DOI: 10.7860/JCDR/2025/76417.21328

Review Article

Psychiatry/Mental Health Section

The Holistic Impact of Omkar Chanting: A Narrative Review of it's Physiological, Psychological and Acoustic Effects

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ABSTRACT

Mantra chanting, being a timeless practice in Vedic literature, has fascinated scholars and practitioners alike in diverse traditions. It is one of the simplest yet most effective part of traditional yoga practices for millennia, particularly Omkar or Om chanting. Chanting of mantra brings clarity of thought, inner peace, and spiritual growth. The benefits of chanting can be understood both scientifically and spiritually, with the impact on multiple levels- mental, emotional, and even physical levels of the individual. Mantra chanting, particularly repetitive vocalisations, has been found to promote relaxation, reduce stress hormone levels, including meditative brainwave patterns. The review article discusses the multifaceted background of the Omkar mantra by tracing its significance. This article delves into the Vedic literature bridging its relevance in contemporary research. Through historical text analysis and recent scientific studies, the study aims to understand the potential benefits of the vocal practice of the Omkar mantra. The novelty of this review lies in how acoustic analysis of Omkar chanting affects psychological and physiological parameters evaluating the effectiveness of treatment approaches. The paper also discusses case studies and clinical findings that emphasise the potential benefits of regular Omkar chanting in mood improvement, rehabilitation of anxiety and depression, cognitive functioning, and its physiological impact on respiratory dynamics, heart rate variability, and neural activity. This article also proposes the future scopes for integrating acoustic analysis of Om chanting with different clinical applications research.

Keywords: Acoustic stimulation, Cognition, Mantra chanting, Mind-body therapies, Phonation, Relaxation techniques, Resonance, Sound spectrography

INTRODUCTION

"Mantra" refers to a word or sound believed to have specific energy patterns and vibrations. Rhythmic chanting of Sanskrit mantras creates a resonance that connects the individual to the higher consciousness promoting the alignment of the physical and energy aspects of the individual [1]. The regular practice of mantra chanting stabilises the mind, promoting greater alignment between gross and subtle states [2].

Mantras are currently present in different schools of Hinduism, Jainism, Buddhism, and Sikhism. According to Gaumond D, a mantra is a collection of sounds, and a relationship of frequencies [3]. Sound frequencies act as an instrument in the practitioner, creating meditative states, endorsing clarity, and aiding mental and physical healing. The specific frequencies of Omkar recitation bring the alignment of the practitioner with the higher states of consciousness [4]. In the context of Buddhists, Mantras act as a medium to cultivate mindfulness and inner tranquility [2]. Jan Gonda defines mantra as a sequence of words containing praise in prose, verses, and sequences are believed to have spiritual efficiency, which is meditated upon, and arranged in ancient texts of Hinduism methodically [5].

In Sanskrit, the definition of mantra is "Mananāt trāyatē iti mantrah". Chanting specific mantra can lead to synchronisation between the left and right hemispheres of the brain [6]. Mantra chanting cultivates a deeper sense of self-awareness and self-regulation, by managing emotions [7]. One can calm the mind by chanting the mantra, minimising the impact of external stressors on mental and emotional well-being [2]. The Omkar mantra represents the harmony between ancient wisdom and modern inquiry. Even though omkar is a symbol associated with Hinduism, the scientific studies, show promising benefits at various levels, like physical, mental, and physiological by positively influencing cardiorespiratory synchronisation, vagal activity, and stress levels [8-11]. Hence, this paper tries to bring out a practice, which originally rooted in the Hindu tradition, has far-reaching health benefits for people at large.

