

Effectiveness of Music Therapy on Physiological Parameters Among Mechanically Ventilated Patients: A Systematic Review

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KEYWORDS

Mechanical ventilation; music therapy; physiological parameters; intensive care unit; nursing; therapeutic music listening; anxiety, agitation, pain; delirium; ICU; music;

ABSTRACT

INTRODUCTION:

Mechanical ventilation is employed in the ICU to aid patients in the case of compromised respiration. Patients undergoing mechanical ventilation frequently exhibit physiological variations and psychological disturbances. Music therapy serves as a non-pharmacological intervention for a variety of problems and has many potential benefits for mechanically ventilated patients. **Aim:** This review is aimed to assess the impact of listening to music as a non-pharmacological intervention on the physiological parameters among mechanically ventilated patients admitted in an intensive care unit. **Methods:** This review was registered on PROSPERO 2025 CRD420250651354. A systematic search was conducted on the literature published between 2000 January to 2024 December in Pub Med, Science Direct, Shodhganga, Science.gov, Google Scholar, Pro Quest, Clinical Key, ELICIT, Semantic Scholar, ERIC, CINAHL, Research Gate, which included original research papers published in English meeting the PICOS criteria. 19 studies with a sample size of 1254 were included in the final quantitative synthesis. **Results:** The analysis showed that music significantly affects vital parameters: decreases the heart rate, blood pressure, and breathing; reduces pain intensity. Also, music affects anxiety and agitation levels, reduces sleep disturbances and delirium occurrence, and decreases length of MV duration. The effectiveness of the intervention is influenced by the choice of music. **Conclusions:** The study concludes that music therapy is highly effective in reducing anxiety, need for sedation, pain and stabilizing physiological parameters in mechanically ventilated patients. Music also decreases agitation in confused patients, improves mood, and decreases length of mechanical ventilation time. Music therapy is an intervention that is easy to administer, inexpensive, and has no adverse side effects for patients in critical care areas.

1. INTRODUCTION

The Intensive Care Unit (ICU) is a distinct critical department within a medical facility, equipped with high-tech specialised facilities designed for close monitoring, rapid intervention and often extended for treatment of patients with acute organ dysfunction.¹ Mechanical ventilation is employed in the ICU to aid patients in the case of compromised respiration due to severe illness or trauma to maintain breathing, ensure lung expansion, facilitate anaesthesia and sedation.²

However, patients undergoing MV frequently exhibit physiological variations and psychological disturbances such as anxiety, fear, despair, and feelings of helplessness and pain. They may also feel isolated, have disturbed sleep patterns, and experience fatigue which not only affects the therapeutic efficacy, but also negatively influences their recovery.³

Studies revealed that the noise that negatively affects the comfort level of mechanically ventilated patients should be eliminated. Today, besides modern medicine, the use of complementary and integrative care therapies has increased considerably all over the world. The most important and most frequently used application of mind-body medicine is music,

which can be used in the management of many symptoms such as anxiety, pain, and sedation.⁴ It can be used as an active multi perspective nursing intervention by nurses.⁵ There are many international and national research results on the effect of different types of music on hemodynamic values, anxiety, pain, agitation stress, and comfort levels of mechanically ventilated patients and these results showed the positive effects of music.

Music alone or accompanied by other complimentary treatments is beneficial in relieving pain and psychological symptoms of mechanical ventilated patients. Music also reduces agitation in confused patients, improves mood, and facilitates communication.⁶ It is indicated that music therapy can be used by nurses to reduce anxiety and pain and stabilize physiological parameters of mechanical ventilated patients⁷. Music therapy is found efficient in decreasing the length of ICU stay and shortening the length of weaning time in mechanical ventilated patients. Music as a therapy is found to be very effective in improving the quality of sleep in ICU patients.⁸

Several studies have investigated the effect of music therapy on critically ill patients. Despite the differences in recruitment criteria and type of music therapy, evidences have all indicated on improving the anxiety, depression and sleep quality in critically ill patients. However, the application of music therapy on mechanical ventilated patients for improving the anxiety, agitation and physiological parameters is less. This current review was intended with an objective to evaluate the effectiveness of music therapy on physiological parameters among mechanical ventilated patients.

