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Meta-analysis

The Effect of Music Therapy on Quality of Sleep

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ABSTRACT

Background Music therapy is a non-pharmacological therapy that combines mind-body therapy as an intervention technique that shapes thinking processes so that it affects psychological and physical conditions (bodily functions).
Objectives This study aims to evaluate the efficacy of music on sleep quality accompanied by sleep complaints with or without comorbid medical conditions.
Data Sources We conducted data searches from Cochrane, PubMed, Willey Online Library, JSTOR, Sage Journal, Taylor Francis Online, Springer and Science Direct.
Method This study uses the PIOS (Participants, interventions, outcomes, Study design) and Mesh methods in finding data. Results Fourteen randomized controlled trials with six treatment conditions and a total of 633 participants with 319 participants in the intervention group and 314 controls met our inclusion criteria. Music therapy has a moderate effect on sleep quality of patients with sleep complaints with an average difference of -0.44 (95% CI: -1.01 to 0.33).
Conclusion Music therapy is an initiative that is easy to implement, practical, and inexpensive and has no side effects and can be done in nursing practice to treat sleep problems in various populations in Indonesia.

Introduction

Sleep is an activity in order to restore physical stamina and energy to humans (Chen et al., 2014). Maintenance of health and quality of life is influenced by good quality sleep (Lafçi & Öztunç, 2015). But sleep disturbance is very common in society (Cordi, Ackermann, & Rasch, 2019). Sleep disorders are an integral and important component of depressive disorders (Deshmukh, Sarvaiya, A, & Nayak, 2009). Also considered a cause of public health concerns (Shum, Joan, Thayala, & Fai, 2014). The prevalence of insomnia in the general population is estimated to be at 29.9%(Chang et al., 2012). Prolonged sleep disturbances result in decreased quality of sleep that affects changes in biological sleep cycle changes, endurance, decreased work performance, irri

tability, depression, lack of concentration and fatigue (Luthfa & Aspihan, 2013). On the other hand sleep disorders also cause physical and psychological complications (Momennasab, Ranjbar, & Saeed, 2018).

Various methods are used to improve sleep quality (Momennasab et al., 2018). According to the findings of Lai et al sleep quality can be improved by complementary therapies such as listening to music (H.-L. Lai et al., 2014). In the medical world music therapy emerged as a non-pharmacological alternative therapy (Deshmukh et al., 2009). Music is the language of inner reality, the universal tongue, personal emotions and expressions that are not expressed (Bloch, Vadas, & Haliba, 2010). The use of music with therapeutic purposes has been commonly used in America. It has been proven that music can reduce plasma cortisol and maximize relaxation (Su et al., 2012). The advantage of music in therapy is that it has a decent, low-cost presentation that can also be addictive (Loewy, 2020). Reggyanti defines music therapy is a technique used to cure a disease by using certain sounds or rhythms. The type of music used in music therapy can be adjusted to the needs, such as classical music, instrumental, slow music, orchestra, and other modern music (Reggyanti & Wenny, 2017) .

Some studies report that music can improve sleep quality, reduce sleep latency and improve sleep efficiency in the elderly (Chen et al., 2014). Loewy also reports that music is effective for achieving sleep or sedation in babies undergoing electroencephalography (Loewy, Hallan, & Martinez, 2005). Music can reduce sympathetic nervous system activity, reduce anxiety, blood pressure and heart and breathing levels (Lafçi & Öztunç, 2015).

Search Method

We conducted searches in Cochrane, PubMed, Willey Online Library, JSTOR, Sage Journal, Taylor Francis Online, Springer and Science Direct. for studies published in English. Keywords, title and abstract are searched.

The selection criteria are predetermined. Our study was conducted in school-age children (), adults (18-60 years) or the elderly population (60 years or older) with primary sleep complaints or sleep complaints with a medical condition. This study involves the active use of music. Exclusion criteria such as playing instruments, people suffering from neurological or severe cognitive impairment (such as Parkinson's or Alzheimer's disease).

