Case Report/Series

Comparing therapeutic effects of Qur'anic recitation and classical music in vascular cognitive impairment: a case series

Ira Ristinawati[1], Tyasno Koeshermanto[2], Muhammad Hafizhan[1], Stefanus Erdana Putra[3], Muhammad Naufal Rafif[4], Suyatmi[4], Pepi Budianto[1], Suroto[1], Diah Kurnia Mirawati[1], Subandi[1], Rivan Danuaji[1], Yetty Hambarsari[1], Baarid Luqman Hamidi[1], Hanindia Riani Prabaningtyas[1], Ervina Arta Jayanti Hutabarat[1], Teddy Tejomukti[1], Raden Andi Ario Tedjo[1], Faris Khairuddin Syah[1], Iqbal Imanuddin[1]

Check for updates

pISSN: 0853-1773 • eISSN: 2252-8083
https://doi.org/10.13181/mji.cr.268266
Med J Indones. 2026;35:252–8

Received: June 15, 2025
Accepted: February 19, 2026
Published online: August 12, 2026

Authors' affiliations:
[1]Department of Neurology, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia, [2]Medical Emergency Unit, Hj. Anna Lasmanah Regional General Hospital, Banjarnegara, Indonesia, [3]Department of Neurology, Faculty of Medicine, Universitas Kristen Duta Wacana, Yogyakarta, Indonesia, [4]Department of Histology, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia

Corresponding author:
Ira Ristinawati
Department of Neurology, Faculty of Medicine, Universitas Sebelas Maret, Jalan Ir. Sutami No. 36A, Jebres, Surakarta 57126, Central Java, Indonesia
Tel/Fax: +62-271-663-088
E-mail: ira.ristinawati@staff.uns.ac.id

ABSTRACT

The increasing prevalence of vascular cognitive impairment (VCI) underscores the critical need for innovative non-pharmacological strategies. This retrospective comparative case series evaluated the effects of classical music therapy, Qur'anic recitation, and their combination on cognitive function and religious engagement in 7 patients with VCI due to rare disorders, including vasculitis related to systemic lupus erythematosus and Balint syndrome. Assessments included brain magnetic resonance imaging, the Indonesian version of the Montreal Cognitive Assessment, the dementia solat score, and C-reactive protein levels. Patients who received only Qur'anic recitation demonstrated the most significant improvement in cognitive function and religious engagement. The findings suggest that Qur'anic recitation therapy has yielded superior results despite potential sound wave conflicts. Future studies with larger samples are required to validate these findings and explore further non-pharmacological interventions for VCI.

KEYWORDS cognitive dysfunction, music therapy, religion

Vascular cognitive impairment (VCI) is the second most common form of dementia after Alzheimer's disease, and it contributes significantly to cognitive decline in the elderly.[1] Unlike Alzheimer's, VCI stems from cerebrovascular diseases that disrupt blood flow to the brain, leading to a decline in cognitive and functional abilities.[2] The disease is often associated with a history of stroke, small vessel disease (SVD), or other vascular conditions, making its management more complex.[3] Moreover, cognitive decline in VCI typically progresses gradually, further complicating diagnosis and treatment. With the global rise in cognitive impairment disorders, there is a growing need for innovative therapeutic strategies that go beyond conventional pharmacological approaches, which often yield only minimal and clinically limited improvements in this patient cohort.[4]

Comprehensive multidisciplinary care is increasingly recognized as crucial for managing complex conditions such as VCI in primary care settings.[5] The approach

Copyright @ 2026 Authors. This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are properly cited. For commercial use of this work, please see our terms at https://mji.ui.ac.id/journal/index.php/mji/copyright.

necessitates collaboration between various healthcare professionals to address the multifaceted needs of individuals with VCI, including cognitive, physical, and psychosocial aspects.[6] Patients' selection of Qur'anic recitation underscores the cultural and spiritual dimensions of non-pharmacological interventions in VCI.[7] This practice is deeply rooted in many Indonesian communities, and can provide spiritual reassurance and potential cognitive benefits.