Historical Roots Describing AUM chanting

According to Vedic literature, the matter is said to be manifested from sound and Aum is considered as a primordial and sacred sound. The idea comes from the Rigveda, the oldest Veda, and it explores the deep meanings within this ancient sound. It is said to be the "root" syllable (mula mantra), that binds the gross individual consciousness and universal consciousness together. The elaboration of the mantra in other Vedic texts, such as in the Bhagavad Gita and Upanishads elucidates its significance for millennia. The Upanishads state that AUM represents God in the form of sound. The Upanishads, a collection of philosophical texts that form the culmination of Vedic thought, provide deeper insights into the Omkar Mantra. Aum is enunciated with the syllables "a", "u", and "m" [12]. These three letters are the foundation of all languages. A mute person also tries to express with these three syllables. So, the mantra is the voice of consciousness. The prominent Advaita philosopher, Adiguru Shankaracharya draws attention to the "Om", which is the sound of the absolute, encompassing the entireness of existence. In the world of non-duality, Brahman is the ultimate reality of collective consciousness from where the whole universe emanates, lives in, and again dissolves into it. So, chanting and meditating on the Omkar mantra is considered to realise the Brahman, transcending the illusion of individuality [13].

Symbolism of A, U, M kara

The Omkar is symbolised as 'AUM', called Pranava, which defines the process of creation and dissolution in the whole universe. Where 'A' represents the creation, the beginning, 'U' defines preservation and sustenance or action, and 'M' signifies dissolution. 'Pranava' can also be defined as 'prana+va', which means it contains the 'prana' or the life force energy in it. 'Akara' is the primary element

pronounced as 'Ah' starts vibrating in the mouth and resonates in the lower and central portions of the body. It denotes the normal waking consciousness. This is relatable to the lower three chakras connecting to the realm of logic, reasoning, and science. It creates awareness on a gross level of the matter showing stability. Then 'Ukara' is pronounced as 'uuu'/'uh', transferring the vibration to the back of the mouth, resonates in the chest, and throat, and shifts the awareness to the dream state of consciousness. Here, gross matter converts to a subtle form showing more fluidity and rapidly changing form. This connects with the realm of imagination, dreams, divinity, and the inner world. The third element is 'Mkara', created by humming gently with the lips closed. This sound starts in the mouth and resonates throughout the head. Here, subtle matter further converts to the form of a causal state. This sound connects with the realm of dreamless deep sleep. Pure consciousness reveals its unseen, pristine, and latent form. In this state, the individual's consciousness turns inward and connects with the cosmos [12].

Contemporary Research and Application on AUM Chanting

Contemporary research on the Omkar Mantra has extended beyond traditional religious and philosophical contexts, encompassing scientific, psychological, and therapeutic perspectives. Research shows that chanting Omkar can benefit both the physical and psychological state of human beings. Here, is a review of the experimental studies done in this particular area to find the effects on the human body.

According to different techniques used and different outcomes found during the inspection, the studies can be subcategorised under, physiological changes and psychological changes.

Physiological changes: The studies taken for review include different techniques, such as Electroencephalograph (EEG), neuroimaging, and evoked potentials, to explore significant changes in physiological parameters during Omkar chanting. The studies show that mental and loud Omkar chanting has a significant positive effect on the brain and other body parts, promoting physical health in the form of improved blood pressure, brainwave activity, neural connectivity, cognitive function, heart rate, cardiac health, lung capacity, and improved memory [14-16].

The physiological and neuropsychological changes measured in Omkar chanting is represented in [Table/Fig-1] [9,11,15,17-32].

Physiologically, regular practice of Omkar chanting influences heart rate variability, respiratory dynamics, and neural activity [15]. The vibratory effects of each syllable stimulate the vagus nerve, promoting relaxation and reducing stress. Empirical evidence supports these findings, particularly through advanced neuroimaging and physiological tools. Telles S et al., reported reduced respiratory rates during Aum chanting, while subsequent studies found decreased heart rates, reduced skin resistance, and heightened mental alertness- key

