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Review Article

Music therapy as a non-pharmacological intervention in Alzheimer's disease: an integrative review

Musicoterapia como intervenção não-farmacológica na doença de Alzheimer: uma revisão integrativa

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RESUMO: *Objetivo:* Analisar a importância e os efeitos benéficos do uso da musicoterapia no tratamento de pessoas com DA. *Métodos:* Consiste em uma revisão integrativa da literatura a partir de critérios de inclusão que abrangeram artigos escritos em inglês, português e espanhol, no período entre 2016 e 2021, totalizando 26 artigos. *Resultados:* Após análise com base nos critérios de inclusão e exclusão, foram selecionados 26 artigos, os quais evidenciaram que a musicoterapia como tratamento não medicamentoso no manejo da doença de Alzheimer é mais eficaz que a leitura de letras e seu impacto se torna ainda maior quando introduzida em intervenções em grupo. Além disso, possui benefícios cognitivos e neuropsicóticos, apesar de não ser a melhor opção de tratamento não medicamentoso para tais sintomas, visto que estes respondem melhor ao treino cognitivo. *Conclusão:* A musicoterapia para pessoas com doença de Alzheimer demonstrou benefícios cognitivos, bem como reduziu a necessidade do uso de medicações antipsicóticas e ansiolíticas.

Descritores: Idosos; Doença de Alzheimer; Musicoterapia; Envelhecimento; Cognição.

ABSTRACT: *Objective:* To analyze the importance and beneficial effects of using music therapy in the treatment of people with AD. *Methods*: Integrative literature review based on inclusion criteria including articles written in English, Portuguese, and Spanish, between 2016 and 2021, with a total of 26 articles. *Results*: After analysis based on the inclusion and exclusion criteria, 26 articles were selected. The studies showed that music therapy, as a non-pharmacological treatment in the management of Alzheimer's disease, is more effective than reading lyrics, and its impact is even greater in group interventions. In addition, it has cognitive and neuropsychiatric benefits, although it is not considered the best non-pharmacological treatment option for these symptoms, as patients respond better to cognitive training. *Conclusion*: Music therapy showed cognitive benefits in people with Alzheimer's disease, and reduced the need for antipsychotic and anxiolytic medications.

Descriptors: Aged; Alzheimer disease; Music Therapy; Aging; Cognition.

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INTRODUCTION

Alzheimer's disease (AD) is a neurodegenerative disease characterized by progressive cognitive and functional impairments[1], gradual loss of autonomy, and, consequently, difficulty performing activities of daily living[2]. According to the Brazilian Alzheimer's Association, patients may have memory issues, temporal and spatial disorientation, deterioration of reasoning and language skills, and neuropsychiatric symptoms such as apathy, depression, and agitation[3].

The most important factor associated with the development of the disease is aging[2]. The presence of senile plaques in the neocortex and the volume reduction in the hippocampus and entorhinal cortex are neuropathological alterations observed in healthy older adults with Mild Cognitive Impairment (MCI) and in the early stages of dementia. As a result, normal aging can lead to Alzheimer's disease in 15% of cases[4,5,6]. In Brazil, estimates indicate a 284.2% increase in the population of older adults by 2050, which would increase the risk of incidence of this comorbidity in the country.

In this context, Alzheimer's disease is considered a public health problem, as it is the most common form of dementia and there is no cure to date[2,7]. There are several pharmacological treatments to improve cognitive and behavioral symptoms[3], but their effectiveness is limited and they have important side effects, such as worsening of motor function, which reduces patients' quality of life. Therefore, it is important to search for alternative therapies[8,9].

An example of a non-pharmacological intervention is music therapy, defined as a music intervention with diagnostic and therapeutic purposes. The use of music can improve social interaction, memory, speech, and self-knowledge of individuals with Alzheimer's disease[10,11]. Musical memory can be preserved even with cognitive decline, as the musical memory area, located in the temporal lobe, remains unaffected until more severe stages of the disease[12,13,14]. In addition, music can be used to evoke the person's memories, producing an emotional response[15]. This can reduce stress and increase melatonin levels[16,17].

Research on this topic is relevant, as music therapy brings benefits to older adults with Alzheimer's disease by evoking memories, stimulating senses, and improving their mood, helping them to be active and healthy. In addition, with the growth of the older population, healthcare workers must be prepared and up to date with the literature on the subject, so that they can provide comprehensive care and improve the quality of life of these individuals.