The physiological and psychological effects of structured auditory stimulation, such as music and rhythmic recitation, are increasingly recognized as a valuable component of a holistic treatment paradigm. Neurobiological studies suggest that such stimuli can engage multiple brain regions, including the prefrontal cortex, temporal lobes, and the limbic system, which are critical for attention, memory, and emotional regulation.[8] Consistent exposure to these auditory inputs may foster neuroplastic changes, stimulating neural pathways compromised in VCI.[4] Furthermore, auditory therapies have been shown to influence neurotransmitter activity, potentially increasing levels of dopamine and serotonin, which can improve mood and reduce anxiety, common challenges in individuals with cognitive impairment.[7,8]

The current retrospective case series assessed the efficacy of classical music therapy, Qur'anic recitation, and a combination of both to improve cognitive function and religious engagement in patients with various vascular neurodegenerative conditions receiving multidisciplinary care. The series included a unique case of vasculitis associated with systemic lupus erythematosus (SLE) and Balint syndrome, underscoring the diverse manifestations of neurological disorders and the potential of non-pharmacological interventions for managing these complex conditions.

CASE SERIES

A retrospective comparative case series design was used to assess the effects of Qur'anic recitation and classical music therapy on cognitive impairment in individuals with neurodegenerative conditions. Seven retrospective cases overseen by Dr. Moewardi Hospital, Surakarta, Indonesia, were collated. Participants were selected based on specific inclusion and exclusion criteria. Eligible participants were individuals diagnosed with cognitive impairment due to various neurodegenerative diseases, aged over 35 years, capable of listening to and understanding auditory stimuli, medically stable, and well managed in terms of comorbid conditions. The participants were also required to be Muslim. Individuals were excluded from the study if they had severe hearing impairment, were undergoing unstable psychotropic medication treatment, had a history of severe psychological or psychiatric disorders, were currently involved in other clinical trials, or had allergies or intolerance to certain types of music.

The study included three non-pharmacological intervention groups; Qur'anic recitation (n = 2), classical music therapy (n = 2), and a combination of both (n = 3). In the Qur'anic recitation group, participants listened to specific surahs (e.g., Al-Qur'an surah Yasin, Ar-Rahman, or Al-Fatihah) for a minimum of 30 min daily.[7] The classical music therapy group listened to selected classical music pieces, including Pachelbel's Canon in D Major and various compositions by Mozart, for at least 30 min daily.[8–10] In accordance with the protocols above, the combination therapy group participated in Qur'anic recitation and classical music therapy. The decision to undergo the intervention was made by the patients and their families after receiving a detailed explanation of the procedures from the doctor and nurse.

Nurses regularly assessed vital signs, performed frequent neurological examinations to detect any new deficits or signs of altered mental status, administered the chosen auditory therapy sessions, and observed patients for any physiological or behavioral changes during and after each session while patients were staying at the polyclinic. When patients were discharged from the polyclinic under close family monitoring, they were provided discharge education to ensure a safe home environment and emotional support, bridging the gap between therapeutic interventions and the daily management of VCI by doctors, nurses, and physiotherapists.

Data collection involved multiple clinical evaluations, including magnetic resonance imaging (MRI) and cognitive assessments using tools such as the Indonesian version of the Montreal Cognitive Assessment and the dementia solat score (DSS). The DSS is a validated, objective assessment tool developed for Muslim patients, as a decline in routine prayer performance is reportedly associated with cognitive impairment regardless of sex or educational background.[11] The scale has exhibited high sensitivity (85.0%) and specificity (93.8%) for detecting cognitive

Table 1. Clinical and biochemical characteristics and follow-up results of participants

