Cochrane Library, DHARA were searched. After reviewing various literatures, this article reveals the mode of action of AUM chanting as majesty of energy healing of Daivyapashraya chikitsa mentioned in Ayurveda.

Keywords: AUM, Ayurveda, Upanishad, Mantra, Schumann Resonance.

Introduction:

Religion deals with the truths of the metaphysical world [1] and hence, scientific lens to view the religious concepts forms the key for human well being. The demographic study which incorporated analysis of more than 2,500 censuses, surveys and population registers of the world in 2010 states that 2.2 billion Christians (32% of the world's population), 1.6 billion Muslims (23%), 1 billion Hindus (15%), nearly 500 million Buddhists (7%) and 14 million Jews (0.2%) [2]. Out these religions, it is important to note that, major religions advocate the word Aum / Om which is the primordial sound as per Hindu Texts. This "AUM" is the same word "Hum" of the Tibetans, "Amin" of Muslims and "Amen" of Egyptians, Greeks, Romans, Jews and Christians. This primal sound of AUM has significance both culturally in religions in view of spirituality but also in science. The traditional science of healing in India, Ayurveda, is a holistic system of medicine, which not only deals with physical and mental well-being but also incorporates spiritual well-being [3]. Ayurveda identifies two types of treatment protocol viz., treatment pertaining to body (Sharir chikitsa sutra) and treatment pertaining to mind (Manas chikitsa sutra)[4]. While discussing about the pathology of disease, it has been documented in Ayurveda that root cause of most diseases is vitiation of digestive fire (Agnimandya)[5] which ultimately leads to vitiation of tissues first documented as vitiation of channels of Lymph within the body (Rasavaha srotas). Also, while documenting about the vitiation of Lymph channels, it has been mentioned that other cause which leads to its vitiation is excessive mental thoughts or continued thinking leading to depression[6] thereby, altering the appetite, either by increased appetite with increased activity in the putative mesocortico limbic reward pathway, or a decrease in appetite which is linked to a hypoactivation of the insular areas responsible for monitoring the body's physiological status[7]. So, the role of body and mind going hand in hand has been very much illustrated in Ayurveda which is being termed as Psychosomatic in Modern Medicine. Classical Ayurveda text, Charaka Samhita, illustrates treatment protocols under three categories. Daivyapashrayachikitsa, Yuktivyapashraya chikitsa and Satvavajayachikitsa. Out of these three, yuktivyapashrayais the dynamization of drugs used as medications prescribed in Ayurveda texts, Satvavajayachiktsais the treatment done by psychotherapy and counseling by which the mind is made to restrain itself from wrong pre-occupations [8] treatment modalities are extensively used in current Ayurveda practice; but the role of Daivyapashraya chikitsa still requires further exploration. Mantra chikitsa i.e. treatment through chanting of auspicious hymns is a type of daivavyapashraya chikitsa where treatment of diseases is done by incantation of appropriate mantra under specified condition. The majesty of healing of Daivyapashraya chikitsa, in turn, can be elucidated as role of energy medicine in human wellbeing; which is the interaction of energy or information with a biological system to restore the organism's homeostasis. This treatment modality deals with acoustic energy which can be altered to electromagnetic or vice versa, which is called as piezoelectricity [9]. Piezoelectric phenomenon is demonstrated by tissues of human body, therefore, whichever input given to body is altered to acoustic which in turn can be altered to electromagnetic energy [10]. Moreover, apart from acoustic energy, the global effects of Earth's geomagnetic field on human health can be explained via the 'biophysical mechanism '[11].

Hence, holistic thinking of treatment modality is incomplete without addressing the patient's sufferings through all the mentioned facets. Therefore, in order to explore this

science of healing of *Daivyapashraya*, energy medicine, mentioned in Ayurveda via acoustic energy and effect of low frequency electromagnetic fields on human health can be achieved by chanting of *AUM*. The study incorporates literary aspects of *Mantra*, review on *AUM* from Upanishads, discussion of relevant concepts of Ayurveda classical texts and comprehensive analysis *AUM* chanting through the lens of Quantum physics. This article shall bring into light the science of quantum physics behind *AUM* Chanting through the discussion of Schumann Resonance, its effects on the body and the concept of *Praspanda* in Ayurveda expounded in terms of energy, frequency and vibrations. Moreover, this conceptual study will also help to perceive the importance of *Daivyapashraya chikitsa* (science of energy medicine) as mentioned in Ayurveda.

