



Research article

Effect of Carnatic raga-Bilahari based music therapy on anxiety, sleep disturbances and somatic symptoms among caregivers of cancer patients

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ABSTRACT

Carnatic raga-Bilahari based intervention is a music therapy technique that enhances relaxation and positivity by reducing anxiety. With extensive empirical evidence pointing out the detrimental challenges faced by the caregivers of cancer patients, the present study intends to find out the effectiveness of a Carnatic raga based music therapy on reducing anxiety, sleep disturbances, somatic symptoms and distress level among this population. A single group pre-post research design was used to conduct the study. General Health Questionnaire (GHQ-28) was used as a screening tool to select participants, and 30 participants were chosen using the purposive sampling. These individuals received instruction in listening to Carnatic music (raga-Bilahari), 5 days a week. The vocal and instrumental recordings were given on alternative days with each session lasting 15–30 min over a month of standard care. From the findings it is observed that there is significant decrease in the anxiety ($p < 0.001$), sleep disturbances ($p < 0.001$), somatic symptoms ($p < 0.001$) and distress level ($p < 0.001$) after the intervention. The study result thus indicates that Carnatic raga-Bilahari-based music intervention is effective among caregivers of cancer patients to reduce anxiety, sleep disturbances, somatic symptoms presentation, and their distress level.

1. Introduction

Cancer is a wide spectrum of diseases that can originate in almost any organ or tissue of the body due to the uncontrollable growth of abnormal cells invading neighbouring organs and or spread to other organs (Bray et al., 2018). It is the world's second leading cause of death, and it is a significant impediment to rising life expectancy in any nation (Bray et al., 2018). Cancer is not a disease that affects patients alone; its physical and psychological impact can be seen in caregivers of patients (Lambert et al., 2016). When cancer is diagnosed, family members take up the role of caregivers and start to face the associated difficulties (Silveira et al., 2010; Tamayo et al., 2010). A great burden is associated with caring for those we love, who are suffering from serious illness (Terakye, 2011). This stress can adversely affect caregivers' and patients' mental and physical health. An appropriate strategy is required to address the psychological difficulties of caregivers since caregivers' wide variety of responsibilities becomes a burden when patient's functional status declines (Grunfeld et al., 2004). A meta-analytic study examining the relationship between problems experienced by cancer patients and their caretakers suggests that

caregivers' anguish also influences patients' distress and vice versa (Hodges et al., 2005). Studies show that a greater degree of behavioural problems in the patient is related to the reduced mental well-being of the caregiver (Pinquart and Sorensen, 2007). Research regarding the reciprocal association between the psychiatric condition of the caregiver and the patient found that if the patient meets the requirements for any mental illness, the caregivers are 7.9 times more likely to meet the psychiatric disorder and vice versa (Bambauer et al., 2006).

The caregivers of cancer patients have been diagnosed with psychological issues such as depression, anxiety, and other mental health problems (Vanderwerker et al., 2005). A significant correlation was found between anxiety issues, sleep disturbances, and somatic symptom presentation (Dong et al., 2013). Studies have shown that anxiety is considered a natural psychological reaction to ongoing stress among those who care for cancer patients; it triggers a slew of other psychological problems such as sleep disturbances, especially insomnia, which are common in anxiety disorders (Staner, 2003; Vanderwerker et al., 2005). Depression is another serious psychological issue observed in these caregivers (Padmaja et al., 2016). These therefore would conflict with their role as caregivers

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and necessitates further effort. Therefore, it is vital to provide a suitable intervention for the caregivers and cancer patients, to improve their well-being as well as disease status.

It is seen that relaxation therapy has become a well-established approach to stress control in recent decades and is useful in diverse cultural settings (Beason 2009). Recent studies have shown music interventions' effectiveness in promoting relaxation, improving immunity levels, and stress control in cancer patients (Nilsson et al., 2009; Chuang et al., 2010; Greenman, 2009; Lai et al., 2006; Lane, 1992). Music therapy gives an effect of relaxation, which helps to increase the well-being of cancer patients caregivers and reduces distress. Music therapy is defined as a systematic process of intervention wherein the therapist helps the client to promote health, using music experiences and the relationships developing through them as dynamic forces of change. Experiences with music entail musical interaction, which may be improvised or not. It involves patients playing music, listening to music, or both. Other modes include singing, song writing, and playing instruments to compose music (Sundar, 2007; Rafieyan and Ries, 2007). It is less known about the soothing mechanism of music, but still, few researches have found there has been a correlation between music and emotional excitement (Salimpoor et al., 2009). Perceptual and emotional processing are the two ways the human brain processes music (Nizamie and Tikka, 2014). In perceptual processing, the pitch, intensity, roughness of sound, etc. are perceived by the individual with the help of neural circuitry, whereas in emotional processing brain differentiates between pleasant and unpleasant music with the help of frontal and temporal lobes, respectively (Boso et al., 2006; Lin et al., 2011; Blood et al., 1999).