Music is the main intervention material in this research. Music in the context of this meta-analysis is considered recorded music, played by CD / DVD players, mp3 players, tape-recorders or video recorders. The music must have been deliberately applied to the promotion of sleeping bags in the passive way, namely listening to music while resting or relaxing. The music chosen in the study is offered with music that the patient likes or chooses, or with standard music that is deliberately made to relax or wake up. Many people choose music with a slow rhythm, without heavy beat and relaxed. But the effect really depends on personal preferences.

Search Result

A joint database search was carried out from 2000 to 2020, and resulted in 2,735 articles in figure 1 that were identified using predetermined search terms. Most of the studies released were articles that did not focus on sleep quality (n = 196), did not use musical intervention (n = 233), and did not use RCT (n = 206). In addition, 818 articles were excluded because they did not have the author's identity and 851 articles were duplicated. When identifying, most of the studies were excluded because the article did not meet PIOS nor was it an article as there were 72 Book chapters, 35 posters and 36 abstract abstract proceedings that had been removed from the EndNote X9 reference manager application.

Quality Assesment

All articles are criticized and rated using CASP (Critical Appraisal Skills Programmed) by independent authors. Selected articles have good CASP levels (7-8 points) and are sufficient (5-6 points). Disagreements related to ranking scores, resolved by discussion. The following diagram (Figure 1) shows the search strategy and the results of the search strategy carried out in this study

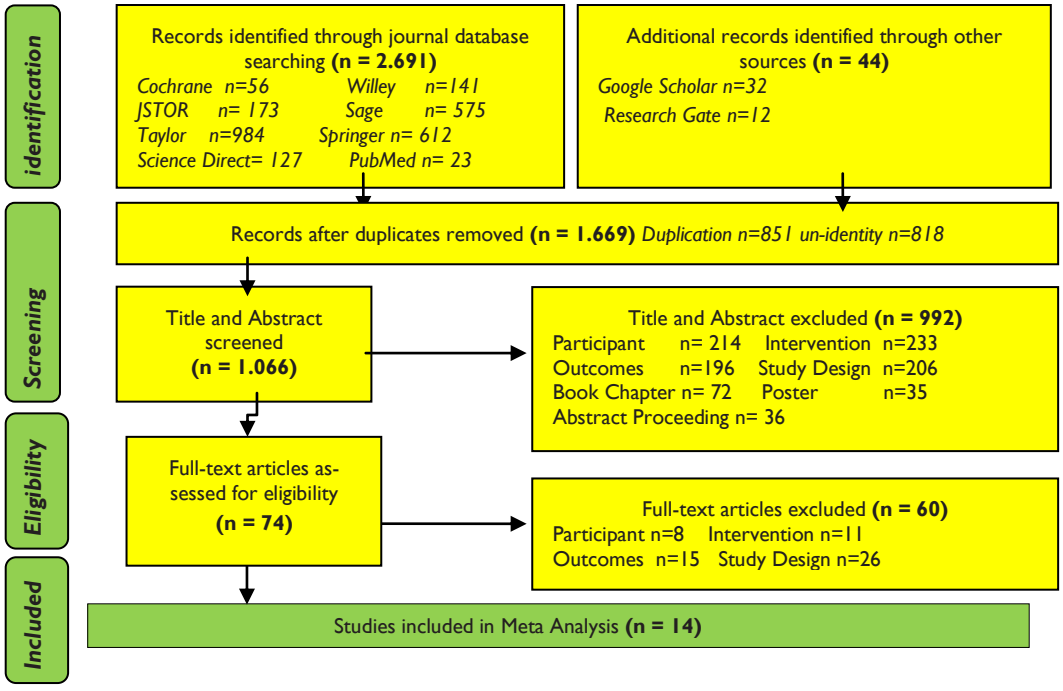

Figure 1

PRISMA (Search and Screening Strategy) of Meta-Analysis (Moher, Liberati, Tetzlaff, & Altman, 2009)

Data Abstraction

This research has conducted data extraction in the experimental group, consisting of; the total number of respondents, intervention protocols, administrative methods, results and critical assessments.