Article reference	Subjects taken	Intervention duration	Place of the study	Tool used in the study	Findings during Om chanting
Telles S et al., 1994 [17]	Eighteen males (9 of experienced+9 of naïve subjects) between 25-45 years	Twenty minutes of mentally chanting "Om" (meditation session) and same of mental repeating "one" (control group)	National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore	AEP-MLR	Increased Na wave amplitude indicates enhanced activation in the midbrain and thalamus among experienced practitioners.
Telles S et al., 1995 [18]	Seven males committed meditators in the age range of 29 to 55 years	Each session lasted three days, with 20 minutes of meditation preceded and followed by two 6-minute relaxation periods for mental chanting of "OM" and non-targeted thinking (instead of meditation)	National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore	Polygraph, EKG, plethysmograph, thermistors, and Benedict-Roth apparatus to measure heart rate, skin resistance, blood flow, respiratory rate, and oxygen consumption	Reduction in heart rate (relaxation), a decrease in plethysmogram amplitude by increased peripheral vascular resistance (increased mental alertness)
Telles S et al., 1998 [19]	Twelve practitioners (4 males+8 females) from 25 to 40 years	Mental repetition on 'OM' for 20 days, twice a day, with each session lasting for 15 minutes.	Vivekananda Kendra Yoga Research Foundation, Bangalore	MLR	Reduced skin resistance, reduced HR, and RR
Kalyani B et al., 2011 [15]	Twelve participants (9 males+3 females) of 22-39 years	Ten cycles of loud chanting including each cycle of "(15 secs) REST-(15 secs) OM-(15 secs) REST-(15 secs) SSSS"	National Institute of Mental Health and Neurosciences, Bangalore	fMRI	Deactivates amygdala, anterior cingulate gyrus, insula, hippocampus, orbitofrontal cortex and thalamus
Das I et al., 2012 [11]	Twenty females of 18-24 years	Daily 30 minutes of prayer and meditation sessions for one month	Dayalbagh Educational Institute, Agra	GSR on a computerised polygraph	Increase in GSR value suggesting the psychophysiological relaxation
Joshi K, 2012 [22]	Fifty males of age group between 20-35 years	Thirty days of yogic practice in which Nadishodhana Pranayama was 20 minutes and Om chanting 10 minutes	Kumaun University, Khatima, Uttarakhand	P.G.I. memory scale	Nadishodhana Pranayama and Om chanting cause a significant positive effect on the memory of the students
Harne BP, 2014 [25]	Ten participants (8 healthy boys of 21 to 22 years and 2 females of age between 40 to 41 years)	Single-day pre and post-chant recording	Shri Sant Gajanan Maharaj College. College of Engineering, Shegaon	EEG signal with HFD	Reduced complexity of EEG signal
Naidu K et al., 2014 [23]	Sixty healthy and willing females aged 12-15 years (n=30 control group +n=30 intervention group)	Daily chanting for 30 minutes once a day between 6:30 AM and 7:00 AM for 12 weeks.	Akshara group of institutions, Manthani, Telangana	Spatial and verbal memory test	Significant improvement in both spatial and verbal memory was observed in the intervention group when compared to the control group
Mooventhan A et al., 2014 [20]	Eighty-two subjects aged 18 to 27 years were randomized into the study group (n=41) and control group(n=41).	Bhramari pranayama and OM chanting for 10 min (5 min for each practice)/day for 6 days/week for 2 weeks	Department of Physiology, SDM College of Medical Sciences and Hospital, Sattur, Dharwad, Karnataka	PEF, FEF and MVV	Significant increases in PEF, FEF, and MVV were seen resulting in improved pulmonary function
Kumar U et al., 2015 [27]	Twenty-one males with a mean age of 32.3 years	One-time study of (OM >no sound, word (AAM) >no sound, and non-word (TOM) >no sound.)	Centre of Biomedical Research, Lucknow	fMRI	Activation in the dorsal medial frontal cortex, and supramarginal gyrus