The raga-based approach is used in Indian music therapy very widely. This strategy is calming, attention-enhancing, and can target musical taste and listening habits (Nizamie and Tikka, 2014). Raga Bilahari in Carnatic music is considered perfect for mornings that exude positivity and happiness (Sarkar and Biswas, 2015). It relieves fear response, pain sensation, skin diseases, and allergic reactions. Research reveals that using an instrumental and vocal recording of Bilahari raga together helps to alleviate fear, stress, and depression (Sunitha et al., 2018). The bhakti rasa that Bilahari pours out is well recognized. The ragas sound lovely and may lift the mood when sung at the appropriate time (Bhagyalakshmy, 1990). The brain's neocortex is stimulated by the repeating rhythmic features of music, which reduces impulsivity and relaxes people (Hegde, 2014). Though Carnatic raga-Bilahari-based music intervention is found to be a relaxant, improve positivity, reduce anxiety, stress, and depression, its therapeutic effectiveness among the caregivers of cancer patients is less explored. Hence, the current study aims to determine the effect of raga-based Carnatic music intervention on anxiety, sleep disturbances, somatic symptoms and distress level of cancer caregivers.

2. Method

2.1. Design and sample

The present study used a single group pre-post design to find out the effect of music therapy on anxiety, sleep disturbances, somatic symptoms, and general mental health among caregivers of cancer patients. The independent variable for the present study is Bilahari music and the dependent variables are anxiety, sleep disturbances and somatic symptoms. By using purposive sampling method, a total of 30 (12 females and 18 males) caregivers of cancer patients from the northern districts of Kerala state in India were recruited for the study. The inclusion criteria followed to choose the participants includes scoring more than 23 on GHQ-28, those interested in music, those without other physical issues, who have been taking care of patients for more than six months and above 18 years of age.

2.2. Research instruments

General Health Questionnaire (GHQ-28) was used in the study to screen and understand the overall distress level of the participants

(Goldberg and Hillier, 1979). Each answer of the GHQ is scored from 0 to 3, with a total possible score ranging from 0 to 84. A high GHQ-28 score suggests a high level of stress. Test-retest reliability of this scale has been recorded to be decent (0.78–0.9) (Robinson and Price 1982), with inter-rater and intra-rater reliability rated as excellent (Cronbach's 0.9–0.95) (Failde et al., 2000).

Beck Anxiety Inventory (BAI) was used to assess the physical and cognitive anxiety symptoms. BAI consists of 21 self-reported items. The test has a rating from 0 to 3. A score of 0–21 suggests low anxiety, a score of 22–35 indicates moderate anxiety and a score of 36 or higher indicates potentially concerning anxiety levels. Cronbach's alpha for the scale is 0.92 (Beck et al., 1988).

The Pittsburgh Sleep Quality Index (PSQI) was used to rate sleep quality. It consists of 19 self-reported questions and 5 questions scored by a person who is close enough to know about participants' sleep cycles. The 19 self-rated elements are combined to create seven component ratings, each with a point scale of 0–3. The seven factor scores are combined to yield a global score ranging from 0 to 21, with 0 indicating no difficulty and 21 indicating severe difficulty in all regions (Buysse et al., 1989). The Cronbach alpha value for the scale is found to be 0.736 (Manzar et al., 2015).

Somatic Symptoms Scale-8 (SSS-8), an 8-item scale was used to evaluate the severity of somatic symptom burden. The factor structure reflects the general somatic symptom burden in terms of gastrointestinal, pain, fatigue, and cardiopulmonary symptoms. The test has a rating from scores 0 to 4, with a total scores ranging from 0 to 32. The SSS-8 has excellent item characteristics and good reliability (Cronbach alpha 0.81) (Gierk et al., 2014).