Case number	Age (years)/ sex	Primary diagnosis	Key symptoms	Neuroimaging findings	Intervention	DSS		MoCA-INA score		Total cholesterol (mg/dl)		TGs (mg/ dl)		HDL cholesterol (mg/dl)		LDL cholesterol (mg/dl)		CRP (mg/l)	
						Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	40/ female	SLE with VCI	Speech and memory problems	Lacunar infarcts, small vessel ischemia, and vascular anomalies (missing ACA segment)	Qur'anic recitation	8	5	20	25	230	190	180	140	40	50	150	120	0.5	0.3
2	54/ male	VCI secondary to CSVD	Progressive memory loss, disorientation, and dysarthria	Chronic infarcts, SVD, frontal lobe atrophy, and arterial hypoplasia	Qur'anic recitation	7	4	17	24	220	180	160	130	45	55	150	110	0.5	0.3
3	51/ female	Balint syndrome	Speech issues, memory problems, optic ataxia, and simultanagnosia	Left occipital lobe lesion, old strokes, and white matter changes	Classical music	7	5	20	22	240	210	190	160	42	48	160	135	0.5	0.4
4	87/ female	VCI secondary to cerebrovascular disease	Cognitive decline, gait disturbances, and frequent falls	Late subacute infarction, SVD, brain atrophy, and ex vacuo hydrocephalus	Classical music	10	8	16	19	250	220	200	170	38	44	180	150	0.5	0.4
5	51/ female	VCI secondary to CSVD	Gradual cognitive decline and memory problems	Small vessel ischemic changes, fetal posterior cerebral artery, and underdeveloped arteries	Combination	9	9	14	15	240	235	180	175	40	41	170	165	0.5	0.5
6	35/ female	Suspected cerebral vasculitis	Forgetfulness, concentration difficulties, and reduced motor coordination	Irregular, non-marginated extra-axial lesion, and small vessel ischemic changes	Combination	8	8	15	15	230	225	170	165	43	44	160	155	0.5	0.5
7	64/ male	Early-stage VCI	Progressive cognitive decline and word-finding difficulties	Small vessel damage and hypoplasia of the right vertebral artery	Combination	10	10	16	16	240	235	180	175	40	41	170	165	0.5	0.5

ACA=anterior cerebral artery; CRP=C-reactive protein; CSVD=cerebral small vessel disease; DSS=dementia solat score; HDL=high-density lipoprotein; LDL=low-density lipoprotein; MoCA-INA=Indonesian version of Montreal Cognitive Assessment; SLE=systemic lupus erythematosus; SVD=small vessel disease; TG=triglyceride; VCI=vascular cognitive impairment

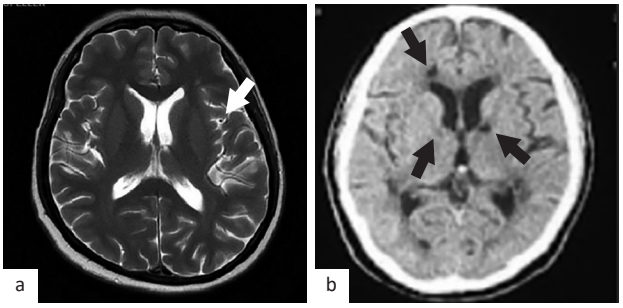


Figure 1. Brain MRI of the patients who adopted Qur'anic recitation therapy. (a) The first patient showed multiple chronic lacunar infarcts in the right putamen and globus pallidus, as well as small vessel ischemia in bilateral parietal lobe white matter (white arrow) and periventricular regions with Fazekas stage 1; (b) brain CT scan of the second patient showed chronic infarctions in the right frontal lobe and multiple chronic lacunar infarctions in the bilateral corona radiata and bilateral periventricular (black arrows). CT=computed tomography; MRI=magnetic resonance imaging

