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Kertas Asli/*Original Articles*

EFFECTS OF MUSIC THERAPY ON PSYCHOLOGICAL DISTRESS OF NEUROSURGICAL PATIENTS: A SYSTEMATIC REVIEW

(Kesan Terapi Muzik Terhadap Tekanan Psikologi Bagi Pesakit Pembedahan Saraf: Satu Sorotan Sistematik)

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ABSTRACT

Neurosurgery has been on the rise, with a yearly estimate of 13.8 million patients suffering from neurological disorders or injuries and require surgery. Psychological distress is relatively frequent in neurosurgical patients due numerous threats and challenges faced therefore, the main objective of this review is to understand the efficiency of music therapy on neurosurgical patients in reducing psychological distress. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework was used to guide the methodology of this systematic review. The PICO format was used as a search strategy in terms of specifying search terms and clarifying limits in relation to the population or intervention studied in this review. Databases like SCOPUS, MEDLINE and OVID, The Cochrane Library was utilized to search for relevant records. A total of 48 studies were identified through the databases search. After the removal of duplicates, 39 studies' titles and abstracts were screened. Through a process of assessing eligibility, 5 studies were consequently included in the review. The year limits for the articles reviewed were 2015 to present, to highlight the more recent findings on the subject. The studies included in this review encompass different countries of origin such as USA, Canada and in Asia, Taiwan, China and India. The findings of this review show that music therapy is an effective intervention in reducing psychological distress, especially anxiety, in neurosurgical patients. Music therapy is also effective as an adjunct therapy for neurosurgical procedures. The cultural aspects infused in music therapy were also discussed in this paper.

Keywords: Music therapy; psychological distress; neurosurgical patients

ABSTRAK

Prosedur Pembedahan Saraf telah meningkat dengan anggaran prosedur tahunan sebanyak 13.8 juta untuk pesakit saraf yang mengalami gangguan atau kecederaan saraf serta perlukan pembedahan. Tekanan psikologi agak kerap berlaku pada pesakit pembedahan saraf kerana banyak ancaman dan cabaran yang dihadapi. Oleh itu, objektif utama tinjauan ini adalah untuk memahami keberkesanan terapi muzik terhadap pesakit pembedahan saraf dalam mengurangkan tekanan psikologi. Kerangka Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) digunakan untuk membimbing metodologi tinjauan sistematik ini. Format PICO digunakan sebagai strategi pencarian dari segi menentukan istilah carian dan menjelaskan had berkaitan dengan populasi atau intervensi yang dikaji dalam tinjauan ini. Pangkalan data seperti SCOPUS, MEDLINE dan OVID, The Cochrane Library digunakan untuk mencari rekod yang relevan. Sebanyak 48 kajian dikenal pasti melalui pencarian pangkalan data. Selepas tapisan kedua, 39 tajuk dan abstrak kajian disaring. Melalui proses menilai kelayakan, 5 kajian dimasukkan dalam tinjauan. Had tahun untuk artikel yang dikaji adalah dari tahun 2015 hingga sekarang, untuk memberi fokus kepada penemuan terkini mengenai perkara ini. Kajian yang disertakan dalam tinjauan ini merangkumi negara asal yang berbeza seperti USA, Canada dan di Asia, negeri Taiwan, China dan India. Hasil kajian ini menunjukkan bahawa terapi muzik adalah intervensi yang berkesan dalam mengurangkan tekanan psikologi, terutama kegelisahan, yang dialamai oleh pesakit pembedahan saraf. Terapi muzik juga berkesan sebagai terapi tambahan untuk prosedur pembedahan saraf. Aspek budaya yang terlibat dalam terapi muzik juga dibincangkan dalam tinjauan ini.