2.3. Carnatic raga-Bilahari based music therapy

South Indian Carnatic music and North Indian Hindustani music are the two broad categories into which Indian music falls. Both musical systems have a diverse range of styles, but Carnatic music is significantly more intricate in terms of how the notes are composed and performed. Raga and Talam are the foundations of Indian music in general. In comparison to melody in Western music, raga is much more robust and powerful in its representation. Raga can be viewed as the orderly arrangement of notes that can evoke the feeling of a song. In Carnatic music, a note is known as a Swara. Arohanam and Avarohanam are traits of raga. The terms "avarohanam" and "arohanam" refer to the arrangement of notes in ascending and descending order, respectively. A raga is divided into janya raga (child) and melakarta raga (parent). The different notes used in Carnatic music are S, R, G, M, P, D, and N, which are comparable to C, D, E, F, G, B, and A (Sorrell and Narayan, 1980).

Bilahari is a raga in Carnatic music. It is a janya raga derived from the 29th melakarta scale, Shankarabharanam. It combines the pentatonic scale Mohanam and the Sampurna raga scale Shankarabharanam (Sunitha et al., 2018). Here in this research, the researcher used the vocal and instrumental 'Raga Visthara', the elaboration of Raga using slow notes (Swaras) following the Raga's Rules.

2.4. Procedure and intervention

The purpose and aim of the study were elaborated to the participants, and their consent was obtained. The ethical clearance of the study was obtained from the ethical review board of the Department of Psychology, Central University of Karnataka, India. The confidentiality and their participation as well as freedom to withdraw, were reiterated. Initially, the GHQ-28 was filled by the participants and asked about their interest in music. Participants scoring 23 and above in GHQ-28 and those interested in listening to music were included in the further intervention study. Along with GHQ-28, BAI, PSQI, and SSS-8 were also administered. The researcher, a trained Carnatic singer, administered the intervention to the participants under the supervision of an expert in Carnatic music. Vocal and instrumental 'raga-visthara' of raga-Bilahari, were instructed to listen alternatively (one day vocal and next day instrumental

recording) by the participants between 8 a.m. and 11 a.m., five days a week, each session lasting 15–30 minute for a span of 1 month of the routine protocol, based on prior literature (Sunitha et al., 2018). All participants listened to the same vocal and instrumental recording of raga Bilahari ‘raga-vistharas’. Post-intervention the GHQ-28, BAI, PSIQ, and SSS-8 were again administered and measured to check the effectiveness of the music-based intervention.

2.5. Data analysis

Data were analysed using SPSS version 20, and the descriptive statistics and paired sample t-test was used to generate results. When the observations are obtained in pairs, this is used to compare mean differences pre and post music intervention.

3. Results

Table 1 shows the demographic details of the participants of the study. Total of 30 caregivers participated in the study, among which 12 were males and 18 were females. All the participants were above 18 years, of which 10 participants lie between the ages of 18–39, 18 participants lie between 40 and 65 years of age and 2 parts were above 65 years old. Among the participants, 5, were from urban settings and 25 participants from rural settings in which all the participants were educated above or up to 10thgrade.

As shown in Table 2, the paired sample t-test indicates a significant difference in the score of distress level between pre-test and post-test scores $t(29) = 8.47, p < 0.001$. The mean pre-test score for general health is higher than the post-test mean score of general health, indicating the effect of music intervention on the general mental health of cancer caregivers by reducing distress levels. The magnitude of the difference between the pre and post-test is found to be larger.

As shown in Table 3, there is a significant change in the score of anxiety between pre-test and post-test, $t = 11.47, p < 0.001$. This indicates that music intervention has a significant effect on reducing anxiety among cancer caregivers. The effect size found was 2.0 which is large, indicating the findings have practical significance.

Table 4 shows, mean, SD and paired sample t test for pre and post scores of participants' sleep quality. The paired sample t test indicates a significant difference in the sleep quality score between pre-test and post-test scores $t(29) = 17.47, p < 0.001$. The mean scores and t value show music intervention's effect on improving individuals sleep quality. The result also mentions the effect size, that is a relatively higher value, 3.1, which indicates a higher effect size.

The result in Table 5 shows a significant change in the scores of somatic symptoms between pre and post-test scores. The t value is 10.95, $p < 0.001$. The result indicates that after the music intervention there is a significant decrease in somatic symptoms among caregivers of cancer patients with a high effect size of 2.0.

Table 1. Sample distribution.

Demographic details	Frequency (n = 30)	
Age	18–39	10
	40–65	18
	65 above	2
Gender	Male	12
	Female	18
Education	10th	2
	12th	3
	Graduation	14
	Graduation and above	11
Residence	Rural	25
	Urban	5

Table 2. Mean, SD, paired sample t test, effect size for pre-test and post-test comparison on general health.

