

THE EFFECTS OF MUSIC ON CHRONIC PAIN

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Abstract <p>The purpose of this study was to find out what kind of music has been used to manage chronic pain, to identify in what kind of conditions music is listened to and to figure out the influence of music on different psychological or physiological variables among patients with chronic pain. The aim of the study was to gain information about the analgesic properties of music on chronic pain, in order to give nurses new ideas on how they can ease their patients' pain.</p> <p>In this thesis a literature review has been composed to analyze what kind of results have been found in research articles about using music as an intervention for alleviating chronic pain. Research material was obtained from databases of: PubMed, CINAHL and Cochrane Central Register of Controlled Trials. Altogether seven articles were included for the study.</p> <p>According to the review, music has a positive effect on chronic pain. All articles found that music decreases the sensation of pain. Music was listened usually 20 minutes to 1 hour per day. Classical music and string instruments were widely used in the studies. Music was listened at home and in hospitals in relaxing settings without extraneous stimuli. The decrease of depression was also regarded in several articles.</p>		
Keywords Chronic pain, Music, pain management		
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Tiivistelmä <p>Tämän työn tarkoituksena on selvittää minkälaista musiikkia on käytetty kroonisen kivun hoitoon, kartoittaa minkälaisessa ympäristössä musiikkia on kuunneltu sekä löytää tietoa musiikin mahdollisista vaikutuksista eri psyko- ja fysiologisiin muuttujiin potilailla, joilla on krooninen kipu. Tavoitteena oli löytää arvokasta tietoa hoitajille musiikin kivunlievittämismomenteista kroonisen kivun hoidossa</p> <p>Tässä kirjallisuuskatsauksessa on kerätty yhteen ja analysoitu tutkimustuloksia, jotka käsittelevät musiikin vaikutuksia kroonisen kivun hoidossa. Tutkimusmateriaali löytyi PubMedin, Cinahlin ja Cochranen tietokannoista. Yhteensä seitsemän artikkelia otettiin tarkasteluun.</p> <p>Katsauksen mukaan musiikilla on positiivinen vaikutus krooniseen kipuun. Kaikki artikkelit todistivat musiikin vähentävän kroonista kipua. Musiikkia kuunneltiin pääsääntöisesti säännöllisesti 20 minuutista yhteen tuntiin päivittäin. Klassisen musiikin ja kielisoittimien käyttö tutkimuksissa oli yleistä. Tutkimuksissa tutkimusryhmät kuuntelivat musiikkia rauhallisissa olosuhteissa, hyvin levänneinä ja vailla häiriötekijöitä. Joissakin tutkimuksissa myös tuotettiin musiikkia esimerkiksi laulamalla. Musiikin huomattiin myös vähentävän masennusta useissa tutkimuksissa.</p>		
Avainsanat (asiasanat) krooninen kipu, musiikki, kivunhallinta		
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Contents

1	Introduction	2
2	Pain	4
2.1	Essentials about pain	4
2.2	Sensation of pain	4
2.3	Chronic pain	6
2.4	Treatment in primary health care and special care	7
2.5	Methods of Analgesia	8
3	“Audioanalgesia”	11
4	Purpose, aims and research questions	12
5	Implementation of the study	13
5.1	Literature review.....	13
5.2	Search and selection of material	14
5.3	Analysis of the material	16
6	Results.....	17
	Types of music was listened to	17
	Conditions under which music was listened to	18
	The effects of listened music	19
7	Discussion	22
7.1	Discussion of the findings	22
7.2	Reliability of the review	24
7.3	Conclusions and recommendations for further research.....	25
	References	27
	Table 1: Studies included and their main findings	19

1 Introduction

Pain is physical suffering and it is the basic experiences of everyday life, familiar to every man, the same affliction that is as old as human history. Different kind of pains can be classified according to their neurophysiological mechanisms and therapies by their effectiveness according to clinical and scientific evidence. (Vainio 2009.) The pain is chronic when it lasts for more than three months or has exceeded the normal healing time of tissue damage (Haanpää 2013). Chronic pain is one of the most common reasons why people seek medical help and most common reasons for chronic pain are back pain and arthritis (Elliott, Smith, Penny, Smith & Chambers 1999). People with chronic pain usually suffer from depression, suffering and distress (Haanpää 2013) and are usually on premature retirement due to the disability (Elliot et al 1999).

Examination of patient with chronic pain consists of anamnesis and clinical examination. Use of indicators and questionnaires to support anamnesis is possible. After diagnosis treatment can be started and it usually consists of non-pharmacological pain management which is supported with medication. (Hagelberg & Heiskanen 2012.)