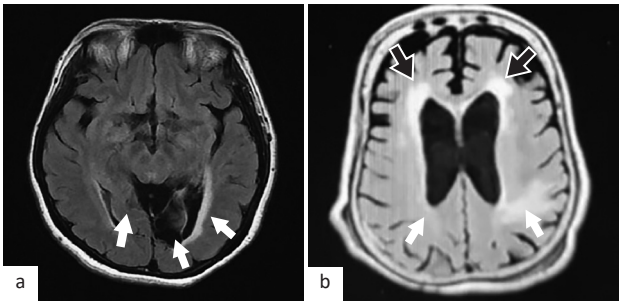


Figure 2. Brain magnetic resonance imaging (MRI) of the patients who adopted classical music therapy. (a) The third patient had an intra-axial lesion in the left occipital lobe, indicative of encephalomalacia cyst (white arrow), this image slice doesn't show the lesion in internal capsule nor corona radiata, and small vessel ischemic changes in the periventricular white matter of the bilateral parietal lobes with Fazekas stage 3 (white arrow); (b) the fourth patient had a late subacute infarction in the left parietal lobe, small vessel ischemic changes in the periventricular white matter of the bilateral parietal lobes with Fazekas stage 1 (white arrows), and infarct periventricular lesions (black arrows)

impairment, and correlates highly with the gold-standard clinical dementia rating scale (r = 0.920, p<0.001).[11] Lipid profiles and C-reactive protein levels were also measured to assess potential physiological changes associated with the interventions. This approach reflects a holistic, multidisciplinary paradigm for VCI management that extends beyond purely cognitive metrics.

Evaluation was conducted 6 months after initiation of the intervention, as shown in Table 1. Effect sizes and confidence intervals were calculated to quantify the extent of any observed improvement. This study was approved by the Health Research Ethics Committee of Dr. Moewardi Hospital (No: 049/II/HREC/2024), and written informed consent was obtained from all participants before their inclusion in the study.

Case 1

A 40-year-old woman with a history of SLE presented with a 2-month history of intermittent speech disturbances and memory deficits, particularly concerning the placement of items and recall of daily routines. Brain MRI revealed chronic lacunar infarcts in the right putamen and globus pallidus, small vessel ischemia in both parietal lobes, and vascular anomalies including a missing right anterior cerebral artery segment and an underdeveloped right vertebral artery (Figure 1a). Collectively, these findings suggested compromised cerebral blood flow, which may have been associated with her reported speech and cognitive challenges.

The treatment regimen for her included donepezil to address cognitive impairment, and cilostazol to enhance cerebral blood flow. She opted to undertake Qur'anic recitation therapy. Post-treatment she reported substantial improvements in memory and overall wellbeing, and cognitive tests indicated enhanced attention and memory. This case highlights the potential benefits of combined medical and non-pharmacological approaches for managing cognitive symptoms in patients with SLE with cerebrovascular involvement.

Case 2

A 54-year-old man presented reporting progressive memory loss, disorientation, dysarthria, and irritability, which affected daily activities substantially. Brain computed tomography scan showed chronic infarcts in the right frontal lobe, widespread SVD, frontal lobe atrophy, and arterial narrowing/hypoplasia (Figure 1b), suggesting that reduced cerebral blood flow was contributing to cognitive decline. He was treated with donepezil for cognitive improvement and cilostazol to enhance blood flow, supplemented with daily Qur'anic recitation therapy. After 6 months he reported feeling calmer and more organized, and experienced stabilization of his disorientation, language difficulties, and memory loss. He attributed these gains to the recitation therapy. This case suggests that adjunctive non-pharmacological interventions like Qur'anic

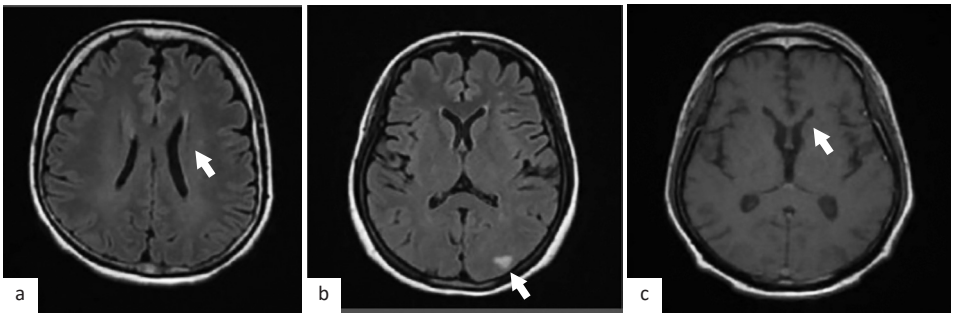


Figure 3. Brain magnetic resonance imaging (MRI) of the patients who adopted a combination of Qur'anic recitation and classical music therapy. (a) The fifth patient had small vessel ischemic changes in the white matter of the left parietal lobe with Fazekas stage 1 (white arrow); (b) the sixth patient had an irregular, non-marginated extra-axial lesion in the left occipital region (white arrow); (c) the seventh patient had small vessel ischemic changes in the left periventricular lateral ventricle with Fazekas stage 1 (white arrow)