Variable	Pre-test		Post-test		t	p	Cohen's d
	Mean	SD	Mean	SD			
General health	32.87	4.82	23.33	4.47	8.47	.000	1.4

Table 3. Mean, SD, paired-sample t-test and effect size for pre-test and post-test comparison on Anxiety.

Variable	Pre-test		Post-test		t	p	Cohen's d
	Mean	SD	Mean	SD			
Anxiety	34.90	5.35	22.63	3.43	11.47	.000	2.0

Table 4. Mean, SD, paired sample t-test, and effect size for pre-test and post-test comparison on Sleep Quality.

Variable	Pre-test		Post-test		t	p	Cohen's d
	Mean	SD	Mean	SD			
Sleep quality	12.57	1.305	6.27	1.639	17.38	.000	3.1

4. Discussion

Caregiving is a vital and momentary activity in which one person provides physical and emotional assistance to another in everyday life. Treatment for loved ones with serious or severe illnesses imposes a significant burden (Tamayo et al., 2010; Terakye, 2011). The patient's recovery, emotional and physical health may be negatively impacted by the stress brought in by caregiving (Terakye, 2011). It has been reported that music therapies are useful in aiding healing and stress management, as well as it has a potentially positive influence on lowering the burden of caregiving (Nilsson et al., 2009; Chuang et al., 2010; Greenman, 2009; Lai et al., 2006). According to research, listening to music that we enjoy causes the brain to release the neurotransmitter dopamine, which improves mood. Music has the ability to evoke intense feelings such as excitement, sorrow, or fear. Some evidence report that it has the ability to move us, and according to some scholars, music may have the ability to influence people's health and wellbeing (Koelsch, 2009).

4.1. Anxiety

Negative expectations are the defining trait of anxiety among cancer caregivers, which manifests as both a mental and physical illness. The anxiety can significantly impacts the caregiver's physical and mental health. They are anxious about unfavourable outcomes as well as undergo serious turmoil of anxiety (Osse et al., 2006; Palacio Gonzalez et al., 2021). Cancer caregivers experience anxiety for a variety of reasons. The threat of losing the care recipient, less emotional support and underestimation of caregiver burden by the care recipient, poor social support, reduced sleep, financial concerns, less information about the patient's prognosis, less savouring and detachment, less information to the caregiver about the patient's situation and disease condition, are found to be the major predictors of anxiety among caregivers (Sklendarova et al., 2015; Shin et al., 2018; Paek et al., 2018; Park et al., 2013; Price et al., 2010; Karabekiroglu et al., 2018; García-Torres et al., 2020; Hou et al., 2016; Møller et al., 2020).

The study result shows that Raga-Bilahari based music intervention has effectively reduced anxiety symptoms in the caregiver sample. The findings of present study are in line with a study that examined the effect of this raga on anxiety, depression, and stress in depressed patients (Sunitha et al., 2018). Music therapy thus has a prominent effect on individuals mental health. Inadequate attention and ignorance of the

Table 5. Mean, SD, paired-sample t test and effect size for pre-test and post-test comparison on Somatic Symptoms.

Variable	Pre-test		Post-test		t (t value)	p (Significant value)	Cohen's d
	Mean	SD	Mean	SD			
Somatic symptoms	20.17	3.00	12.37	3.51	10.95	.000	2.0

caregiver's psychological status may increase the risk of developing physical issues.

4.2. Sleep disturbances

Difficulties in initiating and sustaining sleep due to various psychological and physical factors are considered as major sleep disturbances among caregivers of cancer patients. The results of a systematic review on the sleep problems among cancer caregivers carried out by the researchers Maltby et al. (2017) indicate that about 72 percent of caregivers reported moderate to severe disturbances in sleep (Maltby et al., 2017). Dysfunctions in the sleep-wake cycle, for example, sleep deprivation, is the root cause of most sleep-related issues. The current study result demonstrated the effectiveness of Carnatic raga-based music therapy in reducing sleep disturbances among caregivers of cancer patients which is in line with the findings of a study conducted by Lai et al. (2012). However, a Carnatic raga-based music intervention on reducing sleep disruptions, particularly among cancer caregivers, is highly understudied; therefore, these findings will be crucial and helpful for future studies.

