

Original Article

The Effect of Music and the Pressure Applied on Pain Induced by Intramuscular Injection

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Abstract

Background: It is found out that one of the most pain giving and causing disturbance of the interventions applied for the patients at the hospitals is IM injection. To reduce individuals pain is very important to the nurses. The pain depending on intramuscular injections which have physical and emotional effect should be reduced to maintain patient-nurse relations, patient satisfaction, nursing quality and the adaptation of the patient to the medicinal treatment.

Aim : This study was conducted in order to investigate the effect of music and the pressure applied to the site on pain induced by intramuscular injection.

Methods: The data of the study were collected between 15 March and 1 June 2014. 78 voluntary individuals were included in the study. The injections were administered by using three methods; "applying pressure" to the site before injection, "music practice" starting before injection and lasting until the end of injection, and "standard practice" where no special practice was done. Three injections were administered to each participant from ventrogluteal site with 24-hour interval. 1 ml sterile apyrogenic distilled water was used as injection solution in all injections and the participants marked the level of the pain, experienced by them, on Visual Analogue Scale right after the injections.

Results : Mean pain scores were found to be 3.1 ± 2.2 , 3.1 ± 2.3 and 2.0 ± 1.9 for standard, pressure and music applications respectively. In standard and pressure applications, difference between mean pain scores was found to be statistically not significant ($p>0.05$). However, the differences between the mean scores of standard injection and music applications ($p<0.05$) and between music and pressure applications ($p<0.05$) were found to be significant.

Conclusions: It was determined that listening to music was effective in reducing the pain induced by intramuscular injection, and the standard injection administration and pressure application method had no effect.

Key words: Intramuscular Injection, Nursing, Music, Pressure, Pain

Introduction

IM injections are way of invasive and painful parenteral drug administration in which the drugs are sent to the body through big muscle groups (Harkreader, 2007). In IM injections; disruption of skin integrity, and the physical and chemical effect of the drug administered cause trauma, pain, and discomfort (Harkreader, 2007; Gunes et al., 2009). It is reported that the pain developing due to IM injections is related to mechanical trauma that needle puncture creates as well as the sudden pressure that the substance causes during

intramuscular injection (Mitchell & Whitney, 2001; Celik, 2012). Also, the factors affecting pain perception and the injections that are not administered by using a proper technique can cause pain (Gunes et al., 2009).

IM injection associated pain having physical and emotional effects should be reduced for the compliance of the patient to the drug therapy, quality of patient care, sustainability of patient satisfaction, and continuation of patient-nurse relationships (Hasanpour et al., 2006). The success of pain management depends on the knowledge, behaviours, and talents of the nurses who are

administering the painful procedure (Ozer, Akyurek & Basbakkal, 2006). Nurses are responsible for relieving the patient and preventing the injection pain with the techniques they use (Hunt, 2008; Demir, 2011). Pharmacological and non-pharmacological methods are used in reducing IM injection-associated pain. One of the nonpharmacological methods used in pain treatment is the method of cognitive behavioural therapy, and the other one is skin stimulation method (Demir, 2011).

Music therapy, one of cognitive behavioural therapy methods, is one of the oldest treatment methods. Music is known to be used for treating patients in various cultures such as ancient Egypt, China, and Greece. Florence Nightingale used flute melody in nursing care to relieve the pain of the soldiers during the Crimean War (Murrock & Higgins, 2009). In numerous studies (Chlan, 2002; Voss et al., 2004; Browning, 2000; Heiser et al., 1997; McCaffery & Freeman, 2003) music was found to be relieving the patients physiologically and psychologically by relieving the pain and anxiety. It is thought that music keeps the awareness of the listener at high level and enables a balance between the mind, body, and soul (Arslan & Celebioglu, 2004; Tournaire & Theau-Yonneau, 2007; Liu, Chang & Chen, 2010) Music is argued to enable relaxation by affecting the autonomic nervous system. Music, whose analgesic effect is explained by "endorphin theory", is believed to reduce stress and relieve pain by leading to release endorphin. Music also helps attracting attention from pain to another place, thus limits transmission of stimuli, causing pain sense, to brain and reduces pain. The music is easy to apply, a cost-effective natural intervention, does not have any side effect, and also has an effective role in physical, psychological, social, emotional and spiritual recovery in order to relieve pain (Murrock & Higgins, 2009; Demir, 2011). Thus, it is important that music therapy is combined with pharmacological methods in pain management (Demir, 2011). Even though it is not known exactly by which mechanisms the skin stimulation, another method, relieves the pain, it is explained by the "gate control theory". According to the gate control theory; smaller fibres conveying pain messages are inhibited by activating bigger fibres, and the gate is closed to transition of the stimulations felt as pain (Yavuz, 2014). In their studies, Chung et al., Barnhill et al. (1996) and

Yavuz (2014) found that applying pressure to the injection site before injection reduced the injection pain. In the literature, no study investigating the effect of playing music and applying pressure during injection administration on relieving pain in adults in a comparative way was found. Thus, this study was conducted to examine the effect of music played before the injection and the pressure applied to injection site, on pain induced by IM injection.