recitation may yield subjectively perceived benefits in patients with VCI.

Case 3

A 51-year-old woman with Balint syndrome presented with 2 months of intermittent speech issues and recent memory problems. Neuropsychological testing confirmed classic symptoms including optic ataxia, oculomotor apraxia, and simultanagnosia, which severely affected her daily life. MRI revealed a left occipital lobe lesion, prior strokes, and white matter changes in both parietal lobes (Figure 2a), consistent with the effects of Balint syndrome on visual processing and spatial awareness.

The treatment for her included donepezil for cognitive impairment and cilostazol to improve cerebral blood flow, and she opted to undertake classical music therapy as a complementary intervention. She self-reported notable improvements in well-being, mood, and anxiety which enhanced her quality of life (QoL), even though objective cognitive gains were modest. This case underscores the potential for non-pharmacological therapies to improve QoL, even when objective cognitive gains are modest.

Case 4

An 87-year-old woman presented with cognitive decline and gait disturbances leading to frequent falls and loss of independence. Brain MRI revealed a recent left parietal lobe stroke, SVD, lacunar infarctions, severe brain atrophy, and ex vacuo hydrocephalus (Figure 2b), which collectively explained her cognitive and motor deficits. The treatment for her included donepezil for cognitive issues and cilostazol to improve cerebral blood flow, and she opted to undertake daily classical music therapy as a non-pharmacological intervention. This routine led to her feeling more regulated, calmer, and less anxious, which positively affected her daily functioning and overall QoL, despite modest improvements in cognitive scores. This case demonstrates the potential of complementary therapies to enhance the wellbeing of elderly patients with complex neurological conditions.

Case 5

A 51-year-old woman presented reporting gradual cognitive decline over several months, affecting her memory, daily tasks, and conversation. MRI demonstrated small vessel ischemic changes, a fetal posterior cerebral artery on the right side, and underdeveloped arteries (Figure 3a), indicating that compromised cerebral blood flow contributed to her cognitive difficulties.

She was treated with donepezil for cognitive impairment and cilostazol to improve the blood flow, and she opted to undertake both Qur'anic recitation and classical music therapy. She reported that Qur'anic recitation was spiritually uplifting, and that classical music aided relaxation and concentration, suggesting a role for these therapies in the provision of subjective benefits and coping mechanisms.

Case 6

A 35-year-old woman presented with forgetfulness, concentration difficulties, and reduced fine motor coordination, which severely affected her daily life and work. Brain MRI with contrast revealed an irregular lesion in the left occipital region, suggestive

of vasculitis and small vessel ischemic changes (Figure 3b), indicating vascular compromise as the likely cause of her cognitive and motor deficit. She was treated with donepezil for cognitive issues and cilostazol to improve cerebral blood flow, and opted to undertake both Qur'anic recitation and classical music therapy. She reported deriving spiritual comfort and relaxation from these therapies, but they did not result in significant objective improvements in cognitive performance or overall daily functioning. This case illustrates the challenge of achieving significant cognitive recovery in complex vascular neurological conditions despite combined interventions.

Case 7

A 64-year-old man presented with progressive cognitive decline marked by increased forgetfulness, word-finding difficulties, and impaired daily functioning, leading to frustration and anxiety. MRI revealed early-stage VCI with minor vessel damage and hypoplasia of the right vertebral artery (Figure 3c), both contributing to reduced cerebral blood flow and cognitive symptoms. He was treated with donepezil for cognitive impairment and cilostazol to improve cerebral blood flow. He opted to undertake both Qur'anic recitation and classical music therapy. Despite consistent engagement, he felt that these non-pharmacological therapies did not yield measurable cognitive improvements or have a meaningful effect on his daily routine. This case highlights the variability in patient response to non-pharmacological interventions in VCI, including cognitive improvements and meaningful effects on daily routine.