While there are physiological signs that indicate patient's pain the pain is still subjectively experienced phenomena (Haanpää 2013). Often patients are asked to scale the intensity of their pain by using different pain scales like visual analog scale (VAS) which is 10cm scale wherein 0 is no pain at all and 10 being worst pain there is (Frey-Law, Lee, Wittry & Melyon 2013). Prevention of chronic pain is thorough treatment of acute pain (Haanpää. 2013).

Music as therapeutic intervention for pain has been in use since 20th century. In different hospital settings music has been proved to have positive results in pain relief. Use of opioids has been used less in patients whom have listened to music than those who have not been listening to music. The effects of music as a pain management for acute pain in hospital settings have been studied more than the effects to chronic pain. (Joanna Briggs Institute 2009.)

Topic for this thesis rose in writers mind when he was working with patients whom had chronic pains and were using a lot of pharmacologic agents to alleviate pain. It came to mind that many of them used only pharmacologic aid to pursue status without pain. Few non-pharmacological aids were in use though e.g. hot and cold treatment. When searching for music therapies used inside and outside of hospitals for pain, it was found out that listening to music when suffering from chronic pain was not research as much as e.g. post-operative pain. Saving money in hospitals has been an issue at hand all the time I've been working as a nurse. Non-pharmacologic interventions for pain alleviation are cheaper than pharmacological and I believe that the use of non-pharmacological means together with medication would be economically profitable.

In this thesis a literature review has been composed to analyze what kind of results have been found in research articles about using music as an intervention for alleviating chronic pain. Aim of this study is to find out what kind of music has been used to manage chronic pain, to map out how music is listened and to figure out if music has positive outcome on different psychological or physiological variables. The purpose of the study is to gain information about the analgesic properties of music on chronic pain, in order to give nurses new ideas on how they can ease their patients' discomfort.

2 Pain

2.1 Essentials about pain

According to International association study for the pain (2012) "Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage". Word pain comes from Latin word "poena" which means penalty or punishment (Vainio 2009). Pain is subjectively experienced and yet in society the validity of pain is evaluated by third person using objective methods like x-ray (op. cit. p.).

Pain is the most common reason why people seek medical help. By sensing pain our body protects its system from tissue damage or its progress. Biologists conception states that pain makes you stay alive. This hypothesis can be supported with people who from being born are not able to sense pain. For an example with congenital analgesia you suffer from continuous tissue damages creating growing base for bacteria, leading to infections. (Kalso 2009.)

2.2 Sensation of pain

According to Kalso and Kontinen (2009a) Aristoteles thought pain as feeling, the opposite of pleasure, while "specificity theory" by Descartes states that intensity of pain is in relation to the tissue damage. Knowledge about pain has gone forward from those days (op. cit. p).

There rises series of electrical and chemical functions when body faces tissue damage. Nervous system transports the impulse from small nerve endings in the tissue all the way through spinal cord until ending at the cerebral cortex. This process can be dealt to four stages which are transduction, transmission, modulation and perception. (Kalso & Kontinen 2009b.)

In *transduction* the stimulus causing the tissue damage gives a rise to electrochemical activation of the nerve endings. Frequency of impulses transmits the magnitude of the tissue damage. In *transmission* the impulses flow from peripheral nerves to spinal cord and from here, to the thalamus and on to the cerebral cortex. The *modulation* phase regulates pain in the nervous system. There are inhibitory and excitatory interneurons in the spinal cord. In chronic pain the central modulation can enhance the pain. Subjective response of transmitted pain is *perception*, the fourth stage. (op. cit. p.)

Peripheral nerves are either myelinated A-fibers or not-myelinated C-fibers. these fibers also differ by diameter A-fibers being wider. The pain stimuli transmitted by A-fibers is rapid and causes sharp pain sensation in the brain, while stimuli through C-fibers is slower and then sensed as burning or aching pain. (op. cit. p.)

In 60's Melzack and Wall developed the *gate control theory of pain*. Theory states that when impulses are on transmission from peripheral nerves towards the brain, they must get through "nerve gates" in the spinal cord. These gates can reduce or increase the impulses passing through. In the nerves this means affecting the transmitting fibers e.g. by activating C-fibers we can reduce or block impulses carried by A-delta fibers (Deardoff 2003). Vaajoki (2013) refers to Bonica and Loeser (2001), whom states that by affecting the descending paths from the brain we can manage the pain. By

listening to music we can activate inhibitors rising to the brain, thus weakening the stimuli.

