

OM (AUM) Chanting as a Physiological Approach for Managing Type D Personality: A Narrative Review of Cognitive, Autonomic, Psychological, and Biochemical Outcomes in Adults

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ABSTRACT

Introduction: Type D personality includes negative emotions and social withdrawal with constant stress activation and different biological regulation. This leads to autonomic dysfunction, hormonal imbalance, and immune activation thus increasing the vulnerability to cardiovascular and mental health problems.

Aim: To examine the psychobiological features of Type D personality and assess the role of “OM” chanting in improving vagal tone, reducing stress reactivity in individuals.

Materials and Methods: A comprehensive search strategy was conducted in PubMed, Scopus, Web of Science, and Google Scholar (1990–2025) using keywords related to Type D personality, vagal tone, and OM chanting. A total of 1,287 records were identified, 1,019 were screened after the removal of duplicates, 80 full-text reports were sought for retrieval and assessed for eligibility, with 30 studies finally included in the review. Studies were narratively synthesised, focussing

on Type D’s psychobiological impact and OM chanting’s effects on autonomic and psychological parameters.

Results: Type D personality showed exact signs of stress system overactivity, with higher cortisol levels, lower heart rate variability, and increased inflammatory markers. These patterns show the chronic stress, poor autonomic control, and higher risk for cardiovascular problems. OM chanting had measurable calming effects which increases parasympathetic activity, improves heart rate variability, and lowers blood pressure. Type D individuals showed better memory and coordination after regular practice, and group chanting helped lower cortisol and strengthen social bonding. Overall, OM supports both mental and physical relaxation.

Conclusion: “OM” chanting is a non-invasive, accessible intervention that can reduce the physiological and psychological burden of Type D personality, complementing care, easing stress, and lowering cardiovascular risk in preventive and therapeutic settings.

Keywords: Cortisol, Mantra, Personality traits, Psychoneuroendocrinology, Relaxation therapy

INTRODUCTION

Personality is a stable and distinctive pattern of thoughts, emotions, motivations, and behaviours that regulates a human life [1]. Several researchers have studied how personality influences the physical and mental health of individuals. Type D (distressed) personality acts as a psychosocial risk factor for Cardiovascular Diseases (CVDs). Johan Denollet introduced this concept in the 1990s and described these individuals as more susceptible to adverse cardiac consequences, like hypertension and ischaemic heart disease [2]. He defined it as a tendency toward psychological distress characterised by Negative Affectivity (NA) and Social Inhibition (SI) [3].

Negative Affectivity (NA) is the character to experience a wide range of negative emotions within a specific time period and situations [4, 5], while Social Inhibition (SI) is the tendency to inhibit the expression of emotions and behaviours in social interactions to avoid disapproval from others [6]. Those individuals high in SI avoid social contact, hide emotions, and appear to be withdrawn. Type D personality independently predicts long-term mortality in coronary heart disease patients, regardless of disease severity or medical risk [2]. These individuals show higher stress, more depressive symptoms, and reduced quality of life after cardiac events [7]. Physiological studies have associated Type D traits with increased Cardiovascular (CVS) and neuroendocrine stress responses thus suggesting a biological mechanism for disease progression [8]. This personality pattern shows the chronic

emotional distress and social evasion that has a serious impact on the mental and physical health.

Neuromodulation studies have shown that the vagus nerve regulates mood and emotional processing. Vagus Nerve Stimulation (VNS) produces antidepressant effects in treatment-resistant depression [9]. Non-invasive transcutaneous Vagus Nerve Stimulation (tVNS) reduces the activity in brain regions that is related to emotional reactivity like the amygdala and hippocampus thus improving the mood [10]. These findings thus highlight that vagal tone is a major element in emotional control and stress recovery. Traditional practices like “OM” chanting may have an impact on the vagal function through stimulation of the auricular vagus branch. This occurs due to the vibrations near the ear activate vagal afferents and alter the brain activity. Functional Magnetic Resonance Imaging (fMRI) studies show that chanting “OM” reduces the activity in the amygdala, hippocampus, insula, anterior cingulate cortex, orbitofrontal cortex, parahippocampal gyrus, and thalamus, which are regions involved in stress and emotion control [11]. Type D personality shows immune imbalance and elevated pro-inflammatory cytokines in chronic heart failure patients [12]. These neural changes thus resemble those that are seen with clinical VNS thus explaining the stabilising effect of chanting. This review examines the psychobiological traits of Type D personality and evaluates “OM” chanting as a complementary approach that may raise vagal tone, reduce stress, and improve emotional stability.