Kata Kunci: Terapi muzik; tekanan psikologi; pesakit pembedahan saraf

INTRODUCTION

Neurosurgery has been on the rise, with a yearly estimate of 13.8 million patients suffering from neurological disorders or injuries and require surgery (Dewan et al. 2018). According to the National Health Service (2017), in 2014 to 2015, there were approximately 75, 000 neurosurgery patients each year in England. Lee and colleagues (2018), also reported that neurosurgeries are expected to increase in light of the advancements in neurosurgery techniques dealing with intracranial tumours and aneurysms.

Distress and preoperative anxiety are relatively frequent in neurosurgical patients due numerous threats and challenges faced (Goebel & Mehdorn 2018). There have been various interventions to relieve the distress faced by the surgical patient over the years. Among the interventions, music therapy intervention has been widely used in the surgical population to manage somatic symptoms, pain as well as anxiety (Li et al. 2017; Karaler et al. 2016; Kovac, 2014).

Based on the American Music Therapy Association (2019), music therapy intervention has the ability to redirect one's thoughts in order to decrease pain perception and provide a sense of relief for hospitalized patients. The intervention typically consists of receptive music listening, song writing, guided relaxation and music, and sometimes, active music making (Bojorquez et al. 2020). According to Good and colleagues (2010), music therapy is often paired with relaxation techniques and patient teaching. Music therapy is also feasible to be used as an adjunct therapy as its inexpensive, safe and can be incorporated into the routine of the patient easily (Cole & LoBiondo-Wood. 2014).

Music therapy intervention and any intervention meant to improve the patient's coping is important, to ensue positive surgical outcomes. Surgical outcomes can range from hospital stay and post-operative complications (Lee et al. 2018) to physiological outcomes such as sleep quality and pain perception (Wylde et al. 2011). One of the primary outcomes measured in social sciences would be psychological distress that manifests in anxiety or depression faced by the patients (Shoar et al. 2016). These outcome measures will be accounted for in this review.

The main objective of this review is to understand the efficiency of music therapy on specifically, adult neurosurgical patients. Although music therapy has been researched widely, music therapy for neurosurgical patients is still a topic that requires more scrutiny. Therefore, this review aims to provide an illustration on the current uses and effects of music therapy on the distress levels of neurosurgical patients.

METHODS

SEARCHING PROTOCOL AND STRATEGY

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Moher et al. 2009) will be used to guide the methodology of this systematic review. The PICO format was used as a search strategy in terms of specifying search terms and clarifying limits in relation to the population or intervention studied in this review. The PICO question is tabulated in Table 1.

Table 1: PICO question

Population (P)	Neurosurgery patients
Intervention (I)	Music Therapy
Comparison (C)	Treatment as usual
Outcomes (O)	Distress in patients

The question statement would be "Is music therapy as an intervention effective in reducing distress in neurosurgical patients, compared to treatment as usual?

The following databases were searched by an independent reviewer to answer the PICO question: SCOPUS; MEDLINE and OVID; The Cochrane Library. Trials, relevant grey literature and articles in all languages were considered. This review includes mainly randomized controlled trials (RCTs). The inclusion and exclusion of criterion in Table 2 was used as guidance in the searching process.

Table 2: Inclusion and exclusion criteria for search of articles

Criterion	Inclusion	Exclusion
Population	Adult population (18 years old and above) who have undergone neurosurgery. This can be due to a neurological disorder or an acute injury.	Children (17 years old and below) were excluded from this review, as they may respond to music therapy differently
Intervention	Music therapy was administered with the intention-to-treat	Music therapy that is directed to the caregiver rather than the patient
Outcomes Measures	1. Psychological outcomes such as depression and anxiety 2. Relevant physiological outcomes such as pain, readings of vital parameters and sleep-quality 3. Hospital-related outcomes such as length of hospital stay	Long-term outcomes such as quality of life will be excluded from the review to focus on the outcomes that are more immediate for the patient

The keywords utilized during the search were "music therapy" "music intervention" "music therapy intervention" "neurorehabilitation" "neurosurgery" "craniotomy" "spinal surgery" "neurological disorders" "distress" "patient".