2.METHODS

2.1 Design

This literature review was prepared on the recommendations of the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines for scoping reviews, scheme to describe step by step search strategies, feasibility articles, and include selected articles to be reviewed and analysed in this study. Scoping reviews, a type of knowledge synthesis, follow a systematic approach to map evidence on a topic and identify the main concepts, theories, sources, and knowledge gaps.⁹

2.2. Search Strategy

An extensive literature review was conducted in search of relevant original research studies published between 2000 January to 2024 December. The search strategy followed PICO format. The databases searched include Pub Med, Science Direct, Shodhganga, Science.gov, Google Scholar, Pro Quest, Clinical Key, Semantic Scholar, ERIC, CINHALL and Research Gate. The search was carried out by using various keywords like music, music therapy, mechanical ventilated patients, physiological parameters, ICU patients, critically ill patients, vital signs, physiological signs, ICU outcomes, pain and anxiety. Detailed methods of study excerpts from each database are shown in Table.1

Table 1: Database Search

Database	Years Searched	No. of Studies Retrieved	Total Studies
PubMed	2000 January to 2024 December	31	151
Science.gov		02	
Science direct		4	
Google scholar		74	
ProQuest		09	
Semantic Scholar		06	
ResearchGate		17	
Cochrane		01	
Elicit		03	
CINHALL		04	

2.3. Inclusion and Exclusion Criteria

Inclusion Criteria

Studies were included in this review if they fulfilled the following inclusion criteria –

Type of Study

- Original research studies that were published in English between 2000 January to 2024 December.
- Randomized Controlled Trials, non-randomized controlled trials, and quasi-experimental studies for mechanically ventilated patients in ICUs that incorporated any form of music therapy.
- Research comparing any type of music intervention to standard care.

Type of Participants

- Adult patients > 18 years who are on mechanical ventilator
- Admitted to the ICU ≥ 48 hours

Type of Intervention

- Music therapy combined with standard care.

Type of Outcomes

Music therapy effectiveness on primary and secondary outcomes was evaluated.

- **Primary Outcomes:** Physiological parameters
- **Secondary outcome:** Pain, anxiety, agitation, stress, delirium, sleep, length of mechanical ventilation and weaning duration, sedation level, improved level of consciousness

Exclusion Criteria

- Adult patients of other units
- Patients < 18 years who are on mechanical ventilator
- Articles lacking methodological details, reviews (both literature and rapid reviews), republished literatures, case reports, study protocols without results, editorial letters, books, conference abstracts, and guidelines

2.4. Data screening and extraction

In data extraction, we entered all data from each study into an electronic spreadsheet to make the data extraction process more manageable. Then the data were rechecked for accuracy. The data extracted included: (1) Author, (2) year of research, (3) research country, (4) sample, (5) group allocation, (6) setting, (7) age range, (8) mechanical ventilation use, (9) purpose, (10) outcomes, (11) measurement instruments, (12) intervention, (13) kind of music, (14) duration, (15) sessions, (16) media delivery of music, and (17) relevant finding. The two reviewers (AKN, LMS) independently extracted data from all the pertinent studies to eliminate redundant documents. Any differences amongst the reviewers were handled once the titles and abstracts were checked for eligibility with the third reviewer (GB). Through reading the title, irrelevant literatures were initially excluded, and the remaining was further reviewed by reading the abstract and full-text. Databases were used to obtain the full text contents of the probable articles. To eliminate duplication, studies with multiple reports were integrated together.