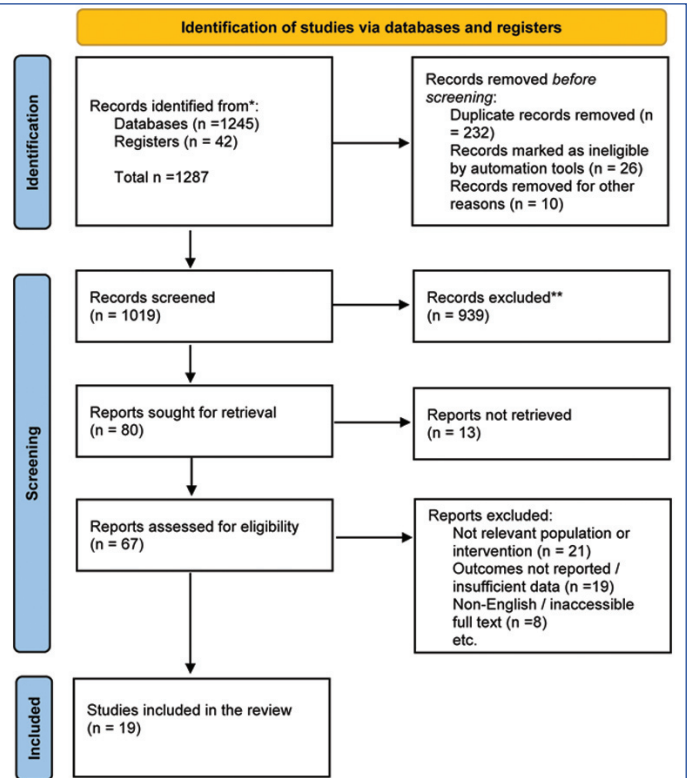
MATERIALS AND METHODS

Research Question: Can regular “OM” chanting enhance vagal tone, reduce stress responses, and improve emotional regulation in individuals with Type D personality, given the influence of Type D traits on stress physiology and autonomic balance?

Search Strategy: A systematic search was conducted in PubMed, Scopus, Web of Science, PsycINFO, and Google Scholar for studies published between January 1990 and August 2025. Keywords that were used included: (“Type D personality” OR “distressed personality”) AND (“vagus nerve stimulation” OR “vagal tone” OR “autonomic regulation”) AND (“OM chanting” OR “mantra chanting” OR “meditation”) AND (“stress reactivity” OR “emotional regulation”). Only English-language papers were considered.

Eligibility Criteria: Studies were eligible if they were peer-reviewed original research, clinical trials, that studied Type D personality in relation to stress physiology, CVS health, or autonomic function. Research on VNS, vagal tone, or other forms of neuromodulation was also included. Papers assessing physiological, neuroimaging, or psychological outcomes of “OM” chanting were eligible for inclusion. Exclusion criteria were non-English papers, editorials, letters, conference abstracts without data, studies with unclear methodology or outcomes, and animal research unrelated to vagal modulation.

Data Extraction and Synthesis: The search identified 1,287 records. After screening 1,019 titles and abstracts, 80 full-text papers were reviewed, and 19 met all inclusion criteria (PRISMA 2020 Flowchart; [Table/Fig-1]). Data were organised thematically to describe biological pathways, psychological outcomes, and clinical relevance. Meta-analysis was not performed because of high variability in study design, outcome measures, and sample characteristics.



[Table/Fig-1]: PRISMA 2020 flow diagram.

RESULTS

[Table/Fig-2] presents studies shows the biological and physiological markers associated with Type D personality. Across multiple cohorts, consistent findings indicate that Type D traits predict poor CVS and stress-related results [8,12-27]. Studies with approximately >300 patients with coronary heart disease found that individuals with Type D personality had higher 5-year