Thus, the present study aimed to analyze the effects of the use of music therapy in the treatment of Alzheimer's disease, through an integrative review, aiming to stimulate the combined use of pharmacological treatment and alternative measures that increase the well-being of the patient with this disease.

METHOD

An integrative review of the literature on Alzheimer's disease and the impact of music therapy on its treatment was carried out. The databases Electronic Library Online (SciELO), PubMed, Science Direct, Google Scholar, and Latin America and the Caribbean Literature on Health Sciences (Lilacs) were used for the search, with the descriptors: Alzheimer's; Music and Therapy in English; Musicoterapia in Portuguese; Canción and Terapia in Spanish, depending on the research base.

After reading titles and abstracts, 45 articles that addressed music therapy as a form of treatment for Alzheimer's disease or cited music therapy as a treatment for mood disorders developed in patients with Alzheimer's disease were included.

After the initial evaluation of the articles selected, 19 studies were excluded based on predetermined exclusion criteria, such as articles published before 2014, duplicates, experiments performed with animals, and studies that did not address the main topic. Thus, 26 articles that met the following inclusion criteria were selected: articles published between 2014 and 2021, carried out with humans, and written in English, Portuguese, and Spanish. Article selection was finalized on October 10, 2021.

As the present study is an integrative literature review, approval of the Research Ethics Committee was not required.

RESULTS

Initially, 45 articles were identified in the database search. Of these, 10 were duplicates. Thus, 35 articles were selected for title and abstract screening. After that, 29 articles were selected for full-text review. Among those, 3 were excluded, which led to a total of 26 articles selected for the present study.

Of the 26 articles selected, 18 were from PubMed, 1 was from SciELO, 2 were from Google Scholar, 3 were from Latin America and the Caribbean Literature on Health Sciences (Lilacs), and 2 were from ScienceDirect.

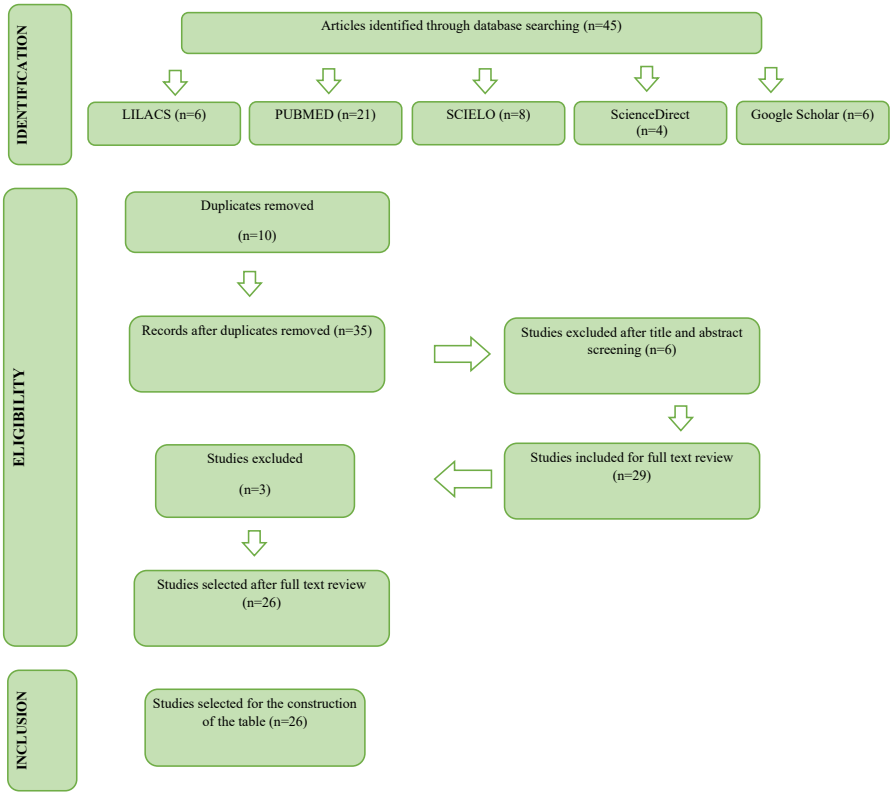

Figure 1. Flowchart of the process of identification, selection, and inclusion of studies selected for integrative review, based on the PRISMA recommendation. Vila Velha (ES), Brazil − 2022.