Integration

Review Manager 5. 3 is used to calculate the effect sizes of each study and to calculate the average difference collected. Since continuous data from different scales were extracted, differences in standardized averages (SMD) were calculated for effect sizes based on sample size (Cohen d with hedges adjusting) 95% confidence intervals for each study, and for studies collected using analysis of variance. The effect size of 0-2 is usually interpreted as small, ie 0-5 as moderate and from 0-8 as large (Cohen 1988). Potential statistical heterogeneity between studies was evaluated by the chi-square test. Statistically significant heterogeneity is considered to be present when the P-value is less than 5%. Publication bias is handled by funnel plot inspections (Begg 1994). The channel plot is the distribution of plot size effects on study size.

RESULT

Characteristics of include studies

Characteristics of the 14 studies that met the inclusion criteria are presented in Table 1. The included studies total was divided into 319 participants in the intervention group and 314 participants in the control group. The average age of the participants was 51 years. Eight studies involved patients in the hospital, four were conducted with parents living in the community and two were carried out with students at home. All studies included were explicit through inclusion and / or exclusion criteria (ie use of hypnosis, psychiatric conditions, sleep apnea). The duration of the intervention varies from 30 to 60 minutes with the exception of the study by Digd Laffcy conducted for 3 hours per session and the follow-up period varied between two days to three weeks. Six studies using standardized music that were deliberately made to calm everyone while sleeping. Digdem Lafcy uses fine Turkish music, other researchers use music that the patient likes that can be chosen from a list. Types of music used in fourteen studies include traditional music (Chinese orchestra), new age instrumental (synthesizer), classical and modern instrumental music (harp, piano, and orchestra), jazz music, Chinese classics, Indian classics, Indian classics and western music soothing.

Abijheet et al's study illustrates that Indian classical music has a calming effect on endoscopic procedures. Indian classical music has a melodic basis and is monophonic while Western classical music has a basis of harmony and is polyphonic. Based on that the single food and sound played at a certain rhythm can be responsible for the psychological effects of music (Deshmukh et al., 2009).

The Abijheet et al study gave music as an intervention and the administration of hypnosis as a control group. Whereas the study of Angela Shum et al used TV and radio as a treatment in the control group. Studies by Hui ling lai and marion good (2008) consisting of two conditions of treatment, music and words of wisdom, both compared with the same control conditions. Research by Kira Verb and Peter Vust also has two treatment conditions, music and ergonomic pillows, both of which are compared with control conditions in the form of ergonomic pillows.

In the abizhet article it was found that the effectiveness of music is comparable to medication therapy as evidenced by the increase in scores with music in proportion to the hypnosis of drugs and survival after the treatment period. With mean sd Music 8.36 ± 2.69 vs. Medication 9.64 ± 2.06, p value = 0.06).

In all the studies included, the efficacy of the intervention was measured by a subjective self-assessment scale. The fourteen studies above use the Pitsburgh Sleep Quality Index (PSQI). PSQI is a questionnaire commonly used to measure self-reported sleep habits during the previous week. This is a global measure with seven components: perceived sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleeping pills, and dysfunction in daytime activities. Scores for each component range from 0 to 3 (H. Lai & Good, 2005). Global PSQI scores are the sum of all score components, ranging from 0 to 21(Wang, Chair, Wong, & Xiaomei Li, 2016). Higher scores indicate poor sleep quality (Tan, 2004). PSQI is used to measure sleep quality before the intervention, one week after the intervention, and two weeks later after the intervention is completed for the first two groups (Votolato, 2016).

PSQI Shows a good homogeneity with a reliability coefficient (Cronbach) of 0.81 and the reliability test tetest test symbolizes acceptable consistency (Jespersen & Vust, 2012). PSQI has been widely applied in various areas of the population, including parents PSQI-C has been validated among 793 adults with a Cronbach a .84 and a reliability-test of a reliability of 0.83. 48 A cutoff score of> 7 yields a sensitivity of 98.3% and a specificity of 90.3% in identifying poor sleep quality among adults (Wang et al., 2016).

Quality of Study Included

All studies included have several methodological shortcomings. CASP scores are largely compromised by blinding requirements. In high-quality RCT, the blind process is used: both participants and administration must know whether the participant is in the intervention or control group. However, the nature of the intervention makes it almost impossible to blind participants, when patients are notified of the aims and procedures of the trial, as demands for good ethical practice, it is not possible to conceal the allocation of their conditions. Randomization was blinded in all included studies.