2.3 Chronic pain

The pain is considered to be chronic when it has lasted for more than 3 months or has exceeded the normal healing time of tissue damage (Haanpää 2013). In series of researches conducted in Europe it was founded that 17% of 20000 participants had chronic physical pain that had lasted over 6 months (Salokangas 2003). The most common reasons for chronic pain are back pain and arthritis (Elliott et al.1999). People with chronic pain usually suffer from depression, suffering and distress (Haanpää 2013). Chronic pain has an effect on economics, in Elliot's et al. (1999) article it was founded that many of people suffering from chronic pains are on premature retirement due to the disability.

There are different types of chronic pain:

Nociceptive pain results from tissue damage from e.g. ischemia, musculoskeletal, inflammation and arthritis. These pains are outside the nervous system although they can activate nervous system and cause sensitivity, color and temperature changes of the tissue. *Neuropathic pain* means pain in the nervous system. The pain results from damage or illness in the body's own sensory system (somatosensory). Neuropathic pain can result from various things, the most common reasons being from diabetes, compressive nerve, spinal cord injury and stroke. *Idiopathic pain* is not either nociceptive or neuropathic pain and it doesn't meet diagnostic criteria of chronic pain syndrome. This type of pain is very difficult to diagnose. Fibromyalgia is a type of idiopathic pain. *Chronic pain syndrome* cannot be explained physiologically. The pain is very intense and persistent, and it causes a lot of suffering. Pain is considered to be result from psychosocial

problems. (Haanpää 2013.)

2.4 Treatment in primary health care and special care

Primary health care has responsibility on care of pain. From there a patient can be referred to the special care if needed. Primary health care takes anamnesis and makes a clinical evaluation. It is important to identify the type of pain and to diagnose the illness behind the pain. Assessment of pain should be done constantly during the care, used scales in Finland are visual analogue scale and numeric rating scale. Primary health care follows local and global evidence based instructions. Patient is referred onward if the pain is intermediate or intense regardless of treatment given in consultation. (Sosiaali- ja terveysministeriö 2009.)

Post-operative pain care is responsibility of the unit who took care of the patient, or the care can be guided to primary health care with proper instructions. If the pain is intense after 1 month – 3 months in intermediate pain, the patient will get a referral to pain polyclinic. Delaying specialized treatment weakens the prognosis. Patients with many diseases and health problems should be treated in collaboration of different specialties, one of them having the main responsibility and others are giving consultation aid. Elderly patients are referred to either pain- or geriatric polyclinic. Geriatric patients have usually many health problems and they are in a need of hospitalized care. Imaging and neurophysiological examinations should be done in 1 month in intense pain and in 3 months if the pain is intermediate. (Sosiaali- ja terveysministeriö. 2009.)

2.5 Methods of Analgesia

Best results in treatment of chronic pain are founded by combining the use of pharmacological and non-pharmacological means (Kalso, Paakkari & Forsell, 2009). There are different kinds of means to decrease chronic pain. Curative treatment of nociceptive pain is the key in preventing pain from getting chronic. Pain medications that are in use for nociceptive pain are e.g. non-steroidal anti-inflammatory drugs and mild opiates like tramadol and paracetamol with codein. Use of opioids is also possible with special indicators. (Haanpää 2013.)

In neuropathic pain the most common treatment is medication, while other treatment methods are for support. Best results can be made when multi professional team works together. Different combinations of medications are needed in the treatment of neuropathic pain due to the fact that the neuropathic pain has different pathophysiological mechanisms. Realistic expectations for pharmacologic pain relief are only 50%. Patient have to understand that the process of getting the best result means starting different drugs one at a time because it is not known for certainty that what medication works and for who. While assessing the intensity of pain at the follow ups is a good tool, patient can keep a pain diary, so the doctor can estimate the effects of the drug. Used drugs for neuropathic pain are e.g. tricyclic and other antidepressants, epilepsy medication, weak and strong opioids. (Haanpää 2011.)

Use of opioids is increasing rapidly and the side-effects with it. Opioids are used to end suffering in cancer patients and to increase functional capabilities in chronic pain caused other than cancer. Use of opioids for other than cancer pain should be started at the pain polyclinic where there is multi professional team to evaluate the whole situation. This is not possible though to the lack of

resources. Start of opioid treatment should be considered thoroughly e.g. the risk of abuse evaluated. Use of long acting opioids should be preferred over the short acting tablets. Opioid treatment should not be considered as life-long treatment. Unwanted effects of opioid treatment are dependence, addiction and tolerance. Physical dependence and its' symptoms are not necessarily same thing as addiction. Addiction is mental dependence. Tolerance means that body gets used to having opioids and their effect is decreased leading to heavier dosages. (Kalso et al. 2009.)