3. RESULTS

3.1. Selection process

The initial phase of the search revealed 151 articles from indexed journals. Precisely 44 were duplicates and were thus eliminated, yielding 107 in total. The abstracts of the 107 publications were subjected to the inclusion and exclusion criteria. Consequently, 50 articles satisfied the inclusion requirements and were initially qualified for evaluation. Then, the research articles were downloaded to be thoroughly examined. The reviewers separately analysed the papers and extracted the most pertinent material, which was then entered into a spreadsheet. Then, data were re-checked, and discrepancies were resolved through concord against inclusion and exclusion criteria. This initial evaluation and discussion of the 50 publication studies excluded 31 papers that did not fit the inclusion criteria. As a result, 19 papers were ultimately chosen for analysis, as illustrated in Figure 1

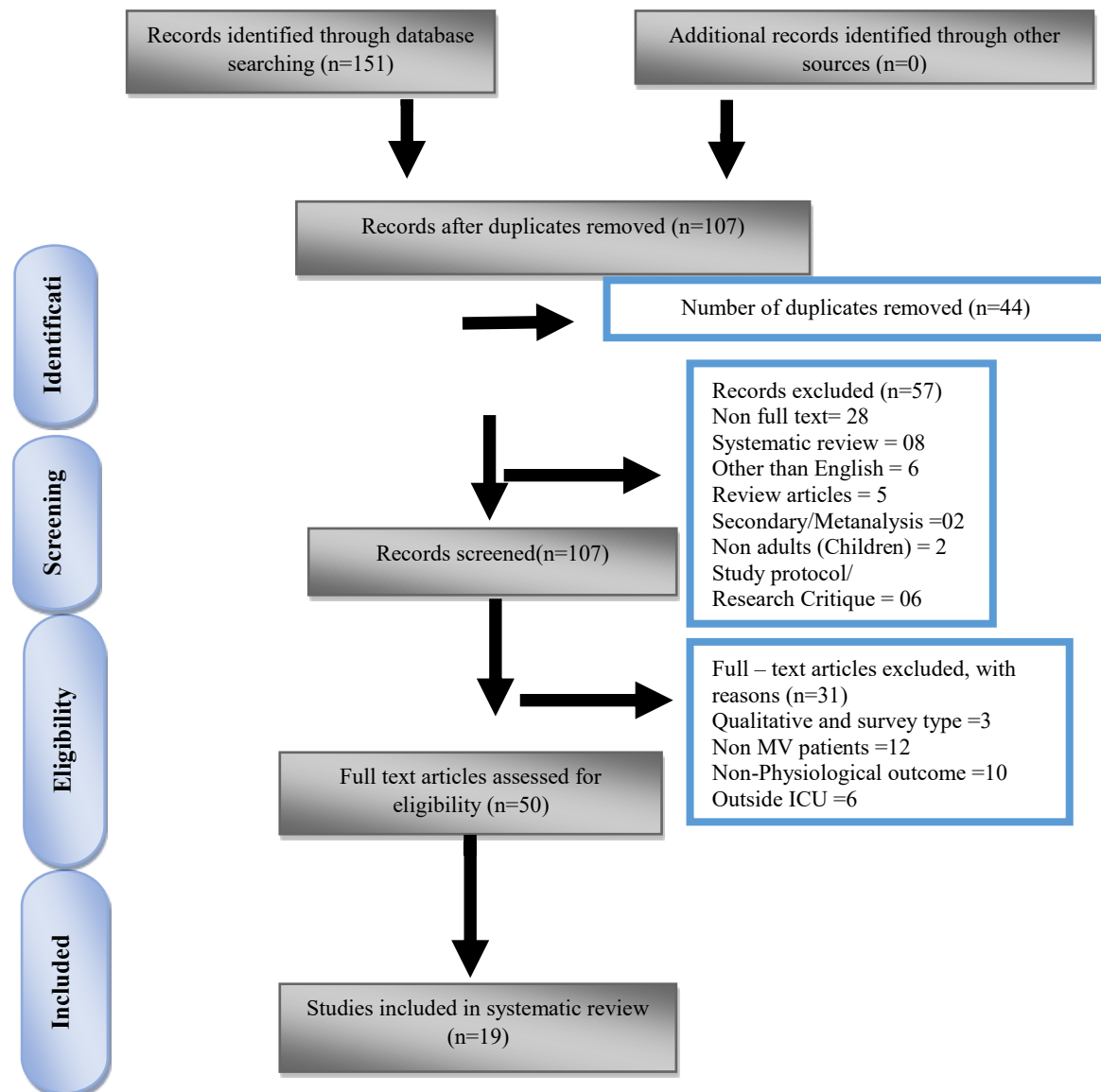


Figure 1: PRISMA flow/ diagram for the selection process of studies systematic review

3.2 Data Analysis

To analyse the studies, the researchers organized the most key data for the review's objective using an analytical grid. First, data was classified using an inductive technique. Second, researchers compared their findings to establish an agreement on the key conclusions of the review.