Research Question

- 1-The application of IM injection in company with music may reduce injectional pain.
- 2-The pressure applied to the region before IM injection may reduce injectional pain.

Materials and Methods

This was a quasi-experimental study with control group. The study was conducted between 15.03.2014 and 01.06.2014 in a student laboratory of a university's vocational school. The population of the study consisted of 200 students receiving education at various programs of this vocational school in the academic year of 2013-2014. Sample calculation was not made, 78 participants, who were older than the age of 18, were not receiving analgesics, did not have any known disease, did not report any sensation disorder, did not have any psychiatric disorder, did not have symptoms of contusion, erythema and ulcers in the injection site, and were voluntary to participate in the study, were included in the study.

The participant information form, visual analogue scale, pressure application tool, headphones and MP3 player in which the music track was loaded, injection materials, and a chronometer were used to collect the data. This form involved questions about demographic characteristics of the participants such as gender and age as well as questions related to their satisfaction about the method of the injection.

Visual Analogue Scale: An unnumbered horizontal 10-cm ruler with "no pain" written on one end and "the worst pain" on the other end, was used to evaluate the perception of pain.

Weight tool: A weight tool of 2 kg was used to apply pressure at same force for each individual. A disc with 1.5 cm diameter was placed and fixed to the part of this tool which would contact with the injection site and was covered with a sheath.

MusicTrack Played During Injection: The lyricless music track in tune hejaz of classical Turkish music which is around 5-6 minute long was played in 60-80 (Db) decibels by using a MP3 player with headphones. Soft padded audio earbuds covering the top of the ear completely and being impervious to external sounds were used.

Intervention: The injections were administered by using three methods; "pressure application" to the site before injection, "music practice" starting before injection and lasting until the end of injection, and "standard practice" where no special practice was done. Each method was applied as IM injection to ventrogluteal site in the same participants with 24-hour intervals. The methods and the first injection (left or right ventrogluteal side) site were determined randomly. The following injections were administered to the side, which was not injected, in order.

In "Pressure Application" method, the pressure application tool was put on the injection site for 10 seconds without pressing to the site and the injection was administered according to injection protocol, and then the pain was evaluated. In "music practice" method, starting before injection and continuing during injection, classical Turkish music was started to be played by using MP3 player with headphones before injection and around 5 minutes later, while the participant was continue to listening to music, the injection was administered according to the protocol. In "Standard injection" method which was assessed as the control group, where no special practice was made; the injection was administered in accordance with the injection protocol and the pain was rated by using Visual Analogue Scale (VAS).

The following protocol was followed in all injection methods; Participants were put in lateral position before IM injection administration. 1ml sterile apyrogenic solution for injection was used in injections. Before each injection, 1ml sterile apyrogenic water for injection was pulled in 5ml injectors and made ready by changing needle tip. 20-23 numbered 38mm needles (green tip) were used. 70% alcohol was used as skin antiseptic and left to dry. Injections were administered to ventrogluteal site with 90° angle. 1ml sterile, apyrogenic water for injection was injected for 10 seconds. After the injection, a slight pressure was

applied to the site, and no massage was made. Just after all injections, the participants were put in the appropriate position and asked to mark the pain, felt by them during injection, on VAS. The distance was measured by a ruler and recorded. 20 minutes after injection, the injection site was checked and recorded in terms of complications such as pain, bleeding, redness and swelling. All injections were administered by the same researcher.

Data analysis

The data of the study were assessed by using a statistical program in the computer. Independent samples t-test was used for statistical analysis of the data.

Ethical considerations

In the planning stage of the study, necessary permissions were primarily taken from Ataturk University Faculty of Health Sciences Ethics Committee and the institution, where the study was conducted. Voluntary participation of the individuals to be included in the study was attached importance.

Before data collection, the participants were informed about the purpose of the study and procedure and their questions were answered. Additionally, after the individuals were informed about the aim of the study for which purposes the obtained results would be used, their approvals (informed consent principle) were taken in written.