Methodology:

Literature review from various databases like PubMed, Scopus, Web of Science, Cochrane Library, DHARA were searched. Upanishads were taken into consideration to understand the concepts of *AUM* as Mantra, its exploration as a healing tool through Ayurveda contemporary texts and its mode of action has been elucidated via Quantum healing from books and websites have been documented precisely.

Mantra and Primordial Sound – AUM

Mantra is made up of syllables based on the physics of sound, vibrations and resonance. Mantra, sacred chant of words, is the potencies of sound and or *vacha*, the human voice, which helps one to attain spiritual union with the divine or ultimate reality also called as Brahman. Through focused repetition of root word sounds with spiritually uplifting vibratory potency, one can experience divine contact [12,13]. The literal translation of Sanskrit mantra is 'instrument of thought'. It signifies 'the ideal, inaudible sounds which represent one aspect of creation; when vocalized as syllables, a mantra constitutes a universal terminology'. Ayurved Dipika, classical text of Ayurveda, throws light on Daivyapashrayachiktsa, and elaborates as the tool of Mantra to be used in chikitsa (treatment protocols) [14]. There are different mantras chanted for varied purposes. Out of numerous Mantras, AUM is the seed Mantra, the literature pertaining to the same is extensively found in *Upanishads*, which are recent elements of Vedas, conversing varied topics of Hindu Philosophy and methodologies to attain communion with Pure Consciousness. Paramhansa Yogananda defines the mantra AUM, as the three manifestations or gunas of creation, sustenance, and annihilation which are part of the vibration created by humming acoustic energy of AUM that resonates throughout the universe[15]. Complete works of Swami Vivekanada, states that the Om represents Akhand Brahman, the undifferentiated / undivided reality, and AUM represents Khanda Brahma, the differentiated reality which is the diverse perspectives of realizing the ultimate reality. AUM in combination is pronounced as Om, and both ways are beneficial for practicing divine meditation and learning the truth[16].

ChandogyaUpanishad

Chandogya Upanishad is the foremost Upanishad of *Samaveda*, which surmises the Hindu philosophy in the eight chapters known as *Prapathakas*. In the first *prapathaka*, syllable *AUM* is particularly discussed as '*AUM*', which states that *AUM* is the closest syllable to the ultimate reality, Brahman. It has been advised to recite *AUM*, if one is willing to achieve Brahman (Pure Consciousness), thereby, explaining the magnificence of the syllable *AUM*. Further, it has been mentioned that Mantras can be chanted via *vaikhari*, loud speech from mouth or can be silently chanted within the mind. Chandogya Upanishad mentions that, the chanting of *AUM* should be loud enough with intense faith of worshipping the Brahman (ultimate reality). Such method of chanting is called as *udgītha*, which is said to purify the mind [17,18]. It should be noted that *udgītha* method of chanting deals with size of the vibration, which in turn, proposes the amplitude of the vibration carrying the energy. Thus, a big vibration certainly carries lot of energy within it.

Katha Upanishad

Katha Upanishad is the important Upanishad of Krushna Yajurveda which narrates the conversations in the form of Question and answers between small boy Nachiketa, son of Sage Vajasravasa and Lord Yama, God of Death; While unfolding the goals of life, Lord Yama praises the syllable Om as the ultimate purpose of life. Om is described as the *pratik* (symbol) of our goal, to achieve final liberation along with austerities of practicing *Brahmacharya*(abstinence/ control over senses and mind by Atman - soul) and other spiritual practices[19]. Katha Upanishad hence, advocated the pronunciation of the primordial sound as Om.