It was found that the probability of diagnosing Alzheimer's disease increases by 11% with each year of life. In addition, at least one in every three Brazilian older adults diagnosed with this disease also felt depressed or sad. Furthermore, it was found that patients with Alzheimer's disease are also more likely to be diagnosed with diabetes, depression, Parkinson's disease, and stroke[1].

Music therapy in Alzheimer's disease can help and complement drug intervention and has shown benefits for some cognitive, emotional, and behavioral symptoms[17,18]. Older adults living in nursing homes with a music therapy program had an increase in the cessation of antipsychotic and anxiolytic drugs[19]. In addition, the combination of music therapy and pharmacological therapy for Alzheimer's disease led to better or equal results than the use of Memantine hydrochloride alone[20].

In this context, the main benefits of this technique are the improvement of musical memory, the reduction of cognitive decline and improvement of orientation and language disorders, and the reduction of neuropsychiatric symptoms such as delusions, hallucinations, irritability, and agitation[2,7,9]. It has also shown benefits in interpersonal relationships, pain management, and quality of life[21].

Music therapy also helped to elicit memories by using songs from the patients' past, especially songs related to their social and national identity[22,23].

While patients listened to music during the sessions, there was a significant decrease in aggressive and agitated behavior. In addition, there were benefits associated with individualized music playlists, relaxation techniques, and singing treatment, which resulted in improved psychomotor performance and prolonged sleep duration[3,13,24]. After the musical intervention, there were immediate positive effects on the mood and behavior of the participants, such as greater happiness, greater attention to the environment, and reduction in perceived stress associated with reduction of cortisol levels[16,25,26].

The association of music therapy with other non-pharmacological interventions, such as meditation, was evaluated through markers of cellular aging, which were correlated with improvements in psychosocial status and in certain cognitive measures[27].

Despite the benefits mentioned above, studies indicate that music therapy has a low probability of being the best non-pharmacological intervention for cognitive ability and neuropsychiatric systems[28]. Cognitive Training (CT) was associated with clinically significant improvement in about 62% of patients, while Active Music Therapy (ATM) showed improvement in only about 8% of patients[29]. However, what makes music therapy a good

option is mainly the safety factor and the low cost of the technique[28].

On the other hand, music therapy was more effective than reading lyrics, and patients recalled sung texts better than spoken texts[30,31].

The group nature of music therapy was also considered, as group therapeutic interventions improved the social interaction of patients when compared to individual interventions[32].