Deepeshwar S et al., 2015 [28]	Twenty-two males aged between 18 and 30 years, for both the meditation and control session	A 3-month orientation including each session of 20 minutes, from 06:00 to 06:30 hours, five days a week before assessments	Anvesana Research Laboratory, Swami Vivekananda Yoga Research Foundation, Bangalore	fNIRS	Increased oxygenation in the Pre-Frontal Cortex (PFC)
Bhargav H et al., 2016 [21]	Twenty participants (eight males and 12 females) in the age range of 18.25±0.44 years	A week-long event in performing OM chanting or producing the sound 'sssss ...' before assessments	Anvesana Research Laboratory, Swami Vivekananda Yoga Research Foundation, Bangalore	fNIRS	A stimulating effect on the vagus nerve in the ear canal
Arora J et al., 2018 [29]	The study group comprises 50 hypertensive subjects (28 male and 22 female) between the age group of 40-60 years	Immediate effect of 5 min Om chanting was studied	Netaji Subhash Chandra Bose Medical College, Jabalpur	PR, Systolic and diastolic BP	The BP decreased by 14/05 mmHg and the PR by 6 beats per minute immediately after 5 minutes of Om chanting
Metri K et al., 2020 [26]	Twenty females ranging between 50-70 years having insomnia	AUM chanting 30 minutes daily for one month from 5:30 pm to 6:00 pm	Thane City, Maharashtra	BP (Systolic and diastolic)	Decreased systolic and diastolic BP by improved sleep quality, insomnia
Swathi C et al., 2021 [30]	Thirty young adults with type D personality, 15 participants in the control and intervention groups within the age group of 18-25 years	Om chanting was performed once a day at 8:00 am daily for 16 weeks	Medical College, Khammam, Telangana	Perceived stress scale, spatial and verbal memory test	Om chanting improved stress and cognitive functions, notably spatial and verbal memory, in young adults with Type D personality
Hotho G et al., 2022 [31]	Nine healthy, trained speech practitioners (5 females and 4 males, aged 41±7.6 years)	One experimental session of 30 minutes consisted of three sets of five consecutive "OM" chants, each lasting about 20 seconds, with two-minute pauses in between	Not clear	Electrocardiogram (ECG) data, RR tachogram HRV, RESP and SBP	A significant increase in the synchronisation of the oscillations among RR, SBP, and RESP was observed compared to resting states
Inbaraj G et al., 2022 [9]	N=36 participants 19 yoga practitioners (9 females and 10 males; mean age 25.9±3.2 years) and 17 naïve persons (8 females and 9 males; mean age 24.8±3.6 years)	Brief chanting of Om (5 min)	Department of Complementary and Alternative Medicine, HCG, South India	HRV (Time and frequency domain)	HRV rises to its most significant level. Vagus nerve stimulation alters the neurotransmitters and electrical signals. Resonance in HR and breath occurs when the breathing happens with a frequency of 0.1 Hz, or about six breaths per minute
Naveen A et al., 2022 [24]	Twenty (nine men and 11 women) age range of 25-55 years divided into two groups having ten participants in each (experiment and control) group	Twelve weeks of Om chanting at 6:30 am every day and reciting Om chanting for 20 min	Department of Pharmacology, Mamatha Medical College, Khammam	Spatial and Verbal Memory test, Auditory and Visual Reaction Time (RT) apparatus	Significant improvement in the spatial memory scores was seen in the auditory reaction time for high and low-pitch sounds and visual reaction time for the red and green light in the intervention group
Suryawanshi K et al., 2024 [32]	Thirty-four school-going students of age between 14 to 18 years (10 in the control group+24 in the experimental group)	Four-week intervention that included 15 minutes of OM mantra chanting sessions daily	Lakshmibai National Institute of Physical Education, Gwalior	Concentration (Dharansheelta) Scale C (D) S to access concentration (Developed by Dr. Mahesh Kumar Muchhal and Yogesh Kumar)	The experimental group showed a significant increase in concentration levels

[Table/Fig-1]: Studies based on physiological and neuropsychological changes measured in Omkar chanting [9,11,15,17-32].
AEP: Auditory evoked potentials; MLR: Middle latency response method; SG: Study group; CG: Control group; SR: Skin resistance; HR: Heart rate; HFD: Higuchi fractal dimension; fNIRS: Functional near-infrared spectroscopy; fMRI: Functional magnetic resonance imaging; GSR: Galvanic skin response; RR: Respiratory rate; RESP: Example of respiration; BP: Blood pressure; SBP: Systolic blood pressure; HRV: Heart rate variability; PFT: Pulmonary function test; PEF: Peak expiratory flow; MVV: Maximal voluntary ventilation; FEF: Forced expiratory flow; PR: Pulse rate

indicators of relaxation and cognitive focus [17-19]. Neuroimaging research demonstrated deactivation in brain regions associated with stress, including the amygdala and hippocampus, further underscoring the chant's calming effects [15,16].