Table 1 Characteristics of Included Studies

No	Author (Year) Country	Design, Concept	Sample Size			Intervention, Facilitator and Setting	Instruments, Outcomes and Result	Conclusion
			a	b	c			
1	Abhijeet Deshmukh et al (2009) England.	RCT, to compare impact of music and medication on quality sleep	d=50 e=50	f=25 g=25	f=23 g=21	Music vs medication, provided by nurse and psychiatrist in psychiatry department to the patient diagnosed with Major Depressive Disorder	PSQI, QoS Music 8.36 ± 2.69 vs Medication 9.64 ± 2.06 with p value 0.06.	Patients had statistically significantly to improved quality of sleep with music (Music 8.36 ± 2.69 vs Medication 9.64 ± 2.06, p value=0.06) (Deshmukh et al., 2009).
2	Angela Shum et al (2014) Singapore	RCT, to compare impact of music Therapy and Non music on quality of sleep	d=78 e=60	f=28 g=32	f=28 g=32	Music vs non music, provided by nurse community department to the olderly on weekly visits	PSQI, QoS Music 5.9 ± 2.4 vs Non-Music 9.5 ± 2.6	Listening music as an effective intervention for older adults to improve sleep quality (Shum et al., 2014).
3	Chih Kuang Chen et al (2014) Taiwan	RCT, to investigate impact music and without music on quality of sleep	d=24 e=24	f=12 g=12	f=12 g=12	Music vs without music, provided by Two certified music therapists to the young adults	PSQI, QoS Music, SLS 71.4 ± 54.3, LSL 50.9 ± 27.9 vs Without Music SSL 45.3 ± 20.4, LSL 57.8 ± 22.3 with p value <0,05	In participants with long SL, sedative music improved the quality of sleep by prolonging the duration of deep sleep. This effect provides an alternative and noninvasive way to improve sleep in selected persons experiencing sleep problems (Chen et al., 2014).
4	Chiu-Ping Su et al (2012) Taiwan	RCT, to examine the effects of non-commercial music on quality of sleep	d=55 e=28	f=14 g=14	f=14 g=14	Music and usual care, provided by nurse to the patient medical ICU	PSG, QoS Music 35.48 ± 14.02 vs Usual care 39.13 ± 15.31 with p value 0.52	The findings provided evidence for nurses to use soothing music as a research-based nursing intervention for intensive care unit patients' sleep improvement (Su et al., 2012).
5	Digdem Lafcy et al (2015) Turkey	RCT, Randomized Experimental Design to investigate the effects of music on sleep quality.	d=60 e=60	f=30 g=30	f=30 g=30	Music and usual care, provided by nurse to the patient breast cancer	PSQI, QoS Music 2.9 ± 0.9 vs Usual care 11.3 ± 1.2 with p value 0.000	Relaxing classical music is an effective intervention in improving sleep quality (Lafçi & Öztunç, 2015).
6	En thing Chang et al (2012) Taiwan	RCT, to evaluation the effect music on quality sleep	d=61 e=50	e=25 f=25	e=25 f=25	Music and usual care, to provide by nurse to the adults with chronic insomnia.	PSQI, QoS Music 89.07 ± 10.23 vs Usual care 91.48 ± 4.73 with p value 0.29.	Music therapy is an effective intervention in improving sleep quality (Chang et al., 2012).