TaittiriyaUpanishad, Principal Upanishad of Krushna Yajurveda

Taittiriya Upanishad, principal Upanishad of Krushna Yajurveda, deals with entire Vedic education in the form of 3 main chapters called as *Valli* viz., 1. Siksha Valli—which deals with education on Invocation and pronunciations 2. Brahmananda Valli—dealing with knowledge of Atman and process of achievement of Bliss and 3. Bhrigu Valli which encompasses dialogues in between Varuna and His son Bhrigu on attainment of Brahman. As mentioned in chapter of *Shiksha Valli* of Taittiriya Upanishad (1:8), Taittiriy Upanishadstatesthat, *AUM* inscribes two ideas viz., to consider *AUM* as the symbol, letter and sound indicating Brahman and to consider *AUM* as Brahman itself for meditation. The idea is that *AUM* is everything, as Brahman is everything [20,21].

Mandukya Upanishad, Principal Upanishad of Atharvaveda

Mandukya Upanishad, chief Upanishad of Atharvaveda, is an Upanishad discussing *Advaita Vedanta* school of thought states that AUM is everything which is past, present and future termed as *AUMkar*; further, it also states, that which is beyond the time (*Trikala-atit*) is also, *AUMkar*. Further the *Mantra AUM*, has been expounded viz., the stages of *Vaisvanara*, *Taijasa*, *Prajna* and *Turiya* states of Consciousness [22].

Swami Yogananda, mentions in His commentary on Mandukya Upanishad that [23], The syllable A denoting Consciousness functioning in the Waking State, termed as *Vaisvanara*, syllable U denoting the Consciousness functioning in the Dream State, termed as *Taijasa* and syllable M denoting the Consciousness functioning in the Deep Sleep, termed as *Prajna*. On meditating upon the *AUM*, the aspirant passes into next state of Consciousness termed as *Turiya*, ever existent and all seeing. Mandukya Gaudapada Karika Upanishad states that, *AUM* should be comprehended quarter by quarter of *Vaisvanara*, *Taijasa*, *Prajna*i.e. though the Syllable A,U,M respectively[24]. Once a person understands the mantra *AUM* quarter by quarter, one should constantly dwell on these syllables and not think anything else [25].

Once a person constantly dwells on the sacred syllable AUM, he gets unified with AUM i.e. with Brahman and becomes fearless. Here, it implies that, the sacred chant of AUM improves mental strength. The primordial sound AUM is beginning, middle and end of everything. After the conception of AUM, the person immediately attains the Supreme Reality [26].

Prashna Upanishad, Principal Upanishad of Atharvaveda

Prashna Upanishad also the Principal Upanishad of Atharvaveda, has an entirely separate chapter on *AUM*. The verses of this upanishad emphasize the chanting and meditation on the tri syllable *AUM* (*trimatren*). While further communicating the glory of this beej (seed) mantra, the Upanishad states that as the snake give up its skin easily without any pain, similarly, the aspirant becomes free of all the sins committed by him. He attains the *Brahmaloka* (world of Brahma) and sees the supreme *Purusha* (pure consciousness) residing in all hearts [27].

Methodology of AUM Chanting

While performing AUM meditation, the procedure involved is easy to assimilate as a person deeply inhales from nostrils and while exhales through mouth which involves the steps.

A-U-M

- 1. A opening of mouth
- 2. U Mid of closure of mouth
- 3. M Humming sound after complete closure of mouth

This pronunciation of *AUM* doesn't require efforts and active energy to be spent and is a natural process of breath exhalation as gained knowledge of *AUM* chanting during *Shambhavi Mahamudra*, yogic practice of Pranayam of Isha Yoga [28].

According to current science, everything is made up of many vibrational levels and energy reverberations. Vibrations and sound go hand in hand. This primordial sound of Universe emitted out of space at a frequency that human ears are incapable of hearing is *AUM*.

In the words of Paramhansa Yogananda, the creative word AUM, the cosmic vibrating force that underlies all atomic energies, is where sound gets its limitless power. Further

He mentions that, AUM, the creative vibration that externalizes all creation; upholds all creation through vibration [29].