DISCUSSION

This case series investigated the effects of multidisciplinary non-pharmacological interventions, specifically Qur'anic recitation and classical music therapy, on cognitive function and general health parameters in patients with diverse cognitive impairments and vascular abnormalities. The findings suggest that these adjunctive therapies can improve cognitive performance and positively affect QoL, although the magnitude of the benefit varies between individuals. Integrating these therapies into a holistic treatment paradigm may be particularly relevant for patients with vascular risk factors and small vessel ischemic disease, where traditional pharmacological treatments often yield limited success with respect to reversing chronic cognitive decline.

Patients who engaged in Qur'anic recitation demonstrated the largest cognitive improvements in this series. This intervention involves intensive listening or repetition, offering spiritual reassurance and potential cognitive benefits through its rhythmic and meditative nature. Such structured auditory input may induce neuroplastic changes in brain regions involved in attention and working memory, reinforcing emotional resilience.[7] The deep cultural and spiritual roots of this practice likely enhance patient engagement, leading to reported emotional stability and a sense of calm.[11] These psychological benefits may act synergistically with standard care to mitigate the anxiety and stress frequently observed in individuals with cognitive impairment.[12]

The classical music group exhibited moderate cognitive improvements, consistent with existing literature on the "Mozart effect" and similar auditory stimuli. Regular exposure to structured compositions, such as Pachelbel's Canon in D Major, has been demonstrated to influence neurocognitive function, particularly affecting memory, mood, and executive processes.[10,13] Music engages a vast network of brain regions, including the prefrontal cortex and the limbic system, which are critical for emotional processing and memory retention.[14] Furthermore, music therapy can influence neurotransmitter activity by modulating dopamine and serotonin levels, which are essential for mood regulation.[15] The observed emotional benefits, including reduced anxiety and greater self-control, suggest that music therapy serves as an essential adjunctive tool for fostering psychological stability.[16,17]

In contrast with the single-intervention groups, the cohort that underwent combined therapy exhibited minimal changes in both cognitive and lipid profiles. This suggests that a combined therapeutic approach may not be universally practical or more effective than single-modality interventions, highlighting individual variability in responses to non-pharmacological care. All patients in this series received standard pharmacological interventions, including donepezil and cilostazol, to manage vascular dementia and improve cerebral blood flow.[18,19] However, the observed cognitive gains from medication alone were limited, likely due to the advanced stage of vascular insults and the progressive nature of SVD.[4] This finding underscores the need for personalized, culturally

appropriate interventions that address the emotional and spiritual needs of the patient, alongside standard medical management.

Despite the insights gained, several factors limit the generalizability of these findings, including the retrospective design and small sample size. A significant constraint was the absence of post-treatment advanced imaging due to local health system policies, which prevented assessment of associations between clinical improvements and structural brain changes. Furthermore, the lack of formal psychiatric assessments using validated scales and the reliance on patient choice rather than random assignment introduced potential selection bias. Future research should prioritize larger randomized controlled trials to establish causality, and optimize treatment strategies for VCI, particularly by investigating why combined therapies do not always provide additive benefits in this patient population.

Conflict of Interest

The authors affirm no conflict of interest in this study.

Acknowledgment

We thank the director of Dr. Moewardi Hospital, Surakarta, Central Java, Indonesia, for facilitating this case study.

Funding Sources

None.