The respiratory benefits of Om chanting are notable. Studies by Mooventhan A and Khode V reported improvements in lung function, with increased peak expiratory flow and maximal voluntary ventilation, highlighting the chant's ability to enhance respiratory health [20]. Additionally, the research by Bhargav H et al., revealed stimulation of the vagus nerve, further promoting relaxation and reducing stress [21].

From a cognitive perspective, memory enhancement is another area where Om chanting has shown positive effects. Joshi K and Naidu KL et al., reported significant improvements in spatial and verbal memory following Om chanting practice [22,23]. Naveen A et al., also found enhanced auditory and visual reaction times, reinforcing the cognitive benefits [24]. These findings align with research by Harne BP, which found reduced complexity in EEG signals, reflecting a calming effect on brain activity [25].

Acoustic decoding of AUM sound: Acoustic decoding of AUM chanting has drawn attention as it reveals the emotional and physiological effects of sound. The different syllables of Om ("A," "U," and "M") generate distinct vibrations that influence various parts of the body. "A" stimulates the spinal cord, balancing pranic flow; "U" resonates in the throat, affecting the thyroid and hormone secretion; and "M" vibrates in the brain, activating the pituitary and pineal glands [12]. These vibrations harmonise the body and mind, emphasising the impact on mental and physical well-being.

Spectral analysis of Om chant: The speech that comes from the glottis through the voice is a blend of sounds. The Mantra, an acoustic signal, is a composition of sound, breath, and rhythm and the fundamental frequency of that sound is called overtones or harmonics. Spectral analysis is the analysis of frequencies or energies. These harmonics are the ratios of, 1:1, 2:1, 3:2, (the whole numbers) [33]. By practicing the mantra chant, harmonics can improve the vocal quality, it changes our brain pattern by building new neural synaptic connections, hearing, and even heightening our consciousness [34].

Apart from other research on Omkar, here, the spectral analysis done on Omkar chanting is also covered.

Researchers have done the spectral dissection of the acoustic signal of Omkar chanting which may lead to future research in the direction of acoustic parameters analysis and may establish a significant tool for the differentiation of pathological conditions from healthy physical and psychological conditions [25,35,36].

The studies on spectral analysis of Om chanting and changes observed in the mental state are presented in [Table/Fig-2] [35,37,38].

The spectral dissection of the acoustic signal of Omkar chanting has opened new avenues for exploring the impact of sound on mental and physical well-being. Researchers have used advanced acoustic analysis techniques to study the harmonics, frequencies, and Power Spectral Densities (PSD) of Om chanting. These studies reveal that chanting can induce calmness, reduce stress, and stabilise the mind, making it a potential therapeutic tool [35,36].

For instance, Devi HJ et al., digitised analog waveforms of Om chanting, finding that the periodic nature of the signals was associated with increased mental stability and calmness [35]. Gurjar AA et al., employed Discrete Wavelet Transform for Time-Frequency (DWT-TF) analysis, observing a stress reduction [37]. In a subsequent study, Gurjar AA et al., applied Fast Fourier Transform (FFT) analysis and found that Om chanting led to a flat PSD, which indicated minimised stress levels [38].

Article reference	Subjects	Intervention duration	Place of study	Tools used	Findings of Om chanting
Devi HJ et al., 2004 [35]	Four (2 male voices and 2 female voices)	Short-term laboratory experiment of four final recordings	Vivekananda Yoga Anusandhana Samsthana, Bangalore	Digitising the analogue waveforms	The periodic nature of the signals shows improved calmness and stability of the mind.
Gurjar AA et al., 2008 [37]	One Om chanting person	NA	Amravati University, Maharashtra	DWT-TF analysis	The scientific findings confirmed that stress reduction in the mind leads to enhanced calmness.
Gurjar AA et al., 2009 [38]	Two of age group 30 to 40 years	Ten minutes of chanting practice	Amravati University, Maharashtra	FFT	Flat PSD concluded minimised stress level.