7	Hui Ling Lai & Marion good (2003) Taiwan	RCT, to investigate of the effects of soft music on sleep quality	d=60 e=60	e=30 f=30	e=30 f=30	Music and usual care, to provide by nurse to older adults.	PSQI, QoS Music 7.13 ± 3.19 vs Usual care 10.07 ± 2.75 with p value < 0.01	Music resulted in significantly better sleep quality in the experimental group, as well as significantly better components of sleep quality (H.-L. Lai et al., 2014).
8	Hui-Ling Lai et al (2014) Taiwan	RCT, to investigate the effects of music videos (MVs) on sleep quality	d=38 e=38	f=19 g=19	f=19 g=19	Music video and usual care, to provide by nurse to Middle-Aged and Older Adults with insomnia.	PSQI, QoS Music Videos 9.29 ± 1.92 vs Usual care 5.47 ± 1.78. with p value 0.006.	Music video is an effective intervention in improving sleep quality on Middle-Aged and Older Adults With Chronic Insomnia (H. Lai & Good, 2005).
9	J. Koening et al (2014) Germany	RCT, to investigates the effects of a music listening intervention on sleep quality	d=10 e=10	f=10 g=10	f=10 g=10	Music and usual care, to provide by nurse to students without sleep complaints	PSQI, QoS Music 4.3 ± 2.63 vs Usual care 4.3 ± 2.21 with p value < 1.00	Music therapy is an effective intervention in improving sleep quality on students without sleep complaints (Koenig, Jarczok, Warth, & Harmat, 2013).
10	Kira Vibe & Peter Vuust (2012) Denmark	RCT, to investigates the effects of a music listening intervention on sleep quality	d=19 e=19	f=10 g=9	f=9 g=6	Music and usual care, to provide by nurse to patient traumatic refugees	PSQI, QoS excl dropout Music 16.00 ± 1.41 vs Usual care 12.67 ± 1.86 with p value 0.002, QoS incl dropout music 15.80 ± 1.48 vs usual care 13.56 ± 2.30, with p value 0.02.	Statistical comparisons showed a significant improvement of sleep quality in the music group, but not in the control group. A significant increase in well-being was found only in the intervention group, but there were no changes in trauma symptoms in either of the groups (Jespersen & Vust, 2012).
11	Leepeng Patsy Tan (2004) Taiwan	RCT, to examine the effects of background music on quality of sleep	d=86 e=86	f=45 g=41	f=45 g=41	Music and non-music. To provide by nurse to the elementary school children.	PSQI, QoS Music 0.93 ± 0.39 vs usual care 0.83 ± 0.67 with p value 0.0001.	Music therapy is an effective intervention in improving sleep quality on elementary school children (Tan, 2004).

12	Moon Fai Chan et al (2010) China	RCT, to examine the effects of music intervention on sleep quality.	d=78 e=42	f=21 g=21	f=21 g=21	Music and usual care. To provide by nurse to the elderly people.	PSQI, QoS music 5.1 (2.6) ± 5.0 [0—10] vs usual care 6.0 (3.6) ± 6.0 [0—14] with p value 0.82, DL music 2.1 (3.0) ± 1.0 [0—9] vs usual care 2.0 (2.4) ± 1.0[0—7] with p value 0.90. SBP music 140.4 (18.4) ± 136.0 [106.0—178.0] vs usual care 135.0 (13.7) ± 130.0 [110.0—162.0] with p value 0.246. DBP music 79.4 (6.1) ± 80.0 [65.0—90.0] vs usual care 77.0 (7.6) ± 77.0[62.0—88.0] with p value 0.289. HR music 76.6 (9.2) ± 78.0 [60.0—91.0] vs usual care 74.2 (7.0) ± 73.0 [59.0—86.0] with p value 0.358.	Music video is an effective intervention in improving sleep quality on elderly people (Fai, Angela, & Mok, 2010).
13	Moon Fai Chan (2011) Hongkong	RCT, to determine the effect of music on sleep quality in older people.	d=45 e=42	f=21 g=21	f=21 g=21	Music and usual care. To provide by nurse to the elder people.	PSQI, QoS music 5.2 (2.6) ± 5.0 [0—10] vs usual care 6.1 (3.5) ± 6.0 [0—14] with p value 0.59. SBP music 140.1 (18.3) ± 137.0 [106.0—178.0] vs usual care 134.9 (13.7) ± 130.0 [110.0—161.0] with p value 0.236. DBP music 79.9 (6.0) ± 80.0 [65.0—91.0] vs usual care 77.2 (7.0) ± 77.0 [62.0—87.0] with p value 0.279. HR music 76.4 (9.2) ± 78.0 [61.0—92.0] vs usual care 74.2 (7.1) ± 73.0 [58.0—86.0] with p value 0.348.	For all vital signs' results, no significant differences were found between both music and control groups within the four weeks. In the music group, there was statistically significant reduction in sleep scores at week 4. In control group, there was no statistically significant improvement of sleep scores in the four weeks. However, no significant difference was found between groups over the four weeks (Chan, 2010).
14	Qun Wang et al (2016) China	RCT, to examine the effects of music intervention on sleep quality.	d=214 e=64	f=32 g=32	f=32 g=32	Music and usual care. To provide by nurse to people in community-dwelling elderly.	PSQI, QoS Music 6.44 ± 3.46 vs Usual Care 3.28 ± 3.59, with p value 0.001.	Music is a safe and effective non-pharmacological intervention for improving the sleep quality of community-dwelling elderly people, especially in improving sleep latency, sleep efficiency, and daytime dysfunction (Wang et al., 2016).