REFERENCES

1. Sanders AE, Schoo C, Kalish VB. Vascular dementia. [Updated 2023 Oct 22] [cited 2025 Jun 3]. In: StatPearls [Internet]. Treasure Island: StatPearls Publishing; 2025. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430817/.
2. Bir SC, Khan MW, Javalkar V, Toledo EG, Kelley RE. Emerging concepts in vascular dementia: a review. J Stroke Cerebrovasc Dis. 2021;30(8):105864.
3. Singh A, Bonnell G, De Prey J, Buchwald N, Eskander K, Kincaid KJ, et al. Small-vessel disease in the brain. Am Heart J Plus. 2023;27:100277.
4. Chang Wong E, Chang Chui H. Vascular cognitive impairment and dementia. Continuum. 2022;28(3):750–80.
5. Young SR, Lattie EG, Berry AB, Bui L, Byrne GJ, Yoshino Benavente JN, et al. Remote cognitive screening of healthy older adults for primary care with the MyCog mobile app: iterative design and usability evaluation. JMIR Form Res. 2023;7:e42416.
6. Soni A, Carthik P, Kumar Devara M, Rooha A, Bajaj G, Moolambally SR, et al. Knowledge, attitudes, and practices of general physicians towards mild cognitive impairment amidst an evolving era of interprofessional collaboration: insights from a small-scale survey in India. BMC Prim Care. 2025;26(1):46.
7. Kannan MA, Ab Aziz NA, Ab Rani NS, Abdullah MW, Mohd Rashid MH, Shab MS, et al. A review of the holy Quran listening and its neural correlation for its potential as a psycho-spiritual therapy. Heliyon. 2022;8(12):e12308.
8. Mir IA, Chowdhury M, Islam RM, Ling GY, Chowdhury AA, Hasan ZM, et al. Relaxing music reduces blood pressure and heart rate among pre-hypertensive young adults: a randomized controlled trial. J Clin Hypertens. 2021;23(2):317–22.
9. Trappe HJ. Effekte von Musik in der Intensivmedizin [Effects of music in intensive care medicine]. Med Klin Intensivmed Notfmed. 2022;117(1):49–56. German.
10. Vieira L, Carvalho C, Grilo A, Reis J, Pires AF, Pereira E, et al. Effects of a music-based intervention on psychophysiological outcomes of patients undergoing medical imaging procedures: a systematic review and meta-analysis. Radiography. 2024;30(2):589–604.
11. Teh HL, Suan MA, Ahmad R, Yahya MH. Development and validation of dementia solat score for detecting cognitive impairment among muslim patients: a pilot study. Neurol Asia. 2021;26(4):767–75.
12. Moulaei K, Haghdoost AA, Bahaadinbeigy K, Dinari F. The effect of the holy Quran recitation and listening on anxiety, stress, and depression: a scoping review on outcomes. Health Sci Rep. 2023;6(12):e1751.
13. Giannouli V, Yordanova J, Kolev V. Can brief listening to Mozart's music improve visual working memory? An update on the role of cognitive and emotional factors. J Intell. 2024;12(6):54.
14. Toader C, Tataru CP, Florian IA, Covache-Busuioc RA, Bratu BG, Glavan LA, et al. Cognitive crescendo: how music shapes the brain's structure and function. Brain Sci. 2023;13(10):1390.
15. T Zaatar M, Alhakim K, Enayeh M, Tamer R. The transformative power of music: insights into neuroplasticity, health, and disease. Brain Behav Immun Health. 2023;35:100716.
16. de Witte M, Pinho AD, Stams GJ, Moonen X, Bos AE, van Hooren S. Music therapy for stress reduction: a systematic review and meta-analysis. Health Psychol Rev. 2022;16(1):134–59.
17. Guo Y. Music therapy in psychological and educational context: enhancing emotional and cognitive development of students. Acta Psychol. 2025;254:104820.
18. Kumar A, Gupta V, Sharma S. Donepezil. [Updated 2023 Aug 17] [cited 2025 Jun 3]. In: StatPearls [Internet]. Treasure Island: StatPearls Publishing; 2025. Available from: https://www.ncbi.nlm.nih.gov/books/NBK513257/.
19. Huang LC, Hsieh SW, Tsai CC, Chen CH, Yang YH. The role of cilostazol and inflammation in cognitive impairment after ischemic stroke. Am J Alzheimers Dis Other Demen. 2021;36:15333175211016185.