3.3 Characteristics of studies and sample

The study aimed to identify original research on effect of music therapy on physiological parameters among mechanical ventilated patients aged >18years in ICUs from studies published predominantly between 2000 January to 2024 December. To obtain relevant articles, our initial literature search yielded 151 articles, 19 of which were included in this systematic review, the characteristics of which are summarized in Table:2

Table 2: Characteristics of Included Studies

Reference s, Country	Study type	Aim	Sample size	Age group	Type of patients	Type of intervention	Outcome measures
Ettenberg. M et al, ¹⁰ 2024, Colombia	RCT Pilot study	To investigate the effect of music therapy on short-term psychological & physiological outcomes in mechanically ventilated patients	23 patients	24-84 years	Mechanically ventilated patients admitted to the intensive care unit (ICU)	Music-assisted relaxation (MAR)-Listening to live music(therapist's voice, an acoustic guitar and an ocean drum), combined with guided relaxation and/or the use of imagery and patient-preferred therapeutic music listening	Anxiety, Pain, resilience, agitation/sedation, vital signs, days of MV, extubation success, and days in the ICU. Electroencephalography measurements
Mishra et al ¹¹ , 2024, India	NRCT	To evaluate how music therapy affects mechanically ventilated patients' cardiorespiratory parameters and stress levels.	30 patients	18 -65 years	Mechanically ventilated patients admitted to the intensive care unit (ICU)	Low-pitched, pre recorded instrumental music.	Cardiopulmonary parameters and stress
Çalışkan et.al ¹² , 2024, Turkey	NRCT	To examine the effect of music therapy and sound isolation on the comfort of mechanically ventilated patients.	24 patients	18 -85 years	Mechanically ventilated patients admitted to the intensive care unit (ICU)	Western classical music and Turkish classical music	Hemodynamic parameters, pain, the need for sedation, consciousness, anxiety, agitation, sleep, ventilator synchrony
Widyaningrum et al ¹³ 2023, Turkey	RCT	To analyse the effect of a combination of music therapy and breathing exercises on anxiety and physiological parameters in patients using mechanical ventilation.	70 patients	18 -80 years	MV patients admitted to the intensive care unit (ICU)	Music with combination of natural-sounding instruments, flute, and gamelan. and deep breathing exercises	Anxiety levels and physiological parameters,

Joseph U. Almazan, Florabelle Patosa, Elnora Argota, ¹⁴ 2013 Philippines	NRCT	To determine the effect of music therapy among stuporous patients attached to a mechanical ventilator.	24 stuporous patients	23-92 years	Stuporous patients attached to the mechanical ventilator	Music therapy	Vital signs, improved level of consciousness
J. Messika et al, ¹⁵ 2019 France	RCT	To determine the effect of a musical intervention on respiratory discomfort during NIV in patients with acute respiratory failure (ARF).	113 patients	>18 years	NIV patients admitted to the intensive care unit (ICU)	“L-type” (MUSIC CARE, Paris, France) musical intervention	Physiological parameters, NIV failure and tolerance, anxiety, depression, peritraumatic stress and NIV appreciation
Fatmana İzan, Fatma Birgili, ¹⁶ 2020, Turkey	RCT	To investigate the effect of therapy through the music enjoyed by the patients with mechanical ventilation support in intensive care unit on their pain, anxiety and vital signs.	62 patients	18-85 years	Patients Receiving Mechanical Ventilator Support	Turkish folk music and patient preferred music	Anxiety, Physiological parameters and pain
Lee, Chiu-Hsiang, et al ¹⁷ . 2017, China	RCT	To test the effects of music intervention and aromatherapy on reducing anxiety for intensive care unit (ICU) patients undergoing mechanical ventilation.	160 patients	18–85years	Patients who are with Mechanical Ventilator	Music intervention (western classical music, Chinese music, natural sounds, religious music) and aromatherapy	Anxiety, Heart rate, breathing rate, and blood pressure
Stephanie M. Morri ¹⁸ , 2019 Minnesota	RCT	To determine effect of music therapy session during a spontaneous breathing trial (SBT) on anxiety and	20 patients	>18 years	Patients who are on Mechanical Ventilator	Patient-preferred music	State Anxiety and physiological parameters, pain, delirium, agitation