Different kinds of anesthesia injections are used in chronic pain, but there is no long-term evidence of their benefits. These injections should only be supporting the main treatment. In this method anesthetic substance is injected to different places like nerves, epidural or spinal. Simplest ones of these injections can be done by general practitioner but more difficult ones are done by anesthesiologist. Most common of these injections in treatment for chronic pain is epidural steroid injections. Indication for this injection is radicular low back pain in discus prolapse or neuropathic pain due to discuss prolapse. (Hamunen & Kalso 2009.)

Transcutaneous electrical nerve stimulation TENS is cheap and user friendly method. How these works are explained with port control and endorphin theories. Activation of non-nociceptive fibers inhibits projective neuron and pain impulse is diminished. Endorphin theory states that the manipulating of certain tissues makes brain and spine to release endorphins, which decreases the pain. TENS treatment is most often used for prolonged musculoskeletal and nerve pains. TENS treatment is done by putting electrodes around the pain area. Treatment is usually started at some health care center with physiotherapist, but afterwards patient can treat himself at home with proper instructions. There are not many contraindications for TENS. The best results of TENS treatment are found in treatment of knee arthritis. (Haanpää & Pohjolainen 2009.)

Physiotherapeutic methods include e.g. cold, warm and acupuncture. Research about these methods is limited, but use of them has been going on since ancient medicine. Warm increases blood flow in tissues, opens capillaries, increases elasticity of the tissue, relaxes muscles and increases metabolism of the tissue. It is founded that warm treatment decreases pain for a while and increases performance in acute back pain. Warm treatment can be done by the patient by himself at home. Cold treatment is most commonly used in acute pain. Cold makes muscles to relax, decreases swelling and decreases tissue damage caused by hypoxia. Cold treatment has been good for rheumatic patients. Cold treatment is also cheap and user friendly method. Massaging of the back is founded to increase performance and to decrease pain in chronic back pain. Most important reasons that it works is touch by other person and interaction. Acupuncture is ancient Chinese method of treatment. In western medicine it was started after publish of the port control theory. Acupuncture is used e.g. for musculoskeletal pain and knee arthritis. (Pohjolainen 2009.)

Chronic pain associates with fear, negativity, anxiety and passivity. These negative phenomena can just worsen the problem. Meanwhile positive thinking, acceptance of pain and active pain control methods have been found to decrease pain and increase performance. With psychological treatment we can effect on how patient reflects on the pain. Goal of psychological treatments is to ease the getting along with the pain. Patients are taught to recognize the risk situations and to use means to control the pain in need. (Elomaa & Estlander 2009.)

3 “Audioanalgesia”

Listening, creating and enjoying music has been present in every culture throughout the history (White 2001). Nightingale (1969) mentioned on her notes that nurse is responsible for soothing environment and that string music has positive effect on pain, but in the 1800's it was impossible to play music for patients in the hospital. First use of music in the hospitals was to enable sleep, lighten anxiety and for distracting patients from unpleasant measures (White 2001). Music listening can be regarded as music therapy if educated music therapist is involved (Nilsson 2011).

Musical attributes have to be taken into account when selecting tunes to induce physiologic and psychological changes. *Rhythm* is key attribute to considerate when certain outcomes are searched. Rhythm can alter body rhythms like heart rate and it is believed to alter mood states as well. Slow, repetitive, steady rhythm relaxes and soothes listener. (White 2001.) Patients with chronic pain have stated that genres which have given positive results have been classical, pop and relaxing music, which should be listened to not too noisy volume (Mitchell, MacDonald & Knussen 2007).

Sequence of musical pitch and interval between musical tones creates the melody. Pitch is the vibration of the sound; faster vibration creates higher pitched tones. Research has provided results, that lower vibration promotes relaxation. Harmony also plays role in relaxing effect. Harmony is the way different pitches blend together. (White 2001.)

These attributes are responded by the right hemisphere and the process is also participated by the limbic system, which is the center of emotions, feelings, and sensations. There are different theories why music is effective

when attempting to invoke an emotional response. It has been suggested that is due to the distraction from unpleasant stimuli, but other theories have been proposed as well. (White 2001.) Primarily results in researching the efficacy of music in pain relief is correlated to the pain control theory (Mitchell et al. 2007).

Music as intervention is inexpensive method and has virtually no contraindications. For the best results it is important to prepare the individual and the environment e.g. limiting extraneous stimuli. Types of music that can be considered varies but it is recommended to use instrumental music (White 2001) with slow and flowing tempo of 60-80 beats per minute, a maximum level of 60 decibels and lasting 20-60 minutes per session (Nilsson 2011). Consultation of music therapist should be done if possible. Music as intervention should be studied more and integrated to nursing practice. (White 2001.)