Table 1 – Articles selected for the integrative literature review

Title of the article	Authors/year	Objective of the article	Results
Psicologia e musicoterapia no tratamento de idosos com demência de Alzheimer.	Barbosa; Cotta, 2017	To know the contribution of music therapy in the treatment of older adults with Alzheimer's disease.	Music therapy works by stimulating cognitive, affective, and social areas of older adults with Alzheimer's disease.
Music intervention approaches for Alzheimer's disease: a review of the literature	Liggieri et al., 2019	To investigate the effectiveness of various intervention strategies and the type of music used in the intervention.	Interventions that use individualized music have shown greater benefits for patients with Alzheimer's disease.
Music therapy is a potential intervention for cognition of Alzheimer's disease: a mini-review	Fang et al., 2017.	To summarize techniques, clinical trials, and mechanisms of MT.	Music therapy reduces cognitive decline and improves symptoms
Music therapy using singing training improves psychomotor speed in patients with Alzheimer's disease: a neuropsychological and FMRI Study	Satoh et al., 2015	To investigate the effect of singing training on the cognitive function in Alzheimer's disease patients.	Music therapy using singing training may be helpful for dementia patients
Who are the people with Alzheimer's disease in Brazil? Findings from the Brazilian Longitudinal Study of Aging	Feter et al., 2021.	To describe the socioeconomic, behavioral and clinical characteristics of older adults with Alzheimer's disease.	Older adults with Alzheimer's disease reported health problems compared to older adults without Alzheimer's disease.
The use of music and music therapy in ameliorating depression symptoms and improving well-being in nursing home residents with dementia	Ray; Götell, 2018 .	To compare residents' outcomes before and after implementing an individualized music program.	Nursing homes trained in the M&M program showed an increase in the cessation of antipsychotic and anxiolytic drugs and a reduction in behavioral problems.
The effects of music therapy on cognition, psychiatric symptoms, and activities of daily living in patients with Alzheimer's disease	Lyu et al., 2018	To explore the effects of music therapy on cognitive function and mental wellbeing of patients with AD.	The study suggests that music therapy is effective in enhancing cognitive function and mental wellbeing
Efecto de la musicoterapia como terapia no farmacológica en la enfermedad de Alzheimer. Revisión sistemática	Garcia-Casares et al., 2017	To analyze recent scientific evidence on the effect of music therapy on cognitive and behavioral symptoms in Alzheimer's disease patients.	It demonstrated the beneficial effect of music therapy on cognition, emotion, and behavior of Alzheimer's disease patients.
Combining drug and music therapy in patients with moderate Alzheimer's disease: a randomized study	Giovagnoli et al., 2018	To clarify whether adding music therapy to memantine can improve language in comparison with drugs alone in patients with moderate Alzheimer's disease.	This integrated treatment can improve the psycho-behavioral profile.
Cognitive training in Alzheimer's disease: a controlled randomized study	Giovagnoli et al., 2017	To evaluate the effects of cognitive training, compared to music therapy and neuroeducation, in patients with mild to moderate Alzheimer's disease.	The association of music therapy with Memantine led to better or equal results than the use of Memantine alone.
Comparison of multiple interventions for older adults with Alzheimer's disease or mild cognitive impairment: a PRISMA-compliant network meta-analysis.	Liang et al., 2018	To compare 4 types of interventions, physical exercise, music therapy, computerized cognitive training, and nutritional therapy, in older adults with mild to moderate Alzheimer's disease	Physical exercise and computerized cognitive training might have a significant improvement in cognition and neuropsychiatric symptoms
Music and dementia: individual differences in response to personalized playlists	Garrido et al., 2018	To investigate the influence of depression, anxiety, apathy, and cognitive decline on affective response to music.	Patients with severe cognitive impairment have less pleasurable responses to music.
Effects of meditation and music-listening on blood biomarkers of cellular aging and Alzheimer's disease in adults with subjective cognitive decline: an exploratory randomized clinical trial	Innes et al., 2018.	To assess the effects of two relaxation programs on the levels of biomarkers and the relationship between these components and quality of life.	Aβ, TA, and TL levels were correlated with improvements in psychosocial status and certain cognitive measures.