Epigenetics and Signal Transduction

The science of epigenetic proposes that nature of our life is determined by our responses to signals perceived from the environment. It states that, when it comes to relaying environmental information, electromagnetic frequencies are a hundred times more effective than physical signals like hormones, neurotransmitters, growth factors, etc. (Mc Clare) [30]. Through this science of epigenetics, one can comprehend the importance of controlling brain neural networking with the help of *AUM* chanting, which will in turn has effect on hormones and other growth mediation in the body and thus, helps in healthy tissue building. Hence, in order to understand the concept of Electromagnetic frequencies produced by *AUM* chanting and the attainment of pure consciousness described in the Upanishads, one needs to figure out the concept of *Praspanda* which has been elaborated in Ayurveda.

Ayurveda Concept of Impulse in neurons (*Praspanda*- due to *Sharirgata Vayu*) and Earth's Geomagnetic field (*LokagataVayu*)

In Ayurveda, the word 'Praspanda' was first coined by Acharya Sushrut with reference to Vayu(one among the Panchmahabhutas, here, and denoted to vital life force as per Ayurveda principles) [31]. The word pra-spanda(pra- prakarshen meaning intensely, spanda— vibrating, pulsating) literally means that which is pulsating or throbbing intensely. Further, search of Ayurveda texts in view of Vayusuggests that there are two forms viz., pulsations/impulse carried in neurons and Earth's Geomagnetic field termed as Sharigata Vayu and Lokasanchari Vayu respectively in Ayurveda [32]. Moreover, it has also been stated that human is a part of cosmic consciousness and cosmos also resides within the human consciousness. Accordingly, the Earth's Geomagnetic field and impulses carried within the neurons are interconnected. This concept has been well expounded in understanding role of Quantum biophysics in plant growth as well which states that right from germination of the seed to the stage of inflorescence everything is governed by the Earth's Geomagnetic field. In other words, to state, it's the vibrations of Earth's geomagnetic field which embeds and governs the cycle of plant growth [33]. Similarly, to understand this concept of Praspanda, in human body, one needs to be acquainted with, this vibratory state in human body and its physiology. Spanda 'vibration' is more than just an auditory tone or mechanical oscillation. It has been observed that the primeval 'sound of silence'— the basic awareness tone from which the entire cosmos and all sounds are created. The silent voice of the AUM, which sings all souls into existence, is the basic tone of Spanda. Every being is defined by this vibrational boundary of inner and outer field of this AUM, as every organ or every cell is in motion through continued vibration [34].

While defining the role of carriage of impulses (*Praspanda*) within the neurons in human body, it is mentioned that *VataDosha* (one of the three body humors mentioned in Ayurveda science – Vata, Pitta and Kapha) is responsible for restraining and impelling

mental activities. These impulses are the Quantum Vibrations in 'Microtubules 'inside the brain neurons. As per Einstein proposition of energy, the world is one inseparable, vibrant web with energy and matter deeply entangled within them. (E = mc2). In order to understand this entanglement of matter, with energy and its brain interactions, the quantum vibrations in microtubules inside the brain were studied. It has been documented in research that, deeper levels of finer scale actions within brain neurons are where consciousness originates. Treatment of brain microtubule vibrations as a result of the identification of quantum vibrations in 'microtubules 'within brain neurons may be beneficial for a variety of mental, neurological, and cognitive problems[35].

So, this word requires further deliberation in view of understanding the subject in length so as to understand the role of vibrations in healing. Hence, it is put forward in the present study that *Spanda* i.e. *AUM* which is universal vibration i.e. *Lokasanchari Vayu*, will certainly have effect on *Sharirgata Vayu*, which in turn, governs human physiology and facilitates healing.