(a): total patient, (b): sample size n per group, (c): sample size each group follow to end (dropout rate), (d)= eligible participants number, (e)= enrolled participants number, (f)= participants number of Intervention A, (g)= participants number of Intervention B, h= participants number of Control Group, (QoS) : Quality of Sleep, (PSQI) : Pitsburgh Sleep Quality Index), (PSG) : Polysomnography, (HD) : Hemodialysis, (BS) : Before Sleep, (DL) : Depression Level, (SBP) : Systolic blood pressure, (DBP): Diastolic blood pressure, (HR) : Heart Rate

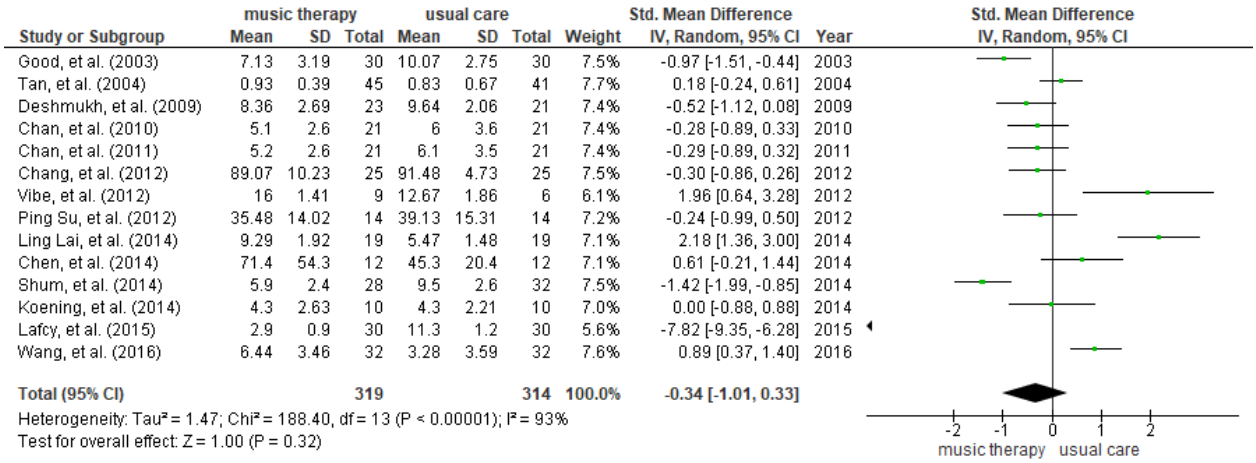

Figure 2. Forrest Plot

Combined Analysis

The clinical diversity of the fourteen studies appears to be rather large (mix of age groups, various medical conditions). However, there is no evidence or theory that distinguishes effects in treatment between various populations.

Figure 2 shows the way and size of the related effects from the included studies. Because the study did not show much in terms of methodological diversity, a joint analysis was carried out.