DATA COLLECTION & ANALYSIS

STUDY SELECTION

Independent reviewer screened titles and abstracts to gauge eligibility based on the open search. Titles or topics that were incompatible to the keywords were excluded at the screening stage. Then, full-text papers which had irrelevant population of interest, inadequately described interventions or measured irrelevant outcomes, were excluded at the eligibility stage.

DATA EXTRACTION AND SYNTHESIS

Information that will be extracted from the studies will be:

1. Background details such as authors and country of origin
2. Characteristics of the study such as the study methodology and manner of randomization
3. Characteristics of the participant including the inclusion and exclusion criteria
4. Intervention characteristics such as manner place of intervention delivery, duration of intervention and format of intervention
5. Measures of outcomes which is generally in the form of psychological outcomes, physiological outcomes and hospital related outcomes

The findings from the categories will be discussed in an attempt to report a synthesis of the data extracted. The findings will be also discussed in terms of clinical implications in relation to neurosurgery and patient's distress.

RESULTS

A total of 48 studies were identified through the database search. After the removal of duplicates, 39 studies' titles and abstracts were screened. 25 studies were mainly due to irrelevance of topic or title. 14 studies progressed to the eligibility stage where 9 were excluded due to wrong population (n=4), inadequately described intervention (n=2) and irrelevant outcomes measures to neurosurgery (n=3). 5 studies were consequently included in the review. This process can be seen by referring to Figure 1. The study characteristics are tabulated in Table 3. Out of the 5 studies, there are randomized controlled trials (n=3) and prospective studies (n=2). The year limits for the articles reviewed 2015 to present, to highlight the more recent findings on the subject. The studies included in this review encompass different countries of origin such as USA (Roufail et al. 2018), Canada (Jadavji-Mithani, Venkatraghavan & Bernstein 2015) and in Asia, Taiwan (Wu et al. 2017), China (Cheng et al. 2019) and India (Reddy et al. 2017). The Prisma flowchart can be seen in Figure 1.

Table 3: Characteristics of Included Studies

Authors	Country	Study Methodology	Intervention Characteristics	Study Participants	Outcome Measure (s)
Wu, Huang, Lee et al. 2017.	Taiwan	Randomized Controlled Trial (RCT)	Participants were asked to listen to music of their preference from 6 types of soothing music such as nature, piano, harp, orchestra, jazz, synthesis music in 2 stages: 1.While holding in the waiting room 2.While the procedure was going on	38 patients undergoing awake craniotomy Experimental group (n=19), Control group (n=19). Control group received treatment as usual	Anxiety, Physiological indicators of distress such as heartbeat rate, systolic pressure and diastolic pressure. Anxiety measured using State-Trait Anxiety Inventory (STAI)
Cheng, Wang, Dong et al. 2019	China	RCT	Tomatis listening therapy was implemented. The duration of intervention was for 14 days participants.	138 neurosurgical patients that underwent cerebral hemorrhage. Divided into 3 groups: 1. Control group 2. Listening therapy group 3. Tomatis listening group	Sleep Quality, Measured by overnight polysomnogram (PSG) monitoring
Roufail, Sahyouni, Malik et al. 2018	USA	RCT	Integrative Healing Services (IHS): consisting acupuncture, healing touch, music therapy, pet therapy and counselling	17 neurosurgery inpatients (11 cranial surgery and 6 spine surgery) were involved in the intervention. Control and experimental groups were age, gender, surgery location (cranial or spinal) and pathology matched.	Primary Outcome: Pain Perception Aspects measured: pain medication consumption and subjective reports of pain Secondary Outcome: Length of Hospital Stay