mortality rates [2]. Several studies using the DS14 tool reported autonomic imbalance, with reduced HRV in different populations, including patients with coronary artery disease, and those with congestive heart failure [15,16,21,22]. Studies also show that endocrine and immune dysregulation, increases the cortisol levels, with increased awakening response, and inflammatory markers like soluble Tumour Necrosis Factor (TNF) receptors and C-Reactive Protein (CRP) [12-14,19]. Reduced endothelial progenitor cells and increased oxidative stress indicate impaired vascular repair and heightened oxidative load [23-25]. Psychological parameters like anxiety, low self-efficacy, and slow recovery after stress also show the parasympathetic withdrawal and sympathetic dominance [17,26,27]. [Table/Fig-2] summarises the physiological and psychological effects of “OM” chanting [8,12-27]. Studies with sample sizes ranging from 12 to 100 participants show measurable autonomic, neurophysiological, and psychological improvements. Short chanting sessions of 10–20 minutes constantly reduced heart rate and blood pressure while increasing the HRV and indicated an enhanced vagal tone [28]. Autonomic changes during OM meditation has demonstrated this change towards parasympathetic dominance [28]. Electroencephalogram (EEG) data revealed increased alpha and theta power thus marking a relaxed although an alert mental state [29]. Immediate effects on HRV measures are observed which shows prominent differences between experienced and inexperienced individuals [30]. Structured OM chanting and listening programmes have been shown to be effective on psychological parameters in specific populations [31], and similar anxiety-reducing effects are observed in other high-stress groups [32]. Six-week interventions in prehypertensive women and hypertensive adults improved HRV and lowered scores for anxiety, depression, and stress [31,33]. OM chanting when combined with Yoga Nidra improves depression, anxiety, stress, sleep quality, and autonomic functions of practitioners [33]. The participants with Type D personality have shown improved memory, coordination, and parasympathetic activity after four weeks of daily chanting [34]. Group chanting helps to reduce the cortisol levels and strengthen social bonding amongst individuals [35]. These interventions are comprehended through established diagnostic frameworks and ancient philosophical texts which produces physiological changes that are constant with stress system dysregulation [36-38].

Study (Year)	Sample Size	Tool	Outcome Measures	Key Findings
Denollet J et al., (1996) [2]	303 Congenital Heart Disease (CHD) patients	Personality questionnaire	5-year mortality	Type D is an independent predictor of long-term mortality.
Habra ME et al., (2003) [8]	173 undergraduate students	DS14	Cardiovascular (CV) reactivity, cortisol	Type D linked to increased Blood Pressure (BP) and cortisol reactivity to acute stress.
Denollet J et al., (2003) [12]	42 men with Congestive Heart Failure (CHF)	DS14	sTNFR1, sTNFR2, TNF-α	Type D associated with elevated inflammatory markers (immune dysregulation).
Whitehead DL et al., (2007) [13]	72 ACS survivors	DS16	Cortisol Awakening Response (CAR)	Type D associated with an elevated CAR {Hypothalamic-Pituitary-Adrenal (HPA) axis dysregulation} axis dysregulation).
Molloy GJ et al., (2008) [14]	70 post-Acute Coronary Syndrome (ACS) patients	DS16	Diurnal cortisol secretion	Type D linked to increased 24-hour cortisol output.
Kang N et al., (2015) [15]	49 CMHC patients	DS14	Heart Rate Variability (HRV)	Type D associated with significantly reduced HRV.

Lin IM et al., (2017) [16]	168 CAD patients	DS14	HRV, lipid profile	Type D linked to reduced HRV and unfavorable lipid profiles.
Smith MA et al., (2018) [17]	101 healthy adults	DS14	Cortisol, perceived stress, anxiety	Stress & anxiety mediate Type D–physical health link; no direct cortisol effect.
Sekar L et al. (2019) [18]	30 nursing professionals (15 intervention, 15 control)	Perceived Stress Scale (PSS)	HRV, Serum Cortisol, Auditory & Visual Reaction Time (ART/VRT)	Mahamantra chanting significantly increased parasympathetic tone (LF/HF ratio), decreased serum cortisol, and improved cognitive performance (shortened ART/VRT).
Einvik G et al., (2011) [19]	453 persons without Cardiovascular Disease (CVD)	DS14	CRP, CV risk factors	Type D associated with higher CRP and more metabolic risk factors.
Williams L et al., (2009) [20]	84 healthy adults	DS14	Cardiac Output (CO), Vascular Reactivity	Type D linked to increased CO in males; no association with vascular reactivity.
Martin LA et al., (2010) [21]	256 adults	DS14	HRV	Type D predicts lower HRV across different ethnicities.
von Känel R et al., (2009) [22]	51 CHF patients	DS14	Heart Rate Recovery (HRR)	Type D associated with slower HRR after exercise.
Fischer JC et al., (2009) [23]	468 adults	DS14	Endothelial Progenitor Cells (EPCs), Cortisol	Type D linked to lower EPC count; cortisol is a partial mediator.
Van Craenenbroeck EM et al., (2009) [24]	35 sedentary men	DS14	EPCs (CD34+/KDR+)	Type D associated with reduced EPCs, indicating impaired vascular repair.
Kupper N et al., (2009) [25]	122 CHF patients	DS14	Oxidative stress (F2-isoprostanes)	Type D linked to increased oxidative stress.
Petrowski K et al., (2017) [26]	203 unemployed	DS14	HRV, self-efficacy	Type D linked to lower self-efficacy; no difference in HRV found.
Sumin AN et al., (2025) [27]	79 students	DS14	HRV, Respiratory Rate, Heart Rate	Type D linked to sympathetic activation and slow recovery post-stress.