In Finland use of music therapy has been operating since 1960's. Music therapists work e.g. in special care, to whom you can get referred to by an general doctor. In Finland you can get compensation from KELA for music therapy. (Suomen musiikkiterapiayhdistys 2013.)

4 Purpose, aims and research questions

The purpose of this study was to find out what kind of music has been used to manage chronic pain, to identify in what kind of conditions music is listened to and to figure out the influence of music on different psychological or physiological variables among patients with chronic pain. The aim of the study

was to gain information about the analgesic properties of music on chronic pain, in order to give nurses new ideas on how they can ease their patients' pain.

Research questions were:

- 1) What kind of music was used in order to decrease chronic pain?
- 2) Under what conditions music was listened to, so as to decrease chronic pain?
- 3) What kind of effects music had on chronic pain and other psychological and physiological variables?

5 Implementation of the study

5.1 Literature review

Scientific information should be public, for all to read and for evaluation (Leino-Kilpi 2007, 2). Literature reviews are collected information about certain topic or research problem (op. cit. p.). Systematic reviews identify, evaluate and summarize existing research in order to give compact packet of information on certain topic (Centre for reviews and Dissemination 2008, v). Literature reviews are based on already gathered information and with it is possible to perceive existing research base as a whole (Johansson 2007, 5). Literature review proceeds through steps. There are differences on how many steps there should be, but roughly they all include three steps, which are planning, implementation (searching and analyzing) and reporting (op. cit. p.).

It is necessary to check if there is ongoing or already existing reviews about the topic. Main focus of the review should be in the creation of the research question, and in the use of appropriate methods. Search should be all-inclusive with clear unbiased inclusion criteria. Every step of the review should be well documented so that it could be reproduced. Lack of documentation leads to lack of reliability of the study. Research questions should be clear, they can be very specific or very broad. Proper amount of questions is from one to three (Centre for reviews and Dissemination 2008, 3-6; Johansson 2007, 6).

5.2 Search and selection of material

Search words thought were (chronic AND pain AND music). These themes are very broad, but they provided quite narrow material itself so narrowing down the search wasn't necessary. Adding more limiting factors was found to decrease the amount of articles and adding more synonyms didn't get more material. Search terms tried were "long-term", "suffering", "music therapy" and "pain management", but they didn't provide more material.

Search was done on most essential databases: CINAHL- and Cochrane Central Register of Controlled Trials and Pubmed and also on Finnish health database Medic. These databases were used because it was thought that these would provide most pivotal information about the subject. These databases were taught to use by a JAMKs librarian.

Frequently updated databases are usually reliable source of information. Used databases in this study are frequently updated and used in many different scientific articles. Peer reviewed articles was inclusion criteria. Language was

restricted to Finnish and English even though it is regarded to limit the material and so manipulate the final result (Center for Reviews and Dissemination 2008, 12). Those articles that had accessible full text were incorporated to the material. Articles that were published after 2000 were included in the study.

Search provided together 111 results, from which 65 had full text available. From these 65 pieces every title and abstract was checked. Sometimes only a title was checked to know if it was suitable article. Abstracts of suitable results were checked few times by one person. Out of the 65 articles, there were 11 articles repeated. By the topic and abstracts 47 of the pieces were not included to the study because they didn't match the inclusion criteria.

The inclusion criteria for this study were:

- Study in English or Finnish
- Scientific publication
- Peer reviewed
- Published between 2000-2014
- Accessible full text
- Answers to one or more research questions

Final study material consists of seven (7) articles. All of them were found through Nelli-portaali. Based on inclusion criteria seven of the articles found were included in the study which are presented in table 1. Articles were found from Cinahl and PubMed databases. In this phase of literature review these articles were analyzed based on research questions and their quality e.g. methods used in research were valuated based on their applicability and usability.

It is important to assess the quality of the articles. Assessment of the quality of the articles is done to increase the quality of the study itself (Kontio & Johansson 2007. 101). In this study the interest is in the use of music and patients responses to it, so main focus of assessment is how well the use of music and its effects are described.

5.3 Analysis of the material

The method of analysis used here is both inductive and deductive. Data analysis is determined by both the research objectives (deductive) and multiple readings and interpretations of the raw data (inductive). Findings are derived from both the research objectives and the data itself. Data-analysis is guided by the evaluation objectives, which presents the topics or themes to be investigated. Framework of the analysis is created by the development of these categories. For the findings to be usable, it is important to make decisions about what is important and what isn't. (Thomas 2006.)