Table 1 – Articles selected for the integrative literature review *continuation*

Title of the article	Authors/year	Objective of the article	Results
Music as a mnemonic strategy to mitigate verbal episodic memory in Alzheimer's disease: does musical valence matter?	Ratovery et al., 2019	To determine whether a musical mnemonic might mitigate patients' learning of new verbal information	Musical mnemonics may help people with Alzheimer's disease learn verbal information that relates to their daily life, regardless the musical expertise of the patients.
Measuring Effects of Nondrug Interventions on Behaviors: Music & Memory Pilot Study	McCreedy et al., 2019.	To show the effects of non-pharmacological strategies on dementia-related behaviors.	There was a significant decrease in aggressive/ agitated behavior while the patient listened to the music.
A intervenção grupal e o uso da arte como ferramentas produtivas para pessoas com Alzheimer	Silva et al., 2019.	To unveil the benefits of group and interdisciplinary intervention, providing better quality of life for people with Alzheimer's.	The group therapeutic interventions were effective in improving social interaction between users.
Récupérer ses souvenirs grâce à la musique dans la maladie d'Alzheimer	Chevreau et al., 2017.	To demonstrate that music is a mediator that facilitates access to autobiographical memory in Alzheimer's disease	Music improves access to personal memories in Alzheimer's disease patients.
Efeito da música como recurso terapêutico em grupo de convivência para pessoas idosas	Medeiros et al., 2021.	To analyze the effect of musical interventions on the reduction of stress levels in older adults.	Musical interventions were able to reduce stress levels, indicating the importance of music as a therapeutic resource in health promotion actions.
The role of singing familiar songs in encouraging conversation among people with middle to late stage Alzheimer's disease	Ayelet; Dorit, 2014.	To explore the role of singing familiar songs in encouraging conversation among people with middle to late stage Alzheimer's disease.	Songs from the past elicited memories of the participants, especially songs related to their social and national identity.
Multisensory stimulation and individualized music sessions on older adults with severe dementia: effects on mood, behavior, and biomedical parameters. journal of Alzheimer's disease	Maseda et al., 2018.	To explore the effects of two non-pharmacological interventions, multisensory stimulation environment (MSSE) in a Snoezelen room and individualized music sessions	Both groups had immediate positive effects on mood and behavior. Participants were more happy/more content and talked more spontaneously.
Benefits of music therapy on behavior disorders in subjects diagnosed with dementia	Gómez-Romero et al., 2017	To verify the benefits of non-pharmacological treatments such as music therapy in patients with Alzheimer's disease.	Music therapy is beneficial and improves behavior disorders, anxiety, and agitation in subjects diagnosed with dementia.
Music therapy and Alzheimer's disease: cognitive, psychological, and behavioral effects	Gallego et al., 2017	To determine the clinical improvement profile of Alzheimer patients who have undergone music therapy.	Music therapy significantly improved issues such as orientation, memory, and language.
Does music therapy improve anxiety and depression in Alzheimer's patients?	De la Rubia Ortí et al., 2017	To evaluate the effectiveness of the implementation of a short protocol of music therapy in patients with Alzheimer's disease	A short protocol of music therapy can be an alternative medicine to improve emotional variables in Alzheimer patients.
A música no controle de sintomas relacionados à demência em idosos	Oliveira et al., 2018	To evaluate the benefits of music therapy, despite its application method - which can be in group, individual, interactive, receptive.	Music therapy has great value in the treatment of dementia symptoms.
Can musical or painting interventions improve chronic pain, mood, quality of life, and cognition in patients with mild Alzheimer's disease?	Pongan et al., 2017	To determine the efficacy of choral singing versus painting sessions on chronic pain, mood, quality of life, and cognition in AD patients.	Singing and painting interventions may reduce pain and improve mood, quality of life, and cognition in patients with mild Alzheimer's disease
Study protocol: individualized music for people with dementia - improvement of quality of life and social participation for people with dementia in institutional care	Weise et al., 2018	To assess the feasibility, efficacy, and acceptability of an individualized musical intervention for PwD living in a nursing home.	On the whole, individualized music represents a promising non-invasive and low-risk intervention that can be delivered easily.

DISCUSSION

During the aging process, the body goes through morphological, functional, biochemical, and psychological changes, which can affect the way the individual adapts to the environment. The progression of Alzheimer's disease leads to an aggravation of these changes, as the neuronal degeneration process impairs the compensation and readaptation of synapses in the brain and leads to the death of these cells[33]. This fact, as well as the increased incidence of the disease in individuals over 60 years of age, makes Alzheimer's a disease that is even more disabling and with

a more unfavorable evolution[1]. Therefore, it is important to seek alternatives that help managing the changes and symptoms of the disease.

It is known that the brain has a great capacity for adaptation due to neuronal plasticity, which can organize new synapses in different areas and protect brain functions from degenerative processes[34]. For this, however, constant environmental stimuli are necessary[35]. According to Muszkat[36], music can activate several neuronal circuits and stimulate the development of multiple skills, integrating cognitive and sensory functions such as memory, attention, language, and movement. In this context, this integrative review showed that music therapy can slow down the overall damage caused by Alzheimer's disease.

In the emotional sphere, studies point to the benefits of using music as an alternative therapy for several symptoms, such as depression, anxiety, and agitation[17,18,25]. De La Rubia Ortí et al.[16] studied the impact of Alzheimer's disease and correlated the chronic stress caused by the disease to high levels of plasma cortisol, a fact that is connected to the progression of the disease and to symptoms of anxiety and depression. After music therapy sessions, samples of the patients' saliva showed a considerable reduction in cortisol and, consequently, in these symptoms.

Regarding cognition, changes such as loss of memory and decreased ability to understand, read, write and recognize objects are observed during the evolution of the disease. Fang et al.[7] and Innes et al.[27] pointed out that the most important benefits of using music therapy are related to reduction of cognitive decline. This is explained by the stimulus produced by music in the prefrontal cortex, responsible for memory[37]. Pongan et al.[38] even suggest that the positive effects of singing on episodic verbal memory may be persistent. However, studies carried out in the USA have shown that this treatment should be initiated when cognitive function is not severely impaired, when it can reduce the prevalence of dementia by up to 23%[39].