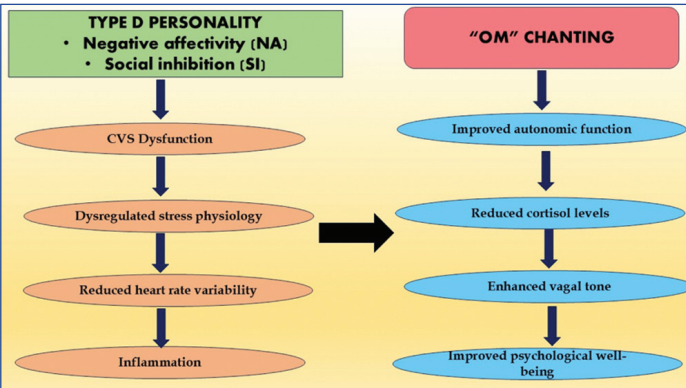
[Table/Fig-2]: Type D personality and associated psychobiological stress markers [2,8,12-27].

DISCUSSION

Longitudinal and clinical research shows that Type D personality predicts unfavorable long-term outcomes. Denollet J et al., examined 303 coronary heart disease patients and found that Type D personality independently predicted five-year mortality, with hazard ratios higher than those of non-Type D patients [2]. This result signifies the impact of psychosocial traits on disease progression. Chronic stress exposure and physiological imbalance are considered as the major regulators of this risk [8]. Type D individuals show increased set of reactions to acute stress. Habra ME et al., examined 173 healthy adults with Type D traits and observed increased level of CVS and cortisol responses during stress tasks, thus showing hyperactivation of the sympathetic-adrenal-medullary and hypothalamic-pituitary-adrenal systems [8,39], core elements of the central stress network. Studies have reported a higher cortisol awakening response in post-acute coronary syndrome patients with Type D traits [13] and increased 24-hour cortisol output in individuals with this personality pattern [14]. “OM” chanting produces

measurable physiological and psychological benefits. Brief sessions of 10–20 minutes constantly reduces heart rate and blood pressure, raised HRV, and shows stronger vagal tone [28,30]. EEG recordings show higher alpha and theta activity thus suggesting a calm yet alert state [29]. There is improved autonomic balance and mental health, with prehypertensive women and hypertensive adults with better HRV and lower anxiety, depression, and stress levels [31,33]. Individuals with Type D personality demonstrates benefits in memory, coordination, and parasympathetic function after daily practice [34]. Group chanting also decreases the cortisol levels and promotes social connectedness [35,36]. These findings show that Type D personality triggers both immediate and sustained neuroendocrine stress activation. Results are in accordance with the allostatic load model, which connects chronic psychological stress to cumulative physiological strain intensified by emotional suppression and social withdrawal [17,37].

Type D personality shows discrete signs of autonomic imbalance. Studies have reported reduced HRV in community mental health users with Type D traits [15]. Lower HRV with unfavourable lipid profiles in coronary artery disease patients have indicated a combined autonomic and metabolic risk [16]. Different populations have showed that Type D personality is a constant cardiac risk indicator with reduced heart rate recovery and parasympathetic dysfunction [21,22]. This indicates an extensive dysregulation in autonomic, neuroendocrine, and inflammatory systems, demonstrating clear physiological effects associated to Type D traits [39]. Higher TNF receptors and CRP levels indicate immune activation [12,19], while reduced endothelial progenitor cells and increased F2-isoprostanes suggest vascular damage and oxidative stress [23-25] which was in accordance to the inflammatory reflex model of sustained immune activation [12,24]. Type D personality affects both mental and cognitive function. People with these characteristics experience more stress and anxiety, which associate them to physical complaints without major hormonal changes [17]. They often show low confidence and poor coping ability [26]. Cardiac and hypertensive individuals with Type D traits report higher depression, anxiety, poorer health, and greater risk of mild cognitive impairment [7,41,43]. The combined psychobiological interactions and the modulatory effects of OM chanting on these systems are summarised in [Table/Fig-3].