The selected studies we're analyzed based on research questions. From each article those informations and expressions, which answered to the set research questions, were checked. Articles were printed out and then read thoroughly, so that all relevant information would be noticed. Found informations and expressions were all highlighted with different color markers to which research question they gave an answer. Some of the articles answered to all research questions and some to only one.

6 Results

Types of music was listened to

Few of the articles didn't say anything about the music listened or played (Gallagher et al. 2006, Nickel et al. 2005). Kenny and Faunce (2004) mentioned that "lively tempo and syncopated rhythm, pitch no more than an octave, and simple structure and words" were used in their therapy sessions. These mentioned articles studied music therapy; including other aspects of participation in music than listening e.g. Kenny and Faunce (2004) studied also singing. Meanwhile others (McCaffrey & Freeman 2002; Guetin et al. 2012; Siedliecki & Good 2006; Onieva-Zafra et al. 2010) studied only listening of music.

Guetin et al. (2012), and McCaffrey and Freeman (2002) mentioned rhythm. McCaffrey and Freeman didn't explain the rhythm of music used in the study. Guetin et al. (2012) explained in detail how rhythm was used in order to obtain different kind of results. Siedlieckis and Goods study (2006) didn't mention rhythm per se, but in the study, the participants were asked to choose from different music for different purposes e.g. "upbeat, familiar, instrumental or vocal music to ease muscle tension and stiffness".

Music therapy studies (Gallagher et al. 2006; Nickel et al. 2005; Kenny & Faunce 2004) didn't mention about the music genres used. Many studies (Onieva-Zafra et al. 2010; McCaffrey & Freeman 2002; Guetin et al. 2012) had classical music included. Siedliecki and Good (2006) had piano, jazz, orchestra, harp and synthesizer for one group and for one group patients could decide what music to listen based on their needs e.g. up-beat to ease muscle tension and slow, melodious and pleasant music for relaxation.

Conditions under which music was listened to

Music therapy studies (Gallagher et al. 2006; Nickel et al. 2005; Kenny & Faunce 2004) didn't mention duration of the sessions and few studies (Gallagher et al. 2006, Nickel et al. 2005) hadn't information on how many times patient had sessions. Kenny and Faunce (2006) had five sessions per week for three weeks, but the duration of the sessions wasn't mentioned. All four other studies mentioned that patients listened to music 20 minutes to 1 hour each session. Also they listened to music everyday with the exception that (Onieva-Zafra et al. 2010) study participants had chance to listen to music four or more times a week during two weeks of the total four weeks study lasted. In Guetin et al. (2012) study participants listened to music twice a day during the experiment.

In majority of the studies participants listen or practice music at hospital or other facility (Kenny & Faunce 2004; Guetin et al. 2012; Gallagher et al. 2006; Nickel et al. 2005). In Guetin et al. (2012) study participants listened to music also at home after hospital stay. Other studies (McCaffrey & Freeman 2002; Onieva-Zafra et al. 2010; Siedliecki & Good 2006) had their participants listen to music only at home.

Many of the studies didn't mention or have instructions for patients on how they should be listening to music e.g. no mention about environment or their own posture. McCaffrey and Freeman (2002) asked participants to sit in a comfortable chair and minimize distractions. Guetin et al. (2012) wanted their music listening group to "lie down in their rooms with their eyes closed under minimum lighting so that they felt at ease". Kenny's and Faunce's (2004) participants were guided to make themselves comfortable to ease any discomfort they may have.

The effects of listened music

Every study researched the effects of music on chronic pain, which was the including criteria for this study. VAS scale was used to evaluate pain in every study except Kenny and Faunce (2004). Some of the studies used also short form of McGill Pain Questionnaire (Siedliecki & Good 2006, Onieva-Zafra et al. 2010, McCaffrey & Freeman. 2010). In every study pain decreased in the group which listened to music.

Several studies examined also different variables than pain. Most often examined was depression which was evaluated in majority of the articles (Onieva-Zafra et al. 2010, Ziedliecki & Good 2006, Nickel et al. 2005, Gallagher et al. 2006, Guetin et al. 2012). Only one study examined the effects of music on the usage of pharmacologic agents (Guetin et al. 2012). Physiological factors wasn't studied much, one study examined the effects of music on shortness of breath (Gallagher et al. 2006).