[Table/Fig-2]: Studies on spectral analysis of Om chanting and changes observed in the mental state [35,37,38].
DWT-TF: Discrete wavelet transform for time-frequency analysis; FFT: Fast fourier Transform analysis; PSD: Power spectral density

Psychological changes: Omkar is the initial soundwave from which the creation began, evolved, and maintained its rhythm. Om chanting has been taught and used as a daily practice since Gurukul's time, as well as the stress management programme of the current era. Physical health is connected with mental and emotional health [39]. Research indicates that Om chanting can be employed as psychophysiologic stimuli to boost melatonin release, which may cause an enhanced sense of well-being [40]. Om chanting is a brain stabiliser and an energy medication for stressed-out people since it allows one to enter their natural state more deeply with practice. Some of the research has been done on Omkar chanting showing the significant development in stress, anxiety, depression, insomnia, and restlessness of mind. This article reviews the effects of chanting "OM" on the central nervous system and emotional level [41].

To analyse and understand the significant changes found in psychological parameters, this article reviews the studies in [Table/Fig-3] [7,42-56].

A profound impact was found on reducing anxiety, depression, and stress across different demographic groups by Om chanting, as demonstrated by the studies [6,14]. Bayan T and Deb N found that Om chanting significantly influences brainwave activities

Article reference	Subjects	Intervention duration	Place of study	Tools used	Findings of Om chant
Bhatt S et al., 2013 [49]	Twenty students aged between 17-25 years	Thirty days for 45 minutes of chanting practicing every day	Dev Sanskriti Vishwavidyalaya, Haridwar	Stress Management Scale (Self-prepared)	Chanting "Aum" significantly reduces stress levels.
Singh D et al., 2014 [50]	One hundred and thirty-three males (66 long term meditators, age 23.96±3.25 years; 67 non-meditators, age 21.72±3.44 years)	Two consecutive days only for data taking	Swami Vivekananda Yoga Anusandhana Samsthana University, Bangalore	STAI, FMI, Mindfulness Attention Awareness Scale (MAAS)	The practice of Om meditation was associated with higher levels of mindfulness and lower levels of psychological anxiety.
Anand H, 2014 [7]	One hundred subjects (50 in each group) of age range 15 to 24 years	One month for 20 minutes daily	Dayalbagh Educational Institute, Agra	PGI wellbeing scale	Om chanting meditation has a significant positive effect on psychological wellbeing in adoloscents.
Amin A et al., 2016 [42]	Forty elderly women (age 50-60 years)	Om chanting practice once a day at 7:30 daily for six months	Sattva Cultural Space and Research Centre, Angamaly, Kerala	DASS, MMSE	Six months of chanting decreased the depression, anxiety, and stress scores along with reduction in systolic and diastolic pressure and pulse rate. MMSE scores also significantly improved.
Perry G et al., 2017 [43]	Forty-five inexperienced chanters of 37 females and 8 males of 18 to 68 years forming two experimental groups	Ten minutes of "Om" chanting practice for two experimental conditions: vocal chanting or silent chanting	Macquarie University, Australia	DLST, PANAS, MME, SRA, SCQ	Chanting increases positive mood, decreases negative mood, and improves attention. Furthermore, altruism increased.
Mishra S et al., 2017 [47]	Eight female school teachers of aged 27-40 years	Participants performed Om chanting once in a day at 6:00 am daily for 12 weeks	Not clearly mentioned	Perceived stress scale, AVRTA	Improves stress management and cognitive functions.
Rankhambe HB et al., 2020 [45]	One hundred bus drivers were divided into study and control group	Om chanting was done for a total of 4 weeks of study duration	Tertiary hospital in a metropolitan city, Mumbai	Hamilton Anxiety Rating Scale	A highly significant reduction in Anxiety levels was seen after weeks of Om chanting in drivers.
Surlya BK et al., 2020 [51]	Eighty students were divided into study group (40) and control group (40)	Twenty minutes of Omkar mantra chanting for three months	Chirayu Medical and Paramedical, Bhopal	Perceived Stress Scale by Cohen (1983)	A significant difference was found in the stress level of students practising Om mantra chanting during examination.