[Table/Fig-3]: Psychobiological pathways of Type D personality and the modulatory effects of OM chanting on autonomic, neuroendocrine, and psychological functions.

Effects of ‘OM’ Chanting on Autonomic, Psychological, and Cognitive Parameters

OM chanting provides a simple, non-invasive approach that counters the physiological and psychological imbalance correlated to Type D personality. Practice improves autonomic control by reducing the heart rate and blood pressure and increasing HRV, thus indicating stronger parasympathetic activity [28,30]. Brain imaging shows reduced activation in the amygdala, hippocampus, insula, and cingulate cortex during chanting with calmer emotional regulation [11]. EEG recordings reveal higher alpha and theta power and indicates relaxed alertness [29]. Regular sessions decrease

the anxiety, depression, and stress, with improvements reported in prehypertensive women and professional drivers [31,32]. Type D adults showed gains in memory, coordination, and parasympathetic tone after daily practice [34]. Group chanting reduced the cortisol level and enhanced social connection therefore confirming its stabilising influence [35].

Correlation and Integration of Type D and OM Chanting Findings

Type D personality combines emotional distress with measurable physiological strain that influences the heart function, hormonal control, and immune balance. People with these characteristics show low HRV and increased cortisol which are signs of chronic sympathetic dominance and reduced vagal tone [8,13,15]. "OM" chanting produces the opposite pattern by increasing the parasympathetic activity, improving HRV, and reducing cortisol levels [28,30,35]. Brain imaging during chanting shows reduced activation in the amygdala and hippocampus [11], which are associated with persistent negative mood [8]. Regular practice of OM lowers the anxiety, depression, and stress scores in individuals [31,32], while improves the cognition, attention, and memory performance [34]. These effects suggest that "OM" chanting restores physiological stability and emotional control through vagal modulation and reduced limbic arousal. Type D personality has been associated with poor cardiac prognosis, greater mortality risk, and prolonged emotional strain that delays recovery [40,41]. Restricted coping resources and exhaustion makes these individuals more susceptible [42], and recent findings have associated this pattern to early cognitive deterioration [43]. Hence, the integration of "OM" chanting as a regular behavioural method provides a simple, low-cost method to improve autonomic balance, reduce stress load, and improve the CVS and psychological health in people with Type D personalities.

Limitations and Future Directions: This review was limited by small sample sizes, varied chanting durations, and inconsistent assessment tools across studies. Long-term trials are required to confirm sustained physiological and psychological changes and to track cardiovascular endpoints. Future studies should standardise "OM" chanting protocols, include diverse populations, and measure autonomic, hormonal, inflammatory, and cognitive variables together. Integrating neuroimaging with physiological and behavioural assessments will help to define how chanting influences body-mind regulation and guide its application in clinical practice.

CONCLUSION

This paper demonstrated the impact of Type D personality on stress physiology, autonomic balance, and emotional regulation, and evaluated the physiological and psychological effects of OM chanting. Type D traits disrupted vagal tone, increased cortisol secretion, and slowed stress recovery, leading to greater cardiac strain. OM chanting reduced heart rate and blood pressure, improved HRV, and decreased cortisol, showing restored autonomic balance. These findings indicated that OM chanting provided a practical, low-cost method to stabilise stress responses, enhance mental well-being, and support cardiovascular health in individuals with Type D personality.