Table 1: Studies included and their main findings

Authors, place, year and database	Purpose of the study	Data and collection of data	Main findings
Gallagher, Lagman, Walsh, Davis, LeGrand. USA. 2006. PubMed	This study was to objectively assess the effect of music therapy on patients with advanced disease.	200 patients with different chronic illnesses got music therapy. Therapy could consist of music listening, playing etc.	Patients received music therapy at their own rooms (inside hospital). Pain evaluated with VAS. It was founded that patients in palliative care had positive results in pain and also in anxiety, depression and shortness of breath.
Guetin, Ginies, Siou, Picot, Pommie, Guldner, Gosp, Ostyn, Coudeyre, Touchon. France.	Assess the usefulness of this music intervention to the management of patients with chronic	A single blind, randomized, controlled trial for 87 patients with different chronic illnesses and	Pre-selected relaxing music in relaxing environment through earphones. 20 minutes at least twice

2012. PubMed.	pain.	pains. 44 listened music and 43 got only standard care. Followed for 3 months. First in hospital then at home.	a day. Pain reduced significantly in music group. After release pain increased a bit. VAS and numeric scale were used to asses pain. Anxiety and depression slightly were decreased as well. Music group used less medication as well.
Kenny, Faunce. Australia. 2004. PubMed.	Explore the impact of group singing on mood, coping, and perceived pain in chronic pain patients attending a multidisciplinary pain clinic.	Groups of ten chronic pain patients attended the center for 5 days/week for 3 weeks. They were there for supervised functional restoration and reduction/withdrawal of medication.	Pain self-efficacy questionnaire (PSEQ), Pain responses self-statements (PRSS), Oswestry low back pain disability questionnaire (PDQ). Trained singing teacher and piano accompanist conducted singing sessions. People who attended singing sessions experienced less pain (although the effect size is small) than people who listened to singing.
McCaffrey, Freeman. USA. 2003. Cinahl- & PubMed	Examine the influence of music as a nursing intervention on osteoarthritis pain in elders.	Randomized clinical trial for 66 participants with osteoarthritis pain.	Music group listened to music 20 minutes of pre-selected music (classical, 60-72 beats per min) per day for 14 days in a quiet room 1 hour after morning toilet. Both rating scales (VAS and SF-MPQ) proved that music group experienced less pain (Assessed on days 1, 7&13.)
Nickel, Hillecke,	(3 different research	Randomized	Group attended

<p>Argstatter, Bolay Germany. 2005. PubMed</p>	<p>from one was selected. Others were for children and tinnitus which don't meet criteria)</p> <p>Examine the effects of music therapy for patients suffering from chronic pain</p>	<p>controlled for 40 persons suffering from chronic pain (most headache and back pain).</p>	<p>music therapy (Heidelberg). Therapy is not described at all. Pain was evaluated with VAS and SES (pain sensation scores). It was founded that music therapy not only reduces pain but also addresses associated psychological distress in a positive way.</p>
<p>Onieva-Zafra, Castro-Sanchez, Mataran-Penarrocha, Moreno-Lorenzo. Spain. 2010. PubMed</p>	<p>To investigate the effects of music on pain and depression for people diagnosed with fibromyalgia.</p>	<p>Randomized controlled clinical trial. 60 patients with fibromyalgia. 30 persons in music intervention group and 30 in control group.</p>	<p>Music group listened to pre-selected music (classical and salsa) for 4 weeks at home. Pain was evaluated with two different scales VAS and SF-MPQ (McGill Questionnaire short form). Depression was evaluated also. Music group experienced less pain and depression than the control group. No mention of used analgesia.</p>
<p>Siedliecki, Good USA. 2006. PubMed</p>	<p>How to use music to enhance the effects of analgesics, decrease pain, depression and disability, and promote feelings of power</p>	<p>Randomized controlled clinical trial for 60 participants for people with back, neck, and/or joint pain for at least 6 months.</p>	<p>One group selected their own music, one group chose from selected music and one didn't listen to music. Music groups listened 1 hour per day for 7 days. No significant difference between 2 music groups. Music groups experienced less pain (evaluated by using VAS and SF-MPQ) and depression and more power.</p>

7 Discussion

The purpose of this study was to find out what kind of music has been used to manage chronic pain, to identify in what kind of conditions music is listened to and to figure out the influence of music on different psychological or physiological variables among patients with chronic pain. The aim of the study was to gain information about the analgesic properties of music on chronic pain, in order to give nurses new ideas on how they can ease their patients' pain. With the articles that were included in this study, research questions were answered quite thoroughly.

7.1 Discussion of the findings

Research questions guided the review of the articles. First question was about the attributes and genres of the music that was used to induce analgesia. Like Nightingale (1968) mentioned that string instruments had positive effect on pain, these were used in several studies (Onieva-Zafra et al. 2010, McCaffrey & Freeman 2002, Guetin et al. 2012). Mitchell et al. (2007) stated that classical, pop and relaxing music has effect on pain. These genres were used and mentioned in every study except the music therapy studies.