		physiologic metrics.					
Parvin Delavari et.al ¹⁹ , 2016, Iran	RCT	To examine the effect of listening to preferred music on physiologic parameters in critically ill patients with severe head injury.	38 patients	17 to 60 years.	Patients who had severe head injury (GCS between 3 to 8)	Patient preferred music played by MP4 player with special headphones	Physiologic parameters.
Beaulieu-Boire .G et.al ²⁰ , 2013, Canada	RCT	To evaluate the impact of slow-tempo music listening periods in mechanically ventilated ICU patients.	49 patients	Not mentioned	MV patients admitted to the intensive care unit (ICU)	Slow-tempo music	Vital signs, cortisol and prolactin blood concentrations
Sondra D. Phillips ²¹ , 2007, Florida	NRCT	To examine the effect of music entrainment on respiration of patients receiving mechanical ventilation in the Intensive Care Unit.	40 patients	26 to 85 years	Patients receiving mechanical ventilation in the Intensive Care Unit.	Live music session from the researcher using guitar and voice.	Rapid shallow breathing index, respiration rate, heart rate, and oxygen saturation rate.
Aghai M. et al ²² ., 2015, Iran	NRCT	To determine the effect of nature-based sound on shortening length of weaning from mechanical ventilation time in patients undergoing CABG surgery.	120 patients	45 to 65 years	Mechanical ventilator patients undergoing CABG surgery	Nature-based sounds	Length of mechanical ventilation time and physiological parameters
Kasaeizadeh SS, et al ²³ , 2021, Iran	NRCT	To determine the effect of classical music on physiological characteristics, and observational and behavioural measures of pain in unconscious patients admitted to ICU	30 unconscious patients	Not mentioned	Unconscious patients admitted to ICU	Classical music using MP3Player and headphones.	Physiological characteristics and pain

Liang.Z et.al ²⁴ , 2016, China	NRCT	To examine the effect of patient-selected music intervention during daily weaning trials for patients on prolonged mechanical ventilation.	31 patients	Not mentioned	Patients on prolonged mechanical ventilation.	Patient selected music	Heart rate, respiratory rate, oxygen saturation, blood pressure, dyspnoea, anxiety and weaning duration
V.Saadatm and et.al ²⁵ . 2013, Iran	RCT	To identify the effect of the nature-based sounds' intervention on agitation, anxiety level and physiological stress responses in patients under mechanical ventilation support.	60 patients	18–65 years	Patients on mechanical ventilation support	Nature-based sounds	Physiological parameters, anxiety and agitation
Manju A K Rajora et.al ²⁶ ., 2019, India	RCT	To estimate the effect of the nature-based sounds on physiological stress responses (heart rate, respiratory rate, blood pressure) in patients under mechanical ventilation support.	120 patients	18 -65 years	Patients under mechanical ventilation support	Nature-based sounds	Physiological parameters
Esra .A et.al ²⁷ , 2024, Türkiye	NRCT	To evaluate the effects of nature sound and cultural music (folk song) during mechanical ventilation period in SICU on physiological responses.	90 patients	20-60 years	Mechanically ventilated patients in the SICU	Turkish folk music and nature-based sound	Physiological parameters and pain scores.
Seyfert et.al ²⁸ 2023,	RCT	To evaluate the efficacy of music	160 patients	50 years of	Mechanically	Slow tempo music	Delirium, pain , anxiety and

USA		intervention compared to a silence-track attention control on delirium/coma duration in mechanically ventilated critically ill older adults.		age or older	ventilated adults admitted to the medical or surgical intensive care unit		physiological parameters
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3.3.1 Demographic Data

Included studies were conducted in Iran, turkey, India, Philippines, Columbia, China, USA, Canada and France. A total of 1254 participants were included in 19 studies. The mean age of the patient population included in the study was 60 years old.