REFERENCES

- [1] Bhatia MS. Essentials of psychiatry. New Delhi: CBS Publishers and Distributors Pvt. Ltd; 2019. p. 846.
- [2] Denollet J, Sys SU, Strobant N, Rombouts H, Gillebert TC, Brutsaert DL. Personality as independent predictor of long-term mortality in patients with coronary heart disease. *Lancet*. 1996 Feb 17;347(8999):417-21. Doi: 10.1016/S0140-6736(96)90007-0. PMID: 8618481.
- [3] Denollet J. DS14: Standard assessment of negative affectivity, social inhibition, and Type D personality. *Psychosom Med*. 2005 Jan-Feb;67(1):89-97. Doi: 10.1097/01.psy.0000149256.81953.49. PMID: 15673629.
- [4] Watson D, Clark LA. Negative affectivity: The disposition to experience aversive emotional states. *Psychol Bull*. 1984 Nov;96(3):465-90. PMID: 6393179.
- [5] Watson D, Pennebaker JW. Health complaints, stress, and distress: Exploring the central role of negative affectivity. *Psychol Rev*. 1989 Apr;96(2):234-54. Doi: 10.1037/0033-295x.96.2.234. PMID: 2710874.
- [6] Asendorpf JB. Social inhibition: A general-developmental perspective. In: Traue HC, Pennebaker JW, editors. *Emotion, inhibition, and health*. Seattle (WA): Hogrefe & Huber Publishers; 1993. p. 80-99.
- [7] Mols F, Martens EJ, Denollet J. Type D personality and depressive symptoms are independent predictors of impaired health status following acute myocardial infarction. *Heart*. 2010 Jan;96(1):30-5. Doi: 10.1136/hrt.2009.170357. Epub 2009 Sep 23. PMID: 19778919.
- [8] Habra ME, Linden W, Anderson JC, Weinberg J. Type D personality is related to cardiovascular and neuroendocrine reactivity to acute stress. *J Psychosom Res*. 2003 Sep;55(3):235-45. Doi: 10.1016/S0022-3999(02)00553-6. PMID: 12932797.
- [9] Nahas Z, Marangell LB, Husain MM, Rush AJ, Sackeim HA, Lisanby SH, Martinez JM, George MS. Two-year outcome of vagus nerve stimulation (VNS) for treatment of major depressive episodes. *J Clin Psychiatry*. 2005 Sep;66(9):1097-104. Doi: 10.4088/jcp.v66n0902. PMID: 16187765.
- [10] Kraus T, Hösl K, Kiess O, Schanze A, Kornhuber J, Forster C. BOLD fMRI deactivation of limbic and temporal brain structures and mood enhancing effect by transcutaneous vagus nerve stimulation. *J Neural Transm*. 2007;114:1485-93. doi: 10.1007/s00702-007-0755-z.
- [11] Kalyani BG, Venkatasubramanian G, Arasappa R, Rao NP, Kalmady SV, Behere RV, Rao H, Vasudev MK, Gangadhar BN. Neurohemodynamic correlates of 'OM' chanting: A pilot functional magnetic resonance imaging study. *Int J Yoga*. 2011 Jan;4(1):3-6. Doi: 10.4103/0973-6131.78171. PMID: 21654968; PMCID: PMC3099099.
- [12] Denollet J, Conraads VM, Brutsaert DL, De Clerck LS, Stevens WJ, Vrints CJ. Cytokines and immune activation in systolic heart failure: The role of Type D personality. *Brain Behav Immun*. 2003 Aug;17(4):304-9. Doi: 10.1016/S0889-1591(03)00060-6. PMID: 12831833.
- [13] Whitehead DL, Perkins-Porras L, Strike PC, Magid K, Steptoe A. Cortisol awakening response is elevated in acute coronary syndrome patients with type-D personality. *J Psychosom Res*. 2007 Apr;62(4):419-25. Doi: 10.1016/j.jpsychores.2006.11.005. PMID: 17383493.
- [14] Molloy GJ, Perkins-Porras L, Strike PC, Steptoe A. Type-D personality and cortisol in survivors of acute coronary syndrome. *Psychosom Med*. 2008 Oct;70(8):863-8. Doi: 10.1097/PSY.0b013e3181842e0c. Epub 2008 Sep 16. PMID: 18799427.