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Reddy, Phanisree, Priyanka et al. 2017	India	Prospective study, pre-and-post session measurements.	Indian Classical Music Three Indian classical ragas were selected and given as follows; Hindola in the morning, Todi in the afternoon, and Kalyani in the evening.	10 patients, moderate to severe traumatic brain injury (TBI) patients who have undergone neurosurgery	Primary Outcome: Vital parameters' readings Heart rate, systolic blood pressure (SBP), respiratory rate, pupillary movement, and motor activity were measured before and after music therapy. Participants were observed 3 times a day for subsequent 7 days. Readings were then summarized.
Jadavji-Mithani, Venkatraghavan & Bernstein. 2015.	Canada	Prospective qualitative research methodology.	Exploring major or minor keys in reducing anxiety. Group 1 subjects listened to major key music and Group 2 listened to minor key compositions. Music was administered in 3 points in time: pre-operative, peri-operative, post-operative	29 patients who were undergoing awake craniotomy were randomly assigned into either group 1 or 2.	Primary Outcome: Anxiety Secondary Outcome: Receptiveness to therapy Methods of measurement: 1. Semi-structured, open-ended questionnaire 2. Beck Anxiety Inventory (BAI)

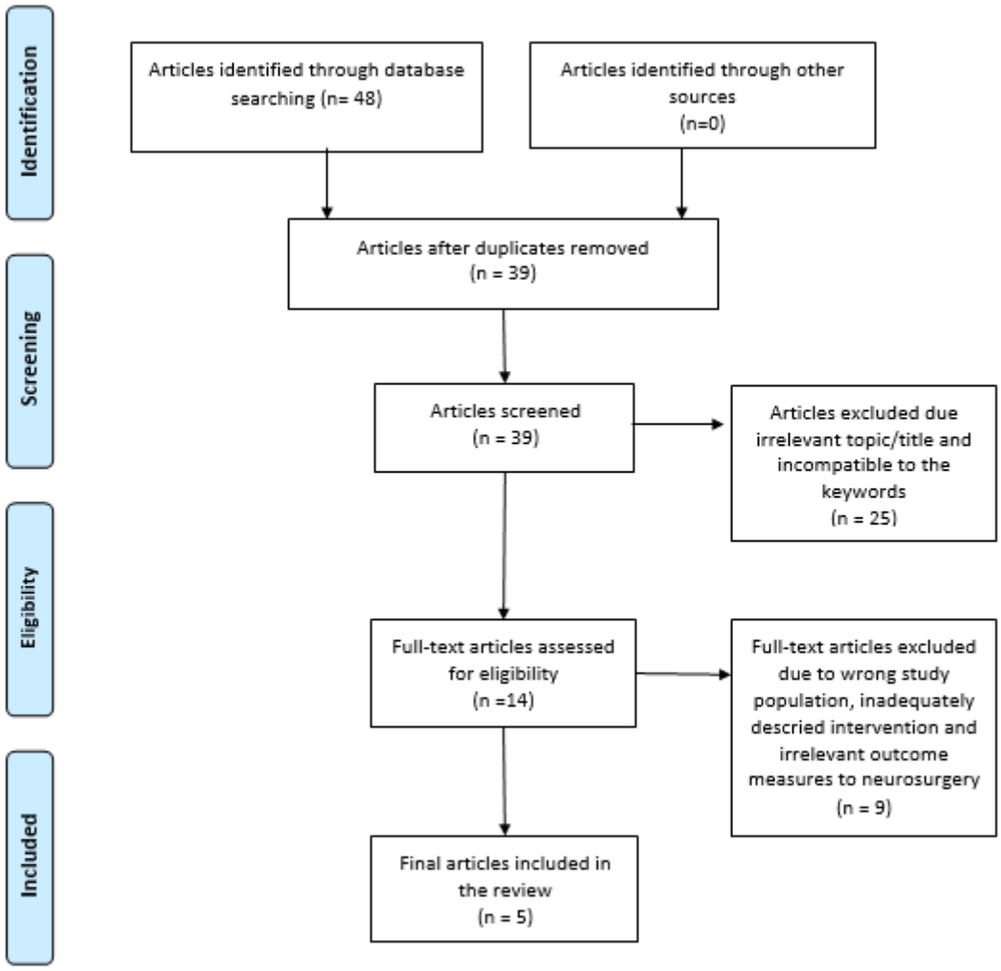

Figure 1: PRISMA flowchart

FINDINGS

All the studies included in this review, managed to reach their objective and reduce distress felt by the patient true the music therapy intervention employed.