Simpson FM et al., 2021 [44]	One hundred and seventeen participants with (vocal chanting+ listening control)	10-minute online chanting session was chosen to detect the immediate effects of chanting	Online chanting	STAI, PANAS, SCQ, IOS	Chanting online resulted in a significant decrease in stress and a positive mood.
Aalasyam N et al., 2021 [52]	Eighty pre-hypertensives women between the ages of 25 and 40 years	The intervention lasted for 12 weeks, taking place once a day, 5 days a week at 6:30 am	Department of Physiology, Little Flower Hospital and Research Centre, Angamaly, Kerala	Depression, anxiety, and stress scale 21	Significant decrease in depression, anxiety, and stress was found by the practice of Om chanting.
Bajappanavar MV et al., 2021 [48]	Eighty (46 males and 34 females) students of age 17-20 years	The study group practiced Om meditation daily for 30 minutes at 4:45-5:15 pm for three months	State Akkamahadevi Women's University, Vijayapur, Karnataka	Perceived Stress Scale	A significant difference was found in the stress level of students during exam.
Verma V et al., 2022 [46]	Fifty (aged 18-25 years) male and female participants in the experimental (N=25) and control groups (N=25)	One month of Om chanting intervention in experimental group only	Soban Singh Jina University, Almora, Uttarakhand	SCAT	A significant reduction in anxiety levels in young adults.
Sudharkodhy S et al., 2022 [53]	Sixty students of the age 18 to 25 years (study group of 30+control group of 30) students	Om chanting training was given to the study group for 30 minutes for 30 days	Karpaga Vinayaga institute of Medical Sciences and Research Centre in Kanchipuram	HRV	Om chanting training increases parasympathetic activity, which is more pronounced in females.
Zhang Z et al., 2022 [54]	Thirty-three healthy undergraduate students (22 female individuals) without meditation experience	One time practice was done of Om chanting for 3 minutes loudly and then a silent chanting in mind without lip movement during the experiment	Soochow University in Suzhou, China	EEG and Event-Related Potentials (ERPs) were examined in response to unpleasant and neutral images while participants performed Om chanting and viewed tasks	The results showed that unpleasant images were rated as less unpleasant and arousing during Om chanting. Om chanting alters individuals' emotional evaluations of stimuli and modifies early visual and later neural processing of the stimuli.
Kar A et al., 2023 [55]	Thirty-six engineering students in the age range of 18 to 25 years	Om chanting for 20 minutes daily was done for 135 days	Kolkata-based engineering college	Depression, Anxiety and Stress Scale - 21 Items (DASS-21)	An effective reduction in depression, anxiety, and stress levels was seen in engineering college students with time.
Chokkan D et al., 2024 [56]	Fifty young adults with pre- hypertension in the study group and 50 young healthy adults in the control group within the age range of 18-24 years	Practice of OUM chanting for 6 weeks, once a day and weekly five sessions	St Peter's Medical College Hospital and Research Institute, Hosur, Tamil Nadu	Perceived stress scale, (DS-14) questionnaire	Practicing OUM chanting promotes stress relief and reduces negative emotions, such as negative affectivity and social inhibition, in pre-hypertensive individuals.

[Table/Fig-3]: Studies based on psychological changes to Om chanting [7,42-56].
DLST: Digit-letter substitution task; PANAS: Positive affect negative affect schedule; MME: Multidimensional measure of empathy; SRA: Self-report altruism scale; SCQ: Social connectedness questionnaire; SCAT: Sinha's comprehensive Anxiety test; DASS: Depression anxiety stress scale; PSQI: Pittsburgh sleep quality index; HRV: Heart rate variability; DASS 21: Depression, anxiety and stress Scale - 21 Items; STAI: State-trait anxiety inventory; FMI: Freiburg mindfulness inventory; STAI: State-trait anxiety inventory; IOS: Inclusion of self in other scale; PGI: Patient-generated index; AVRT: Auditory and visual reaction time apparatus; HAMA: Hamilton anxiety rating scale; PTQ: Preservative thinking questionnaire; ERQ: Emotion regulation questionnaires; RRS: Rumination response scale; SDS: Self-rating depression scale; SBP: Systolic blood pressure; DBP: Diastolic blood pressure

linked to increased theta and alpha brain rhythms, highlighting its potential in rehabilitation programs [36]. Singh M further reported that Om meditation decreased psychological anxiety and increased mindfulness, particularly in meditators [57]. Similarly, Amin A et al., and Thanalakshmi J et al., observed a reduction in depression, anxiety, and stress scores in elderly women and office workers during COVID-19, coupled with improvement in physiological parameters like blood pressure, pulse rate, and sleep quality [42,58].