- [15] Kang N, Lim JS, Hwang TG, Joe SH, Lee MS. The Relationship between Type D Personality and Heart Rate Variability in Community Mental Health Center Users. *Psychiatry Investig*. 2015 Apr;12(2):197-203. Doi: 10.4306/pi.2015.12.2.197. Epub 2015 Jan 20. PMID: 25866520; PMCID: PMC4390590.
- [16] Lin IM, Wang SY, Chu IH, Lu YH, Lee CS, Lin TH, Fan SY. The Association of Type D personality with Heart Rate Variability and Lipid Profiles Among Patients with Coronary Artery Disease. *Int J Behav Med*. 2017 Feb;24(1):101-109. Doi: 10.1007/s12529-016-9571-x. PMID: 27229521.
- [17] Smith MA, Riccalton VC, Kelly-Hughes DH, Craw OA, Allen SF, O'Connor DB, et al. The relationship between Type D personality and physical health complaints is mediated by perceived stress and anxiety but not diurnal cortisol secretion. *Stress*. 2018 May;21(3):229-236. https://doi.org/10.1080/10253890.2018.1435637
- [18] Sekar L, Niva WJ, Maheshkumar K, Thangavel G, Manikandan A, Silambanan S, et al. Effect of mahamantra chanting on autonomic and cognitive functions-An interventional study. *J Clin Diagn Res*. 2019;13(5):CC01-05.
- [19] Einvik G, Dammen T, Hrubos-Ström H, Namtvedt SK, Randby A, Kristiansen HA, et al. Prevalence of cardiovascular risk factors and concentration of C-reactive protein in Type D personality persons without cardiovascular disease. *Eur J Cardiovasc Prev Rehabil*. 2011 Jun;18(3):504-9. Doi: 10.1177/1741826710389383. Epub 2011 Feb 9. PMID: 21450648.
- [20] Williams L, O'Carroll RE, O'Connor RC. Type D personality and cardiac output in response to stress. *Psychol Health*. 2009 Jun;24(5):489-500. Doi: 10.1080/08870440701885616. PMID: 20205007.
- [21] Martin LA, Doster JA, Critelli JW, Lambert PL, Purdum M, Powers C, et al. Ethnicity and Type D personality as predictors of heart rate variability. *Int J Psychophysiol*. 2010 May;76(2):118-21. Doi: 10.1016/j.jpsycho.2010.03.001. Epub 2010 Mar 6. PMID: 20211208.
- [22] von Känel R, Barth J, Kohls S, Saner H, Znoj H, Saner G, et al Heart rate recovery after exercise in chronic heart failure: Role of vital exhaustion and type D personality. *J Cardiol*. 2009 Apr;53(2):248-56. Doi: 10.1016/j.jcc.2008.11.008. Epub 2009 Jan 23. PMID: 19304130.
- [23] Fischer JC, Kudielka BM, von Känel R, Siegrist J, Thayer JF, Fischer JE. Bone-marrow derived progenitor cells are associated with psychosocial determinants of health after controlling for classical biological and behavioral cardiovascular risk factors. *Brain Behav Immun*. 2009 May;23(4):419-26. Doi: 10.1016/j.bbi.2008.08.005. Epub 2008 Aug 31. PMID: 18799132.
- [24] Van Craenenbroeck EM, Denollet J, Paelinck BP, Beckers P, Possemiers N, Hoymans VY, Vrints CJ, Conraads VM. Circulating CD34+/KDR+ endothelial progenitor cells are reduced in chronic heart failure patients as a function of Type D personality. *Clin Sci (Lond)*. 2009 Jul 16;117(4):165-72. Doi: 10.1042/CS20080564. PMID: 19173675.
- [25] Kupper N, Gidron Y, Winter J, Denollet J. Association between type D personality, depression, and oxidative stress in patients with chronic heart failure. *Psychosom Med*. 2009 Nov;71(9):973-80. Doi: 10.1097/PSY.0b013e3181bee6dc. Epub 2009 Oct 15. PMID: 19834046.
- [26] Petrowski K, Wendt K, Wichmann S, Siepmann M. Type-D personality in unemployed subjects: Prevalence, self-efficacy and heart rate variability/autonomic response.