The overall Standard Mean Difference was found to be -0.34 (95% CI: -1.01 to 0.33). The Z test for overall effect was statistically significant (Z = 1.00, P <0.32). Chi-square for heterogeneity statistics was not statistically significant (x2 = 188.40, df = 13, P = 0.00001). The I-square test represents differences that cannot be attributed to chance. Values greater than 50% can be considered to be substantial heterogeneity. In our case, the I-square is 93%. To detect bias publications, Forrest Plot was examined and found to be roughly symmetrical

Discussion

All studies included have several methodological weaknesses. The most important thing is the lack of Double blind. Slightly perceived quality of sleep can have different causes (for example physical, neurological, psychological or hormonal) and some sleep problems may not only be affected by music (ie restless sleep apnea legs). The main limitation of this review is the general limitations of all reviews that are responsible for publication bias. Forrest Plot examination shows rough symmetry. However, this is only a rough indication of the absence of publication bias. The clinical diversity of included studies is large. The question may arise whether data collection is appropriate. However, his findings are very consistent. This could mean that the effect of the intervention does not depend on the patient's condition.

Unfortunately, none of the studies we included provided follow-up and lack of data to evaluate long-term effectiveness. Nevertheless, regression analysis revealed that length of follow-up was not a statistically significant predictor of effect size (Niet, Tiemens, Lendemeijer, & Hutschemaekers, 2009). To evaluate clinical relevance, we compare these results with other meta-analyzes. They also used randomized controlled trials and sleep quality as a measure of results. But their study uses a combination of relaxation as an additional intervention to improve sleep quality (Niet et al., 2009).

In the 2016 Qun Wang study it was found that musical intervention revealed a significant effect in improving the three components of sleep quality namely sleep latency, sleep efficiency, and daytime dysfunction (Wang et al., 2016). Abhizeet et al's study explains that music allows the creation of a state of relaxation by reducing anxiety, which can contribute to improving sleep quality. Neurobiological studies have confirmed that the calming effect arises from music associated with electroencephalographic and serum frontal asymmetries showing lower cortisol levels associated with depression (Deshmukh et al., 2009). Besides music can also correlate the ratio of brain activity between relaxing and busy (Durousseau, Mindlin, Insler, & Levin, 2016). Research in Iran also shows that music therapy can improve sleep quality among older men (Allami, Dalvandi, Zadehmohammadi, & Rezasoltani, 2020).

Music can function as a focal point of attention which distracts the listener's attention from the stress of the mind. Some participants stated that music helped them "turn off their heads" and thus promote sleep. This mechanism seems very relevant when working with trauma patients who often suffer flashbacks and attacking thoughts about traumatic events (Jespersen & Vust, 2012).

Sympathetic nervous system activity and heart rate can be influenced by music (Laily, Juanita, & Siregar, 2014). In this case, of course, using soft music and easy listening that helps calm the mind and with a low music volume (Rahman, Oktiawati, & Khodijah, 2017). Music therapy is a non-pharmacological therapy that combines mind-body therapy as an intervention technique that shapes thinking processes so that it affects psychological and physical conditions (bodily functions) (Wijayanti, Johan, & Rochana, 2020).

Music has become one of the most commonly used self-help strategies for promoting sleep (Niet et al., 2009). We find scientific support for the effective use of systematic music aids to improve sleep quality and enhance creativity during the day (Lazic & Ogilvie, 2007). Because there are no reported side effects, nurses can use these findings for their practice in promoting music therapy.

Conclusion

Based on fourteen studies, the results show that music therapy is a research-based intervention that facilitates the achievement of medical, physiological and educational goals that have been proven effective in improving sleep quality in patients with various conditions. (Efendi & Tane, 2019)(Niet et al., 2009). Music can affect humans both psychologically and physiologically (Yasril et al., 2018) and improve spiritual well-being (Ubaidillah, Nuriya, & Novila, 2020).

As a non-pharmacological method, music therapy is an initiative that is easy to implement, practical, inexpensive and has no side effects (Mornhinweg & Voignier, 2015) and can be done in nursing practice to treat sleep problems in various populations in Indonesia (Etkisi, 2016). The use of music therapy is considered fast and easy to use. However, this requires further exploitation. Determining the most effective form (duration of exposure, time of exposure) of the intervention and type of music for different populations (eg children, adolescents, parents) attracts topics for future studies. Because objective and subjective outcome measures reflect different sleep dimensions, researchers should assess both. Strict inclusion of criteria based on the definition of good sleep problems is highly recommended for future research.

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