3.3.2 Type of study

Of the 19 included studies, 09 of them were reports of randomized controlled trials. One paper was a RCT pilot study, three was quasi experimental design. Other studies were based on the pretest and post-test design.

3.3.3 Tools of assessment

Scales that were used to assess patient reactions to music intervention were: the Richmond Agitation and Sedation Scale, the Likert scale, and the Glasgow Coma Scale. Other scales were: the Chinese version of the Spielberger State-Trait Anxiety Scale, the Hospital Anxiety and Depression Scale (HADS), the Facial Anxiety Scale, the Critical Care Pain Observation Tool, the Numeric Rating Scale, and the Visual Analog Scale.

3.3.4 Types of Music Therapies

It is important to distinguish between forms of treatment with music because therapeutic music listening is very often confused with music therapy, as these two terms are not the same. The first form of music used in the form of music therapy can only be conducted by a certified music therapist, while therapeutic music listening is conducted by nurses, through patients listening to music on headphones or volunteers playing live music.²⁹ Only therapeutic music listening can be implemented by nursing personnel²². Music therapy is accepted as a therapeutic tool by most patients^{10,22}

Various forms of music were used in the researched original papers. In studies by Aghai M.et.al²², Kasaeizadeghan SS, et.al²³ and Joseph U.et.al¹⁴ patients listened to music on headphones connected to a portable CD player or an MP3 player. Some authors confirmed that music should have a slow tempo and low volume because the processes taking place in the brain during its playback have a calming effect^{20,28}.

In some studies, different instruments, like acoustic guitar, ocean drum along with music therapist voice¹⁰, flute and gamelan¹³, L type instruments¹⁵ were used and some used instrumental music¹¹, western classical music¹², chinese music¹⁷, folk music¹⁶, natural sounds^{21,25,26}, religious music¹⁷ as a music intervention.

Ettenberg.M etal,¹⁰ conducted the study making the patients listen to live music, combined with guided relaxation and/or the use of imagery and patient-preferred therapeutic music listening. Some studies showed that playing live music on musical instruments requires the employment of qualified musicians or music therapists, which is associated with additional costs.

3.3.5 Outcome Measurements and Effectiveness

Sondra D. Phillips²¹ used live music therapy session using guitar and voice which measured rapid shallow breathing index, respiration rate, heart rate, and oxygen saturation rate

Widyaningrum et al¹³ anticipated that playing music for critically ill patients may encourage the release of endorphins from the CNS, which can lower heart rate, blood pressure, and respiratory rate, promote a positive mood and lessen fear and anxiety.

Aghai M. et al²², V.Saadatmand et al²⁵ Manju A K Rajora et al²⁶ showed that nature based sounds reduces length of mechanical ventilation time, anxiety, agitation and stabilizes physiological parameters.

Musical intervention also has a positive effect on improving the patients' vital parameters^{10,13,14,16,18,19,22,25,26}. Patients listening to music with a slow tempo on headphones had an improvement in heart rate and systolic blood pressure^{20,28}. Patient participation in the musical intervention revealed decreased self-reported pain, anxiety and agitation^{10,12,16,18,20,21,23,28}.

Beaulieu-Boire. G et al²⁰ showed that music reduces cortisol and prolactin blood concentrations.

Two studies concluded that music decreases length of mechanical ventilation time and weaning duration^{22,24}.

One study had compared deep breathing exercises with music¹³ and other one compared music with aromatherapy¹⁷.

3.5 Quality Assessment

A checklist derived from the Joanna Briggs Institute (JBI) was utilized to evaluate the quality and risk of randomized controlled trials and other studies in preparation for systematic reviews³⁰. While most studies suggested a low risk of bias, most scored 8 or higher. All the studies were of good quality. The evaluation findings are shown in Table 3.