- [27] Sumin AN, Zagorskaya NN, Shcheglova AV, Shipilov AA, Kostylbaev DZ, Shikanova EA, et al. Personality Type D and Psychophysiological Stress Reactivity During Mental stress in Young Healthy Individuals. *Behav Sci (Basel)*. 2025 Jun 24;15(7):852. Doi: 10.3390/bs15070852. PMID: 40723636; PMCID: PMC12292575.
- [28] Telles S, Nagarathna R, Nagendra HR. Autonomic changes during "OM" meditation. *Indian J Physiol Pharmacol*. 1995 Oct;39(4):418-20. PMID: 8582759.
- [29] Harne BP, Hiwale AS. EEG spectral analysis on OM Mantra Meditation: A Pilot Study. *Appl Psychophysiol Biofeedback*. 2018 Jun;43(2):123-129. Doi: 10.1007/s10484-018-9391-7. PMID: 29752573.
- [30] Inbaraj G, Rao RM, Ram A, Bayari SK, Belur S, Prathyusha PV, et al. Immediate effects of OM chanting on heart rate variability measures compared between experienced and inexperienced yoga practitioners. *Int J Yoga*. 2022 Jan-Apr;15(1):52-58. Doi: 10.4103/ijoy.ijoy_141_21. Epub 2022 Mar 21. PMID: 35444369; PMCID: PMC9015091.
- [31] Aalasyam N, Goothy SS, Mukkadan JK. Effectiveness of structured Om chanting and listening program on psychological parameters in pre-hypertensive women. *Nat J Physiol Pharm Pharmacol*. 2021 Sep 30;11(10):1095-.
- [32] Rankhambe HB, Pande S. Effect of Om chanting on anxiety in bus drivers. *Natl J Physiol Pharm Pharmacol*. 2020;10(12):1138-41. Doi:10.5455/njppp.2021.11.10268202014102020.
- [33] Rajagopalan A, Krishna A, Mukkadan JK. Effect of Om chanting and Yoga Nidra on depression anxiety stress, sleep quality and autonomic functions of hypertensive subjects - a randomized controlled trial. *J Basic Clin Physiol Pharmacol*. 2022 Jun 13;34(1):69-75. Doi: 10.1515/jbcpp-2022-0122. PMID: 35689170.
- [34] Jose P, Jose MS, Mukkadan JK. Beneficial effects of Om chanting on spatial and verbal memory, motor skills and pupil to limbus diameter ratio in young adults with Type-D personality. *Int J Pharm Biol Sci*. 2019;9(3):1298-307. Doi:10.21276/ijpbs.2019.9.3.159.
- [35] Perry G, Polito V, Thompson WF. Exploring the physiological and psychological effects of group chanting in Australia: Reduced stress, cortisol and enhanced social connection. *J Relig Health*. 2024 Dec;63(6):4793-4815.
- [36] Pender VB. *Diagnostic and statistical manual of mental disorders: DSM-5-TR*. Washington (DC): American Psychiatric Association Publishing; 2022. p. 733.
- [37] Chinmayananda S. *Mandukya Upanishad*. Mumbai: Sachin Publishers; 1984.
- [38] Gold PW, Chrousos GP. Organization of the stress system and its dysregulation in melancholic and atypical depression: High vs low CRH/NE states. *Mol Psychiatry*. 2002;7(3):254-75. Doi: 10.1038/sj.mp.4001032. PMID: 11920153.
- [39] De Fruyt F, Denollet J. Type D personality: A five-factor model perspective. *Psychol Health*. 2002;17(5):671-83.
- [40] Martens EJ, Mols F, Burg MM, Denollet J. Type D personality predicts clinical events after myocardial infarction, above and beyond disease severity and depression. *J Clin Psychiatry*. 2010 Jun;71(6):778-83. Doi: 10.4088/JCP.08m04765blu. Epub 2010 Feb 9. PMID: 20156412.
- [41] Schiffer AA, Pedersen SS, Widdershoven JW, Hendriks EH, Winter JB, Denollet J. The distressed (type D) personality is independently associated with impaired health status and increased depressive symptoms in chronic heart failure. *Eur J Cardiovasc Prev Rehabil*. 2005 Aug;12(4):341-6. Doi: 10.1097/01.hjr.0000173107.76109.6c. PMID: 16079641.
- [42] Polman R, Borkoles E, Nicholls AR. Type D personality, stress, and symptoms of burnout: The influence of avoidance coping and social support. *Br J Health Psychol*. 2010 Sep;15(Pt 3):681-96. Doi: 10.1348/135910709X479069. Epub 2009 Nov 21. PMID: 19930789.
- [43] Ye Q, Liu L, Wang Y, Li L, Wang Z, Liu G, Lin P, Li Q. Association of Type D personality and mild cognitive impairment in patients with hypertension. *Front Psychol*. 2022 Nov 16;13:974430. Doi: 10.3389/fpsyg.2022.974430. PMID: 36467148; PMCID: PMC9709486.

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