ANXIETY AS A PSYCHOLOGICAL OUTCOME

The main psychological outcome that was in the findings of the studies above was anxiety regarding the surgical procedure (Jadavji-Mithani et al. 2015; Wu et al. 2017). Even in the studies where the primary outcome measured was physiological like vital parameter readings (Reddy et al. 2017), anxiety of the patients were monitored. It was noted by Reddy and colleagues (2017) that the intervention benefited TBI patients through the reduction of anxiety and successful facilitation of stress.

The studies that measured anxiety as a primary outcome were, one quantitative and another qualitative in nature. The differences between more methods were seen in the data derived. In the quantitative research (Wu et al. 2017), anxiety was measured using the self-report instrument the State-Trait Anxiety and with the intervention, significant decrease was noted ($p < .004$), indicating the effectiveness of music therapy. While the qualitative method (Jadavji-Mithani et al. 2015) focused more on the interview responses, even though Beck's Anxiety Inventory was utilized to record patient's anxiety. The themes uncovered (with respect to time points of administration) include:

1. Before surgery, some patients disliked listening to music before surgery because it prevents them from talking to their family before the surgery.
2. During surgery, patients like listening to music.
3. After surgery, some patients don't want to listen to music because of post-surgical pain and they feel the music doesn't help them relax.

The themes derived are useful for further exploration and doesn't immediately assume that patients benefit from music therapy.

CULTURAL INFLUENCES IN MUSIC THERAPY INTERVENTIONS

Based on the studies above, two interesting methods of administering music therapy were from China and India due to the cultural influences. In China, the Tomatis Listening Therapy which is listening to music that consists of sounds with sudden transitions from low-to-high frequencies and high-to-low frequencies, was compared against a control group and a listening therapy group which received common music therapy (Cheng et al. 2019). The Tomatis Listening Therapy proved to be better in improving sleep structure of the neurosurgical patients.

In India, Classical Indian Music components called "Ragas" were incorporated in the music therapy provided to patients with TBI who underwent neurosurgery (Reddy et al. 2017). Three ragas which have a specific tone, rhythm and structure were given at different times of the day. This is because each raga, in that particular time, has a specific feature that induces a calming and soothing effect (Reddy et al. 2017). Based on the study findings, this method's outcome was positive. Although, it's reported the need to have more in-depth research with a longer administration time of this music therapy, this is an example of how culture can be incorporated into music therapy intervention.

POPULATION STUDIED AND OUTCOMES

Diverse group of neurosurgical patients were studied in the included studies such as patients who underwent awake craniotomy (Jadavji-Mithani et al. 2015; Wu et al. 2017), cerebral hemorrhage (Chang et al. 2019), TBI (Reddy et al. 2017) and general neurosurgeries (Roufail et al. 2018). The outcomes measured where specifically anxiety, sleep quality, pain perception, length of hospital stay, vital parameter readings and receptiveness of patient towards therapy.

DISCUSSION

The findings echo previous studies on surgical distress, with anxiety being a consistent psychological outcome especially in neurosurgery (Goebel & Mehdorn 2018). The physiological outcomes especially vital parameter readings are related to anxiety as increased heart rate and respiratory rate are some physiological indicators of anxiety (Chalmers et al. 2014).