Authors	Study Type	Randomization	Allocation/Concealment	Groups similar at baseline	Participants blind	Outcome assessor blind	Treatment groups treated identically	Follow up complete	Participants analyzed/randomized	Outcome measured in the same way	Outcome measured in a reliable way	Used appropriate statistical analysis	Trial design appropriate	Score	Quality
Ettenberg M et al. ¹⁰	RCT	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	11	High
Mishra et al. ¹¹	Pre/Post Test Design	Y	N	Y	N	N	Y	Y	U	Y	Y	Y	Y	8	High
Çalışkan et al. ¹²	Pre/Post Test Design	Y	N	Y	N	N	Y	Y	U	Y	Y	Y	Y	8	High
Widyaningrum et al. ¹³	RCT	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	11	High
Joseph U. et al. ¹⁴	Quasi-experimental design	Y	N	Y	N	N	Y	Y	U	Y	Y	Y	Y	8	High
J. Messika et al. ¹⁵	RCT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12	High
Fatma İzan , Fatma Birgölü ¹⁶	RCT	Y	U	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	10	High
Lee, Chiu-Hsiang, et al. ¹⁷	RCT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12	High
Stephanie M. Morri ¹⁸	Mixed-methods design	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12	High
Parvin Delavari et al. ¹⁹ ,Iran,	RCT	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	11	High
Beaulieu-Boire .G et al. ²⁰	RCT	Y	U	Y	N	N	Y	Y	Y	Y	Y	Y	Y	9	High
Sondra D. Phillips ²¹	Pre and post-test design	Y	U	Y	Y	N	Y	Y	U	Y	Y	Y	Y	9	High
Aghai M. et al. ²² ,Iran	Quasi-experimental study	Y	U	Y	Y	N	Y	Y	U	Y	Y	Y	Y	9	High
Kasaeizadeh SS, et al. ²³ ,Iran	Quasi-experimental study	Y	U	Y	Y	N	Y	Y	U	Y	Y	Y	Y	9	High
Liang Z et al. ²⁴	Crossover repeated measures design	Y	U	Y	U	U	Y	Y	U	Y	Y	Y	Y	8	High
V.Saadatmand et al. ²⁵	RCT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12	High
Manju A K Rajora et al. ²⁶	RCT	Y	Y	Y	Y	U	Y	Y	Y	Y	Y	Y	Y	11	High
Estra .A et al. ²⁷ ,	Pre-test - post-test study	Y	U	Y	U	N	Y	Y	U	Y	Y	Y	Y	8	High
Seyfert et al. ²⁸	RCT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12	High

Note: rating score is from 1(lowest) to 10 (highest); Y=Yes; N=No; U= Unclear

Quality score were categorized into three groups:Low:1-4, Moderate:5-7, and High:8-10

Table 3: Results of systematic review using the JBI critical appraisal tool for randomized control trials

4.DISCUSSIONS

The analysis of selected articles made it possible to present the impact of music on the physiological responses of mechanical ventilated patients from intensive care units with various problems. In the current review, it has been identified that music therapy serves as a simple, inexpensive non-pharmacological intervention for a variety problem in mechanical ventilated patients. The current review reported a wide range music inventions for mechanical ventilated patients with different ailments. It was revealed that music therapy improved the symptoms often experienced by mechanically ventilated patients in the ICU. This intervention was associated with reduced pain, anxiety, stress, delirium, increased mobilization, sleep quality, and sedation levels^{10,12,15,18,,2021,22,28}. Based on our systematic review, music provided the highest benefit on vital signs, anxiety and pain^{10,13,14,16,18,19,22,25,26} and also improved oxygen saturation, blood pressure, dyspnoea, and weaning duration^{24,21} among mechanically ventilated patients. Through an in-depth analysis of effects of music on mechanically ventilated patients, it becomes clear that music is effective humanizing therapy and should be used in daily routine in all ICUs.

Music preferences of patients were always systematically assessed, the majority of studies emphasized the importance of patients' involvement in choosing the music. Giving

music for at least 20–30 min was sufficient to provide symptom improvement during the ICU. The maximum limit of giving music was 60 min in one application and the length of days for giving music can be adjusted to the needs and condition of the patient.^{31,32}

In all studies, music therapy also led to reductions in exposure to sedatives, analgesics, and the duration of mechanical ventilation. In addition, music therapy improved patients' satisfaction. This is because music can calm patients during treatment. Even though the patient is unconscious, the patient's hearing is still active so that through music the patient feels calm.

