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Active music therapy improves cognition and behaviour in chronic vascular encephalopathy: A case report



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Summary

Objectives: This study describes the effects of active music therapy (AMT) on cognition and behaviour in chronic vascular encephalopathy.

Design: A single case study investigated different cognitive and psycho-behavioural changes after AMT.

Setting: An adult patient with memory, attention, and verbal fluency deficits associated with Vascular Cognitive Impairment-No Dementia (VCI-ND) was treated.

Intervention: A four-months AMT course was based on creative and interactive music playing. Sixteen sessions were conducted simultaneously to the pharmacological therapy.

Main outcomes measures: Cognitive performances, mood, interpersonal interactions, and perceived abilities were assessed using standardized neuropsychological and psycho-behavioural measurements.

Results: At baseline, the patient reported a tendency to feel tense, nervous, and angry and difficulties in memory and visuospatial performances, frequently accompanied by attention drops. The social network was a habitual component of the patient's life, but not a source of sharing of personal experiences, safety or comfort. Neuropsychological tests showed deficits in object and figure naming, verbal fluency, short and long-term verbal memory, short-term spatial memory, selective attention, and visuomotor coordination. After AMT, the cognitive profile significantly improved in attention, visuomotor coordination, and verbal and spatial memory. Such positive changes were confirmed at the three-months follow-up. An increase of the interpersonal interactions and consistent reduction of anxiety were also observed.

Conclusions: In selected patients with VCI-ND, a well-structured AMT intervention added to standard therapy may contribute in determining a stable improvement of cognitive and psycho-behavioural aspects. Controlled studies are needed to confirm these promising results.

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Introduction

Different changes in the vascular system bear the risk of neurological disturbances as consequences of the vascular alterations or associated metabolic and haemodynamic abnormalities (e.g., diabetes, congestive heart failure, and obesity).¹ Primary or secondary vascular changes may cause oxidative stress, accelerate brain degeneration, provoke asymptomatic infarct or inflammation, and reduce cerebral blood flow and vascular density.^{2,3} In midlife, the proportion of dementia attributable to vascular causes may vary.⁴ Manipulation of the vascular risk yields up to a 50% reduction of the prevalence rate of dementia in people aged 65 years or older.^{5,6} Vascular cognitive impairment (VCI) refers to cognitive decline attributable to vascular disorders. Unlike mild cognitive impairment (MCI), which is a pre-clinical form of dementia, VCI encompasses any degree of cognitive decline associated with vascular lesions or risk factors. The severity of VCI ranges from mild difficulties to vascular dementia (VaD) or mixed VaD, where vascular and Alzheimer's disease (AD) pathologies co-occur. VCI not fulfilling the criteria for dementia is defined as VCI no dementia (VCI-ND). VCI-ND does not necessarily represent a pre-clinical stage of dementia, as the outcome across different VCI conditions may reveal improvement or stability of the cognitive patterns.^{7,8} In VCI, the neuropsychological profile is often represented by attention and executive deficits and psychomotor slowing, with spared language and memory abilities,⁷ although the deficits may vary in relation to the type and severity of the vascular disorder.^{8,9} In MCI, the coexistence of vascular lesions was associated with a decreased risk of cognitive decline or stable cognitive profile.^{10,11} Pharmacological and non-pharmacological treatment of the vascular disorders and their risk factors showed marginal effects on the prevalence of dementia in the general population.¹² However, as regards the primary prevention, physical activity proved to reduce the risk of VCI-ND.¹³

A large body of research supports the use of music therapy within many areas of physical, cognitive, and psychosocial rehabilitation.¹⁴ Different studies of the effect of music or music therapy on the behavioural and psychological symptoms of dementia (BPSD) were based on music listening or making (active music therapy, AMT).^{15–17} Sung et al.¹⁸ showed that older adults with dementia undergoing music activity were significantly less anxious than controls. In elderly patients with AD, Ziv et al.¹⁹ demonstrated significant reduction in disruptive behaviour and improvement in positive social behaviours, during the presence of music. Cooke et al.²⁰ analyzed the positive effect of live music on quality of life (QoL), depression, agitation, and anxiety. Two studies^{21,22} evaluated the effects of AMT on BPSD in patients with moderate to severe dementia. The first²¹ showed that AMT was more effective than educational and occupational activities, the second²² revealed a significant reduction of BPSD (delusions, agitation, anxiety, apathy, irritability, aberrant motor activity, sleep disorders) on the Neuropsychiatric Inventory. As for the influence of music therapy on cognition, two studies indicated a significant improvement of verbal memory and attention after listening to favourite music a hour a day²³ and an improvement in articulation, prosody,

verbal repetition, and comprehension after vocal, rhythmic, and melodic training,²⁴ respectively. Bruer et al.²⁵ showed cognitive improvement after the listening to familiar songs, while Ceccato et al.²⁶ reported a significant improvement in attention and prose memory.

This study adopted a standardized AMT method in a case of VCI-ND with the goal of analyzing its cognitive and psycho-behavioural effects. The patient showed high motivation and collaboration to AMT and repeated assessments, which made it especially representative of the type of intervention and measurement of the cognitive and psycho-behavioural changes. The AMT used in this study was characterized by an "inter-subjective approach"²⁷ based on relationship, "affect attunement" between therapist and patient, and empathetic listening, which bore the therapeutic character of the intervention. The non-verbal and sonorous-musical aspects in the patient/music therapist interaction may facilitate the organizational processes and emotional modulation.²⁸ The sonorous-musical elements may also stimulate the cognitive functions as a consequence of the activation of many brain areas.²⁸ AMT may secondarily help adapt to the disease and improve the interpersonal relations and QoL.^{27,29} This case represents a peculiar application of AMT in VCI-ND.

Methods

Participant

A 62 years-old woman, with 18 years of schooling, reported chronic difficulties in speech, memory, person and object naming, and recognition of the spatial position and orientation of objects, and short episodes of spatial disorientation. Past clinical history was characterized by arterial hypertension and high blood lipid levels. Two years after clinical onset, neurological examination showed impaired episodic memory, attention, and verbal initiative. Electrocardiogram provided normal results. Brain magnetic resonance revealed multiple small hypertense areas in the white matter of the left and right hemisphere, associated with very mild enlargement of the ventricles and cortical sulci. Carotid sonography showed small plaques in the absence of lumen alterations. The pharmacological treatment of the vascular risk factors (calcium antagonist, aspirin, dietary restriction) started 10 years before the onset of cognitive failures and remained unchanged during and after AMT. In this period, no anxiolytic or antidepressant drugs were added and the patient maintained her family, social, and leisure activities.

Neuropsychological assessment

Two neuropsychological evaluations were carried out before treatment at 7-months interval, after informed consent. Two evaluations were repeated soon after AMT and a 3-months interval, respectively (Table 1). Standardized neuropsychological tests assessed verbal and visuospatial short-term memory (Digit Span, Corsi Blocks Span), long-term memory (Short Story, Rey Complex Figure Recall), learning (Rey Auditory Verbal Learning Test), executive functions (Tower of London, Weigl Sorting Test), selective and divided attention

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