Another important fact is that, due to all the difficulties and limitations it imposes, Alzheimer tends to make the person extremely dependent and socially isolated, limiting their social life to responsible family members or caregivers[40]. It is known that social isolation can have extremely negative effects, as it is related to more accelerated cognitive decline and progression of psychological and behavioral symptoms[41]. Based on this assumption, music therapy can unite people with the same problem in a common environment, providing effects such as reduction of negative behaviors, improvement of apathy and anxiety, increase of positive and social interactions, and improvement of well-being, through stimulation and interaction with peers[42]. Mcdermott et al.[43] also observed that, during the intervention, even patients with severe dementia showed increased eye contact, improved communication skills, and changes in facial expression.

In the field of memory, Sarkamo et al.[44] and Lord and Garner[45] observed that patients who listened to music remembered individuals from their childhood and past events of their own lives, while participants in the control group did not present the same development. Therefore, it is noted that individuals with Alzheimer's who receive music therapy may recall situations from the past and from their own autobiography[37].

Alzheimer's also leads to behavioral changes such as delusions, hallucinations, and aggression, which are usually controlled by medication. However, music therapy activates the motor cortex, leading to the modulation of movement during listening, reducing symptoms such as agitation and aggression in musical sessions[37].

As for pain management, older patients frequently live with chronic pain and functional limitations, often related to the aging process and musculoskeletal and tissue disorders of this phase[46]. The benefit of music therapy in this context is explained by the theory that music would act as a competitive stimulus to pain neurotransmitters, modulating the individual's perception of painful stimulus[21]. However, some limitations were found in the association between pain management in patients with Alzheimer's and music therapy. Thus, other studies with this focus should be carried out for better clarification.

Even so, despite having cognitive, neurological, and psychological benefits, as well as benefits in several other areas, music therapy is not considered the best non-pharmacological treatment option for the symptoms of Alzheimer's disease, as patients still respond better to cognitive training[29]. However, when compared to reading lyrics, music therapy is more effective[30], especially in group therapeutic interventions[32]. In addition, it is a method that is easy to perform and is well accepted[47].

Furthermore, most of the benefits occur in cases of mild or moderate dementia, as patients with severe cognitive impairment have less pleasurable responses to music[48].

The limitations of the studies reviewed were related to small sample sizes, short intervention periods, and lack of follow-up of clinical response. Thus, there is a need for further studies that evaluate the impact of music therapy as a therapeutic tool for Alzheimer's disease.

However, the present study is clearly beneficial, as it reiterates the benefits of music therapy for the quality of life of patients with Alzheimer's. Thus, it is expected that, after this study, new experimental studies are carried out by the scientific community to confirm the facts presented here and find breakthroughs and improvements concerning the disease. In this context, it is expected that music therapy will be used more often in clinical practice to help in the treatment.

CONCLUSION

Based on this integrative review, it can be concluded that music therapy for people with Alzheimer's disease has more benefits in patients with mild or moderate dementia compared to those with severe dementia. Among the beneficial effects found, there was an improvement in language, memory, attention, and temporal and spatial orientation. In addition, there was a significant decrease in aggression and agitation during music sessions, as well as a reduction in the need to use antipsychotics and anxiolytics.

Authors' participation: *Beatriz Gonçalves Cosmo*: performed the bibliographic search and data tabulation, worked on the writing the introduction and results, correction of references, and final editing. The participant approved the final version for publication. *Giulia de Menezes Vervloet*: performed the bibliographic search and data tabulation, worked on the writing of the conclusion and final editing. The participant approved the final version for publication. *João Pedro Machado Rocha*: performed the bibliographic search and data tabulation, worked on the writing of the discussion, correction of references and final editing. The participant approved the final version for publication. *Mylena Pimentel Klein*: performed the bibliographic search and data tabulation, worked in the writing of the introduction and discussion and in the correction and final editing. The participant approved the final version for publication. *Raquel dos Santos Silva*: performed the bibliographic search and data tabulation, worked on the elaboration of the flowchart and the table, correction of references, and final editing. The participant approved the final version for publication. *Valdir Ribeiro Campos*: performed the bibliographic search, correction, final editing, and general guidance. The participant approved the final version for publication.

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