A study by Lee et al. found that 85% of patients admitted to an ICU experienced anxiety, and similarly, V.Saadatmand et al.²⁵ showed that 82% of patients experienced anxiety, but the music therapy used was highly effective in reducing anxiety and stabilizing physiological parameters among those in the experimental group at post-test compared to the conventional care group, who received no intervention beyond routine care^{16,25,26}.

Based on our review, we formulated that music therapy was different in each study i.e type of music, duration, session, and the characteristics of the music. Regarding the kind of music, we saw that the music that gave the best results in symptom improvement in ICU patients was calming music, with soft tones, slow rhythms, and most of the studies used an average music tempo ranging from 60 beats/min and 80 beats/min.

The review showed that unfortunately there was no standardized tool to measure the effect of music therapy on patients' well-being, some researchers used the Glasgow Coma Scale, others the CAM-ICU, CPOT scales, or physiologic parameters.

4.1. Areas for Further Research

Music therapy should be used for mechanically ventilated patients as part of the complementary and integrative care applications and be included in nursing care since these interventions reduce anxiety, stress, tension, increase relaxation and blood circulation, provide haemostasis, improve the quality of life, increase the comfort level, and also have no side effect. These methods should be included in curricula of nursing education and in-service training should be given to nurses to ensure effective implementation of music therapy in ICUs. Undoubtedly, it is worthwhile to deepen the topic of the impact and benefits of using music in the intensive care unit setting, especially since the use of therapeutic music listening as one of the few intervention methods is very well-received by the medical community, but also by the families of patients.

Further research can be conducted to explore the benefits of music therapy on various outcomes in larger sample group. Comparison studies with higher methodological qualities are needed to explore the effects of music therapy and contribute to the literature.

5. LIMITATIONS

Only studies published in English were considered for the review, which could lead to publication bias. Furthermore, the search was restricted to only a few databases. Other issues to be concerned about include study heterogeneity in terms of demographic characteristics, intervention type, outcome variables, and sample size. As a result, generalizing the conclusions drawn from this study should be done with caution.

6. CONCLUSIONS

The study concludes that music therapy is highly effective in reducing anxiety, need for sedation, pain and stabilizing physiological parameters in mechanically ventilated patients. Music also decreases agitation in confused patients, improves mood, and decreases length of mechanical ventilation time. Based on this review we recommend that music therapy is a viable option in managing several symptoms in mechanically ventilated patients. Music therapy is an intervention that is easy to administer, inexpensive, and has no adverse side effects for patients in critical care areas. These results were achieved even when music therapy was given as a single and short intervention. Conducting music therapy is very well-received not only by staff working in an intensive care unit but also by family members who visit patients. When the literature was reviewed, it was found that music therapy was practiced effectively during

mechanical ventilation till the patient is weaned. Hence there is a great need for more research studies in this area. Also, very less studies are conducted in this area in countries like India.

7.ABBREVIATIONS

PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

PICO - P – Patient, problem or population, I – Intervention, C – Comparison, control or comparator, O – Outcome(s), S- Study design.

ICU- Intensive Care Unit

MV- Mechanical Ventilation

8.DECLARATIONS

8.1. Ethics Approval and Consent to Participate

Since the protocol is without patient recruitment and personal information collection, the approval of the ethics committee and consent is not required.

8.2. Consent for Publication

Not applicable

8.3. Data Availability Statement:

The authors declare that the data of this research are available from the corresponding author upon request.

8.4. Conflicts of Interest:

The authors declare no conflict of interest.

8.5. Funding

The authors received no monetary aid for the research and/or publication of this article.

8.6. Authors' Contributions

AKN designed the study, searched literature, analysed the data and prepared the review. LMS and BM designed, analysed and reviewed the manuscript. All the three authors read and approved the final manuscript.

9.ACKNOWLEDGEMENT

We thank the department of library and information sciences, Laxmi Memorial College of Nursing, Mangalore and Kodagu Institute of Medical Sciences, Government college of Nursing for providing us with excellent online and offline resources for the conduct of this study.

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