Sleep quality especially in a hospitalized setting for neurosurgical patients is an outcome to further explore and understand. Previous studies have shown that personal factors affect sleep quality (Sendir et al. 2007) as well as the hospital environment due to the nocturnal patient care interventions (Ugras et al. 2015) In these instances, care should be taken when administering the intervention, because the issue may be technical rather than psychological.

Outcomes like length of hospital stay is related not only to the patient's well-being but it also contributes to bigger picture and medical system. This was highlighted in the study by Roufail and colleagues (2018) with the formation and administration of Integrative Healing Services (IHS) in the USA. With the introduction of the intervention the process is becoming and has the potential to become more efficient. In addition to that, music therapy was quoted to be the most feasible and affordable therapy under IHS, further supporting previous literature (Cole & LoBiondo-Wood 2014).

Some clinical implications of understanding how music therapy can aid neurosurgical patients besides reducing hospital stay and reducing likelihood of post-operative complications (Lee et al. 2018), it as can as a successful adjunct therapy. This is especially true in procedures like awake craniotomy where the patient is only under local anesthesia and is able to hear everything around them. The fear of the unknown causes them stress and anxiety which can be combated through music therapy as seen in the study down by Wu et l. (2017).

Besides the outcome measures and implications, the inclusion of a prospective qualitative based study was based on the clearly growing inclination to include qualitative studies into systematic reviews. NHS Centre for Reviews and Dissemination stated that more recognition is given to diverse types of evidence (Dixon-Woods & Fitzpatrick 2001). Articles and papers following this showed support by forming frameworks on how to include qualitative studies in systematic reviews. The independent reviewer supports this notion because this diversity can be seen in the study done by Jadavji-Mithani and colleagues (2015), where new themes and possible explorations were discussed in this review, through their findings.

The most similar systematic review to this review, was one conducted by Lieber and colleagues (2018) studying music therapy in relation to angiography with the inclusion of cerebral angiography. This systematic review is a valuable addition especially to the neurological field because unlike the review done previously (Lieber et al. 2018), this review focuses solely on neurosurgery. Besides that, the cluster of studies reviewed here is also culturally diverse prompting new viewpoints and approaches to music therapy interventions for neurosurgical patients.

LIMITATIONS

There are several limitations to this systematic review. Firstly, although music therapy is researched widely, there

is limited research when it pertains specifically to neurosurgery. Hence, there was a limitation of enough literature. Secondly, there is no third-party reviewer or peer-reviewer partaking in the process of finalizing the inclusion and exclusion criteria for the data searches which increases the risk of bias in the reporting of the results. Besides that, certain databases could not be accessed limiting the searching scope or limit for this research. Lastly, neither fixed effect nor random-effect meta-analysis could be done, due to the lack of time and resources. Some recommendations to combat these limitations would be the increased accessibility to resources as well as third party reviewer to review this paper for revisions.

CONCLUSION

This review paper has managed to answer the PICO question statement, which was mentioned at the beginning of the paper: "Is music therapy as an intervention effective in reducing distress in neurosurgical patients, compared to treatment as usual?" Through the finding and discussion, it can be concluded that music therapy is an effective intervention for neurosurgical patients in reducing distress, especially anxiety. From a holistic viewpoint, music therapy not only is an effective intervention to reduce distress, it is also feasible enough to be made an adjunct therapy for neurosurgical procedures.

Although music therapy as an intervention has been reported to be easy, feasible and has little to no cost, caution needs to be taken in the training for relevant professionals for administering the intervention. There are boards such as American Music Therapy Association that provides certification for music therapists. A sense of standardization in terms of training, modules given and way of administering will lead to higher generalizability of data from clinical practice as well as lower discrepancies between expectation and service.

Further research should be conducted in the area of cultural influences on music therapy intervention to provide the necessary empirical evidence to approve or disprove the wide usage of those methods. Qualitative systematic reviews may be conducted to discover more exploratory areas as well as synthesized the diverse opinions that may be obtained. These opinions may, in turn, help the efficiency of music therapy administration.

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