Interrelationship of *LokasanchariVayu- ShariragataVayu*via Schumann Resonance in Biological Systems

The discussion of Schumann Resonance holds important in view to understand the proposed theory of Lokasanchari Vayu (Earth's Geomagnetic Field). To define Schumann Resonance(SR), those are global electromagnetic resonances, produced and excited by lightning discharges in the cavity formed by the Earth's surface and the ionosphere which have extremely low frequency (ELF). The natural SR is noted to be 7.83 Hz[36]. Cherry (2002) infered that SR, which worldwide disseminates waves of extremely low frequency (ELF, to be 'the possible biological mechanism 'which elucidates effects of geomagnetic activity on biological and human health effects [37]. Plants act in response to this magnetic field via perception of these signals and plants do respond quickly to varying magnetic fields which alter their gene expression and phenotype [38]. Further, in human biological system due to frequency-related, ionospheric propagation loss, its peak strength can be detected at about 8 Hz, along with its harmonics with weaker intensities at 14, 20, 26, 33, 39, and 45 Hz [39]. There may perhaps exist a causal relationship between SR found within both global and human electroencephalographic activities [40]. Varied researches also suggest that SR and human brain waves share the same frequency range. The process of resonance matching of frequency is how the human body recognizes, absorbs, and reacts to natural EMF. The biological communication phenomena in cell-to-cell communication in the human body can be influenced by natural EMF with this matching [41]. That means the natural vibration of the cosmos is 7.83 Hz. It is important to note that, production of Alpha waves in both the cerebral hemispheres occurs at 7.8 Hz. This production of alpha waves in the brain causes the optimum impulse within the neurons thereby, leading to important benefits of deep mental and physical relaxation, higher creativity levels, improvements in mood and emotional stability, problemsolving skills, and mood States of super learning and genius improved immune System and Serotonin Levels [42].

Moreover, researchers have discovered that the production and activity of the enzyme hydroxyindole-O-methyltransferase (HIOMT) are significantly impacted by

electromagnetic and geomagnetic fields.[43] This enzyme plays a key role in the synthesis of 5-methoxytryptamine (5-MT) and perhaps melatonin, hormone responsible for control sleep patterns and the circadian system and is also involved in protection of cell and neuro protection [44]. Furthermore, it is postulated allowing transmission of more light which means more quantum information is communicated to the DNA within the nucleus. The role of vibroacoustic therapy (VAT) and its potential brain effects have been elaborated via various researches in this context[45].

Heisnam Jina Devi et al. have performed the spectral analysis of the Vedic mantra Omkara. In their research, identification of predominant frequencies and their subharmonics A,U,M and Om has been performed as per the Sanskrit pronunciation [46] Further, this concept can also be expounded with the knowledge of *shada chakra*, which are energy centers of the body where cosmic energy flows are connected to the body's primary nerve plexus anatomically, and endocrine glands [47]. Elucidation of the ways of chanting of Om or *AUM* has been researched by Lalita Wani et al. Their research, determines the frequencies generated during chanting of Om and *AUM* in view of its pronunciation and the paper proposes that the frequencies of pronunciation of subjects under study are linked with 'A' 'U' 'M' and related with the *Chakras*, – energy centers of the body viz., "Root", "Heart" and "Crown" respectively; which means that with the pronunciation of *AUM* all the energy centers of the body are energized. [48]

Moreover, health benefits due to chanting of this sacred sound as Om (AUM) has been comprehensively also reviewed by the Lalita Wani et al. In their research paper, Om has been alternatively used as *AUM*, further giving the brief introduction of *AUM* as four states of human consciousness. While discussing the health benefits, the research paper incorporates the importance of chanting this sacred sound in Thyroid Epidemiological studies, effects of chanting in nervousness, stress and as a tool of meditation for self-realization [49].

Discussion:

Mantra is that essence which dispels Avidya, darkness of ignorance from human mind to progress further to realize the ultimate reality (discourses of Swami Rama). It is important to understand the methodology of chanting of Mantra. While one chants the Mantra, one should hear it as well. This technique of Mantra chanting helps one to practice mindfulness during Mantra Chanting. It is important that, Mantras to be chanted under the guidance of Spiritual master of the particular lineage. Person unaware while treading the path of Pure Consciousness, A UM, the Pranava Mantra (Primordial sound of the Universe) is a tool which can be used. AUM as described by seers of Upanishads is not just a word; moreover it is the Entire Brahman (ultimate reality) itself. To comprehend, the knowledge of Upanishads of communion with the Divine, it has been narrated that AUM has the power of creation, preservation and annihilation. Swami Vivekananda explains OM as Akhanda Brahma (undifferentiated form of reality) and AUM as Khanda Brahma (differentiated form of reality). While treading the knowledge about method of AUM chanting, it is pertinent to note that, it is particularly emphasized in Prashna Upanishad that this chanting of AUM has to be a trimatren i.e. tri-syllable and not Mono syllable of OM. Further, Paramhansa