Results

The mean age of the participants was 20.28 ± 1.3 . A 57.7% of the participants were female and 42.3% were male. The pain mean scores of the participants were 3.1 ± 2.2 in standard injection administration, 3.2 ± 2.3 in pressure application method, and 2.0 ± 1.9 in music method. The differences between standard injection administration and pressure application method in terms of pain mean scores was statistically insignificant ($p > 0.05$). The difference between standard administration and music method; and between pressure application method and music method was statistically significant ($p < 0.05$), (Table 1). A 43.6% of the participants stated that they were satisfied with standard administration, 55.1% with pressure application, and 91.0% with music method. The difference between the methods in terms of satisfaction status was found to be statistically significant. ($p < 0.05$), (Table 2)

Table 1. Comparison of pain mean scores according to injection methods

Methods	Pain mean scores (cm)	p	t
Standard administration	3.1 ± 2.2	0.904	.059
Pressure application	3.1 ± 2.3		
Standard administration	3.1 ± 2.2	0.049	-3.210
Music method	2.0 ± 1.9		
Pressure application	3.1 ± 2.3	0.048	-3.198
Music method	2.0 ± 1.9		

Table 2. Comparison of injection pain relieving methods in terms of satisfaction status

Methods	Satisfied		Not satisfied		Total	
	n	(%)	n	(%)	n	%
Standard administration	34	43.6	44	56.4	78	100
Pressure application	43	55.1	35	44.9	78	100
Music method	71	91.0	7	9.0	78	100
	p<0.05		x²=41.071			

Discussion

The related literature was discussed with the purpose of investigating the efficiency of injection administered with music and pressure applied to injection site on relieving pain induced by IM injection.

When Table 1 was examined, it was observed that the scores obtained for all the injection methods used in pain relieving were between 2.0-3.1. In similar studies, the mean scores of perceived pain in IM injections that were administered after manual pressure application were found to be 1.77±1.49 (cm) (Chung, Ng & Wong, 2002), 13.8± 13.6 (mm) (Barnhill et al., 1996), 1.3 ±0.9 (cm) (Yavuz, 2011), 3±2 (cm) (Alavi, 2007) and the mean score of pain induced by injections accompanied by music was reported to be 5.13±2.11 (cm) (Ozdemir, 2008). The scores of pain induced by injection methods administered are thought to be similar to the pain mean scores reported in previous studies.

When the mean scores of pain associated with injection methods used in relieving pain were compared, it could be asserted that method of injection with music is the most effective method in perceiving pain less (Table 1). In numerous studies (Chlan, 2002; Voss et al., 2004; Browning, 2000; Heiser et al., 1997; McCaffery & Freeman, 2003) it was proven that music had a positive effect on pain. Even though no study examining the effect of the

music during the injection on reducing pain in adult individuals, in the study conducted by (Ozdemir, 2008) on children it was stated that the music reduced the injection pain. Results of this study are compatible with Ozdemir's study. It is argued that music enables relaxation by affecting the autonomic nervous system (Nilsson, 2008). Lack of loosening of tissue where the needle is inserted in IM injection and tension caused by drug injected cause to increase pain sense (Celik, 2012). The music played is thought to reduce the pain sense by enabling relaxation.

It is also believed that music reduces the pain sense by attracting the attention of the patient to another place (Nilsson, 2008). Providing the pain control with music is an inexpensive, safe, and easy method to be used by the nurses. In this aspect, it can be considered as an alternative to other methods. In the study, it is found that applying pressure to the injection site before the injection did not reduce pain. There are some studies in the literature examining the effect of manual pressure application to injection site in reducing the pain caused by IM injection (Chung, Ng & Wong, 2002; Barnhill et al., 1996; Yavuz, 2011). Chung et al. (2002) found that applying pressure to the injection site for 10 seconds until feeling of resistance in the adult individuals, who would be vaccinated with 2 doses of hepatitis A and B vaccinations, decreased the perceived pain significantly. Similarly, (Barnhill et

al.1996) stated that among adult patients who were administered with IM immunoglobulin, applying pressure by thumb to the injection site for 10 seconds with resistance towards thumb reduced the injection-associated pain.

Yavuz (2011) determined that applying manual pressure to injection site in IM benzathine penicillin G injection reduced injection pain in children and adolescents with acute rheumatic fever. When these studies are examined, it was observed that Chung, (2002) and Barnhill et al., (1996) applied a pressure of 190.82 mmHg to the injection site, but in the study of (Yavuz, 2011) information about the magnitude of the pressure was not given.

When a force is applied to surface, the effect of the force on this surface is dependent both on the magnitude of the force and the size of the surface to which the force is applied. In this study, 2kg of pressure applied per cm² was thought not to be effective in inhibiting pain impulses. The results of this study are not compatible with results of the previous studies. It is thought that studies in which different pressure forces would be used are required (Table 1).

When Table 2 was examined, it was found that the highest rate of satisfaction was observed in music method. It was thought that perceiving pain less in injection administered with music and relaxing effect of the music affected the satisfaction from injection administered with music.

Limitations

The study was limited with only healthy young adults; it can be generalized to this group.

Conclusion

As a consequence, it was determined that administration of IM injection with music reduced the pain associated with the injection, and there was no difference between standard injection administration and pressure application method in terms of pain mean scores.

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