In the present study population, the sleep quality is very compromised. Frequent sleep deprivation can cause troubles with body weight, metabolism, higher cognitive functioning, learning, stress management, and a host of other things. It is crucial to maintain appropriate sleep hygiene as a caregiver to maintain good physical and mental health.

4.3. Somatic symptoms

The present study gives evidence-based conclusions that it is effective to use Bilahari raga-based music therapy for reducing somatic symptoms among caregivers of cancer patients. Somatic symptoms includes a person's extreme focus on physical symptoms such as discomfort, fatigue, or shortness of breath, which causes extreme functional anxiety and/or difficulties (Padmaja et al., 2016). In terms of physical symptoms, the person has an abundance of thoughts, emotions, and attitudes. Physical manifestations may or may not be consistent with the diagnosis of a medical disorder, but the client has complications. Somatization in caregivers also results in the fear of being affected by cancer (Padmaja et al., 2016).

Untreated and unattended somatic symptoms in individuals can result in various issues such as the development of mood disturbances such as depression, anxiety, and other issues including relationship issues, physical health issues, and many more. According to prior research, somatic symptoms in caregivers have the potential to influence the cancer patients, thus it is vital to treat the presence of somatic symptoms and somatization in caregivers (Padmaja et al., 2016).

4.4. Distress

In the present study, the general mental health of a caregiver indicates the overall distress level participants are going through being a caregiver for a cancer patient. The study results found that the Bilahari raga-based therapy brought about a prominent change in the general health of the caregivers. A study by Algoodkar and Sunitha (2019), to find the effect of raga-Bilahari in depression on individuals found that, raga-Bilahari has a prominent effect in reducing depressive symptoms and improving positivity among individuals. This finding is in line with the results of the present study. The current study also supports the findings from the

previous studies that caregiving for cancer patients can result in psychological disturbances or distress among caregivers (Lambert et al., 2016; Vanderwerker et al., 2005).

A key aspect of the quality of life for cancer caregivers is physical health. Physical functionality, exhaustion, erratic sleep, health issues, and self-care practises including healthy diet, daily exercises, quality leisure time and sleep quality are all considered to be part of one's physical well-being. As the physical strains of caregiving mount and the patient's requirements become more important over time, caregivers are found to report more issues (Glajchen, 2012). Similar trend of compromised general health was also found to be present in the study population. The analysis found that Carnatic raga-based intervention has a prominent effect on anxiety, sleep quality, somatic symptoms, and the general mental health of the caregivers. Bilahari raga, which is renowned for bringing cheerfulness, has demonstrated its impact on improving caregivers general wellness. As caregivers play an important role in a patient's life, they have to be mentally and physically sound for themselves. It is crucial to show concern and have a thorough understanding of the caregiver's psychological issues. Appropriate interventions, like the one used in the current study, could improve psychological well-being among them, which could have an impact on the patient's general and psychological health.

4.5. Limitations

The present study specifically included participants who are interested in music only, so the music intervention result cannot be generalized more widely among other cancer caregivers who are not interested in music. Since the sample size for the present study was small, further studies with more participants or comparison with a control group could be conducted. Based on the prior literature the researcher used both vocal and instrumental recordings of 'Bilahari raga vishara' but it was not analysed separately. Therefore, in future studies, the impact of both vocal and instrumental recording can be studied separately. The grade of the cancer diagnosis is not considered in the study, the impact of caregiving and the approach of patients might be different when it comes to the severity. Hence future studies should address whether these aspects influence the intervention effect or not.

5. Conclusion

This study is unique in the way that it is one of the pioneer attempts that studied the effect of Bilahari Raga-based music intervention on mental health of caregivers of cancer patients. The present study found that Bilahari Raga in Carnatic music has a prominent effect in reducing anxiety and somatic symptom presentation, increasing sleep quality, and improving the overall mental health of caregivers. The study also found in accordance with the previous literature that caregivers extremely suffer from psychological issues like anxiety, sleep disturbances and somatic symptoms, leading to poor mental and physical health. The findings reflect that raga-based music interventions can be used to improve the overall wellbeing among cancer caregivers. This kind of low cost, easily delivered interventions could be used among caregivers of other patients such as parents or caregivers of children with disabilities and other vulnerable groups. This can also be applied among students or population high at risk for developing symptoms of depression, stress and other mental health issues especially in the post covid phase or the recurring confinement to home due to further pandemic waves.

Declarations

Author contribution statement

Ramachandran Krishna: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Eslavath Rajkumar: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

John Romate: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Joshua George Allen: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

Daniel Monica: Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

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