Om chanting emphasised the broader psychological effects, such as improving mood and attention. Perry G et al., showed that chanting enhanced positive mood and altruism while reducing negative mood in inexperienced chanters [43]. This mood regulation was also seen when participants engaged in online chanting reported decreased stress and enhanced positive emotions [44]. The reduction of anxiety was consistently noted across studies involving varied populations, including bus drivers, hypertensive women, and students [45,46,59].

Om chanting also proved effective in stress management, particularly among students and professionals. Mishra S et al., demonstrated improvements in stress management and cognitive function among schoolteachers, while Bajappanavar M et al., found that students practicing Om chanting had significantly lower stress levels during exams [47,48].

Vedic Insight of Omkar

The ancient texts of the Vedas emphasise the resonance associated with the Omkar mantra. The vibrational qualities of the AUM mantra create resonance and harmony within the body, leading to holistic well-being at physical, mental, and spiritual levels, aligning with the frequency of the universe. This concept aligns perfectly with the Vedic understanding of how everything, in existence is interrelated. The Omkar mantra is a central and revered aspect of Hinduism, but its significance extends beyond religious practice to encompass spiritual, physiological, and psychological well-being. The synthesis of several studies suggests a consistent positive impact of the Omkar chanting on mental well-being and cognitive functioning aligning with the profound insights derived from Vedic philosophy. This convergence of empirical findings with ancient wisdom underscores the holistic nature of the mantra's effects. in the aspects of mental wellbeing [8,12].

The symbolism of Aum is embedded in its three syllables: A, U, and M, which represent creation, sustenance, and dissolution, respectively. These syllables correspond to different states of consciousness: 'A' (A kara) signifies waking consciousness and resonates in the lower body affecting the spinal cord; 'U' (U kara) connects to the dream state and resonates in the chest to the throat affecting the thyroid glands, while 'M' (M kara) links to deep sleep and resonates within the head activating the brain centers. Together, these sounds harmonise the gross and subtle aspects of human experience, influencing both the body and mind [26]. The psychological benefits of Om chanting have been showing its potential to positively influence emotional well-being, stress reduction, and cognitive function.

Future Scopes

The future scope can be that data collected from different samples from male and female subjects needs to be analysed. The findings warrant more experimental and empirical studies in neuroimaging

and EEG methods. Further, an algorithm can be developed to decide the degree of correctness of Om chanting. The speech signal is considered to be an indicator of psychological stress. The healthy Om chanting voice frequency can be documented in both genders. Future work could also involve analysis of voice parameters such as pitch, fundamental frequency, and Harmonic noise ratio with the ideal Om chanting sound.

CONCLUSION(S)

Omkar mantra chanting has been practiced in meditation as a spiritual practice. In this paper, an effort is made to gather the empirical studies conducted so far to summarise the effect of Om chanting on the psycho-physiological and cognitive aspects of the body. According to the outcomes of the studies mentioned above, Om mantra chanting has a nostalgic effect on mental health and physiological markers of autonomic, cardiovascular, and central neurological system of the body. The investigations showed an overall improvement of health, including heightened mental alertness, stimulation of the vagus nerve, activation of the pineal gland, and increased theta and alpha brain rhythms resulting in increased verbal and spatial memory, decrease in cortical alertness and anxiety, and improvement in cognitive abilities in different age groups. The review on acoustic analysis proves that Omkar chanting improves concentration and helps the mind attain steadiness, reducing mental stress. The review supports the holistic benefits of Omkar chanting, highlighting its insights into mind-body connections and its role in achieving a balanced life. The author suggests that further work needs to be done on the structure of the mantra forms and its characteristics to understand the mantra in detail.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Oct 21, 2024
- Manual Googling: May 08, 2025
- iThenticate Software: May 15, 2025 (3%)

ETYMOLOGY: Author Origin

EMENDATIONS: 7

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Oct 20, 2024**
Date of Peer Review: **Jan 18, 2025**
Date of Acceptance: **May 17, 2025**
Date of Publishing: **Aug 01, 2025**