White (2001) said that rhythm is key attribute to think about when choosing music to alter physiological and psychological variables, "slow, repetitive, steady rhythm relaxes and soothes listener". Rhythm was mentioned and used same ways in almost half of the studies (Guetin et al. 2012, McCaffrey & Freeman, 2002).

First research question was answered quite well. None of the studies let the participants choose from their own personal music collection. These studies provided information only about the effects of pre-selected music by the researcher.

Second research question wanted to know about the conditions in which music was listened to. Nilsson (2011) said that one session should last from 20-60 minutes. This was done in many of the studies (Onieva-Zafra et al. 2010, Guetin et al. (2012), Siedliecki & Good. 2006, McCaffrey & Freeman. 2003). Music was listened mostly daily, one study had two 20 minute music listening sessions twice a day. This information was left out in few studies. All of the studies lasted for several days, even weeks.

Music was listened in both at home and hospital environment. It was mentioned in many studies that how patients should be listening to the music e.g. McCaffrey and Freeman (2003) asked participants to have music listening session in quite room at home without distractions one hour after morning toilet. In one hospital study patients listened to music with dimmed lights in their own hospital bed. According to White (2001) the best results are found when extraneous stimuli are limited.

Third research question wanted to know what kind of effects music has. All of these studies found that music decreases chronic pain. More interesting result was that music had ongoing effect on the patients' pain; longer the music was daily listened to, the pain was decreased more. This was found in several studies (Onieva-Zafra et al. 2010; McCaffrey & Freeman 2003; Guetin et al. 2012).

White (2001) regarded that music can alter mood as well. Most studied psychological variable in the studies was depression. Music seemed to have decreasing effect on depression, which is very common symptom patients who suffer from chronic pain have. Third research question was answered but more information would have been welcomed.

7.2 Reliability of the review

To ensure the reliability of the review it is important to document every step of the process (Johansson 2007, 6). Every step of the process of searching the material and inclusion of material is documented with care, so that reader could re-done the same search if wanted. Manual search should be included (Johansson 2007, 6), but it was not done here, so it decreases the reliability of this study (Center of reviews and dissemination 2008). Two persons are needed to evaluate if articles meet the inclusion criteria (Pudas-Tähkä & Axelin 2007). In this review this was not possible and therefore might decrease the reliability.

To ensure the reliability of this study the search of material was practiced with the information specialist working at JAMK library. Too narrow search terms might limit the material so broad terms were used. In this case broad terms didn't provide too extensive material, so it was easily navigated through. References of this study were carefully selected from relatively new material to decrease false information. Big part of the literature about pain and care of pain is from Finnish literature, so some information might not be applicable in different countries.

Limiting errors and bias two persons are needed to make the review (Johansson 2007, 6). This was not possible in this case, but the material was quite small total of included articles being seven. According to Center of reviews and dissemination (2008) one researcher misses 8% of possible articles, in this study 8% would mean less than one article. Also thorough research was done in order to leave anything noteworthy out. One way to ensure reliability is to use peer reviewed articles, which was done in this study.

7.3 Conclusions and recommendations for further research

The way music should be listened is very crucial information for nurses in pursuance to decrease chronic pain. Nurses work in different fields like homes and hospitals. Listening to music is justified method to decrease pain on both of these settings. The way music supposed to be listened is pivotal information for nurses so that they can guide their patients accordingly.

It was somewhat surprising that physiological factors weren't studied almost at all. Only one study studied one variable which was shortness of breath, and music had positive effect on this factor as well. Only one study examined the use of pharmacological aids during the experiment. Even though pain was decreased, the use of analgesics decreased only slightly.

It is great to see that music has positive effect on chronic pain. More information about the usage of medication when also listening music regularly was craved. Also physiological factors weren't sufficiently studied. From obtained information from selected studies we can say that listening music

doesn't provide sufficient analgesia on chronic pain, but together with use of medication it reduces pain, and this reduction is noteworthy for nurses.

Chronic pain is difficult to treat and sometimes treatment in our primary and special health care doesn't work enough, new ideas should be brought up. While music, doesn't have almost any contraindications, is relatively cheap, extremely available, and showed to have analgesic properties, western health care doesn't seem to use this method as much it should.

This study provided information about what kind of music has positive effects on chronic pain and its' symptoms, and how it should be listened. Research is needed to map out more the effects of music on usage of medication.

There should be a research conducted on how music effects on chronic pain if music is selected by the patient. In this study only pre-selected music was used. Comparison of these methods would be interesting to read.

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