Yogananda states AUM is the only driving force behind the universe's maintenance through vibration. This vibration has been documented in Ayurveda as *Praspanda*, which is the vibrational energy, term coined in Ayurveda for *Vayu i.e. Vata Dosha. Spanda*i.e. sounds emitted from the universe are documented to be *AUM*. This vibrational energy of the universe or the electromagnetic energy of the earth documented as Schumannn Resonance is nothing but the *lokasanchariVayu*as explained in *Ayurveda* texts via Plant germination and growth till inflorescence. As human body and cosmos are interlinked and interconnected to each other, it can be very well established that, the Earth's Geomagnetic field (*loksanchari Vayu*) and impulses in neurons generating from the brain (*praspanda – shariragata vayu*) certainly plays interrelationship which is very well demonstrated with quantum vibrations in microtubules in human brain, the effect of geomagnetic field on Pineal gland leading to secretion of melatonin hormone. The science of epigenetic and signal transduction suggests that beyond genetic control over organisms, the cells are capable to function as per electromagnetic frequencies provided to the cell.

Chanting of *AUM*, thereby, creates impulse/vibration in human brain. This electrical signaling in the brain when resonates in 7.83 Hz which is similar to Schumann Resonance or cosmic resonance leads to development of alpha brain waves in brain causing genius states of brain activity with profound relaxation. It also influences pineal gland leading to secretion of melatonin. Apart from these benefits, these resonances have direct effect on DNA and help resonate the DNA in cosmic consciousness, thus, leading to setting of correct resonance contributing to mental health.

Conclusion:

To summarize the concepts propounded in Upanishads and Ayurveda, all the life forms are embedded in Earth's geo-magnetic field which is explained via Schumann Resonance which is nothing but the Lokagata Vayu mentioned by Acharya Charak. The natural SR is 7.83 Hz. which is the same frequency responsible for production of alpha waves in brains for genius states of intelligence and higher levels of creativity and positivity. Every biological system on earth is defined by the vibrational boundary of inner and outer field of Spanda which is nothing but AUM, as every organ or every cell is in motion through continued vibration. Earth's geomagnetic field has direct effect on biological systems (be it plants, animals, humans) which is the interaction of Lokagata Vayuwith Sharirgata Vayu via Praspanda, vibration. Through the phenomenon of Piezoelectricity on cells, earth's geomagnetic field is converted into acoustic energy and vice versa. Thus, by consciously creating the impulse by chanting of AUM which is similar to cosmos, the restrain and impulses of the mind can be controlled by exhibiting conscious control over Sharirgata Vayu. The Upanishads mentions AUM as the Brahman which is the Ultimate reality to be known to human consciousness which is mentioned as Om (mono syllable), Omkar and AUM (tri-syllable). Explicitly, Prashna Upanishad mentions the tri-syllable AUM chanting. The methodology of chanting tri-syllable AUM, is not pronunciation or involvement of active energy but merely is a natural process of breath exhalation. This facilitates the easy learning of AUM chanting which is hereby, proposed as one of the

treatment modalities to control mental activities and hence, establishes *Daivvyapshraya chikitsa* of Ayurveda in holistic treatment modality.

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Pradnya Chaugule contributed in conceptualization, review of literature and writing original draft, Shraddha Nayak contributed in Supervision and provided intellectual input via revisions in the drafted article, Rajkumar Gupta contributed in conceptualization and editing draft, and Sneha Vidhate contributed in designing and preparation of the final draft. All the authors approve of content of the manuscript and agree to be held accountable for the work.

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