Music Listening to Decrease Pain during Second Trimester Genetic Amniocentesis: A Randomized Trial

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Objective: *To evaluate whether music listening decreased pain perception during second trimester genetic amniocentesis.*
Material and Method: *We conducted a prospective randomized study to compare the pain perception using a visual analogue scale (VAS), pain rating, future decision to repeat the procedure, and pain perception compared to a venipuncture before and after the second trimester genetic amniocentesis between groups of pregnant women who underwent amniocentesis with and without music listening.*
Results: *Three hundred thirty two pregnant women were enrolled; 161 listened and 171 did not listen to the music. The pre-procedure anxiety, the anticipated pain, post-procedure pain/ anxiety median VAS scores, pain rating, future decision and level of pain compare to a venipuncture in the music-listening and non-music-listening groups did not show statistically significant difference. The pre-procedure anxiety median VAS scores were 1.3 and 0.5 in the music-listening and non-music-listening groups, respectively and the anticipated pain median VAS scores were 4.8 and 4.5 in the music-listening and non-music-listening groups, respectively. The post-procedure median VAS pain/anxiety scores were 2.7 and 2.5 in the music-listening and non-music-listening groups, respectively.*
Conclusion: *Music listening was not significantly effective in reducing pain during second trimester genetic amniocentesis.*

Keywords: *Amniocentesis, Pain, Music*

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The second trimester genetic amniocentesis is the most common prenatal invasive procedure and more than 1,000 cases are requested each year at Songklanagarind Hospital. Post procedural-associated complications are rare, occurring in as little as 0.1% of cases[1]. Besides the awareness of complications, most pregnant women perceived the procedure to be painful and request methods to decrease the intensity of the pain. Needle puncture at the upper third of the uterus and cryoanalgesia were reported to reduce the pain sensation[2,3]. Other treatments, such as local anesthetic drug injection, do not decrease the perception of maternal pain[4]. However, the limitation of needle puncture at the upper third of the uterus in some patients and the time consumption for cryoanalgesia were demonstrated. Therefore, more convenient modalities should be studied.

Immediate and late post-operative music were found to reduce pain in many procedures such as laparoscopic cholecystectomy and open heart surgery[5,6]. Classical music selections, particularly Bach, Mozart, and Italian composers, have the most benefit on health conditions such as quality of life improvement, preoperative anxiety level reduction, and palliative medicine. Thus, the aim of the present study was to evaluate whether listening to jazz music during second trimester genetic amniocentesis will decrease the degree of pain sensation.

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Material and Method

Subjects

This prospective randomized controlled trial study was conducted on pregnant women between 15 and 21 weeks of gestation according to the last menstrual period or ultrasonographic biometric measurement who underwent a second trimester genetic amniocentesis due to advanced maternal age at the Maternal-Fetal Medicine Unit, Department of Obstetrics and Gynecology, Faculty of Medicine, Prince of Songkla University, Hat Yai, Thailand between February and May 2013. Multiple pregnancies, presence of fetal structural malformation, history of amniocentesis in previous or current pregnancy, more than one attempt of needle insertion, history of a hearing problem, and illiterate participants or could

not understand the questionnaires or refused to be enrolled in the study were excluded. To achieve 80% power, with an alpha equal to 0.05 and 90% retention at finishing of the study, the required sample size was 157 per each group, or 314 in total.

Study procedures

The present study was approved by the Ethics Committee of the Faculty of Medicine, Prince of Songkla University. Firstly, the pre-procedural counseling for second trimester genetic amniocentesis was routinely performed by a nurse and the patients were asked if they would give consent to the procedure. The study was then explained to the participants and they were all asked to provide written consent. The data collection form included information on maternal age, body mass index (BMI), gestational age, education, religion, occupation, and previous abdominal surgery. After that, the participants were asked to complete the visual analog scale (VAS) to measure their pre-procedure anxiety and anticipated pain levels before the procedure. The VAS is an indirect tool used to assess the degree of pain. The participants were asked to indicate a point along a 10 centimeter horizontal line (0 = no pain and 10 = worst possible pain).

Then all participants were randomized into two groups by computer using block of four with 1:1 in box ratio, numbered and sealed in opaque envelopes. The envelopes were prepared by an author (Hanprasertpong T). The envelope was sequential opened by our nurse-aid after participant signed the consent form. Our study used the most popular Thai classical music composed by King Bhumipol, the past King of Thailand. The selection of music titles included Candlelight Blue, Love at Sundown, Falling Rain, and Near Dawn. Although the music is typically blue jazz rather than classic, we preferred to use it because it is cool and valuable for Thai people. Earphones were given to all participants and the music started at the antiseptic skin preparation process and finished at the end of the needle removal process in the music-listening group. The music was turn-on by a nurse-aid who was not involved the VAS score assessment process. There was no music for the non-music listening group. All amniocentesis procedures were done under continuous ultrasonographic guidance, free-hand technique, using a 23-guage spinal needle by a physician who has been certified Maternal-Fetal Medicine from the Royal Thai College of Obstetricians and Gynaecologists. Seven physicians (all authors) performed the procedure. No local anesthetic was used during the procedure. Approximately 16 to 20 mL of amniotic fluid per sample was collected and fetal cardiac activity was immediately checked after the procedure. Before discharge from the Maternal-Fetal-Medicine Unit, the participants routinely rested at least 30 minutes.

Each participant was asked to mark the VAS score for their post-procedure pain/anxiety perception immediately after the procedure. The participant's experience of intensity of pain was assessed from the verbal rating scale and described as no pain, discomfort, minimal discomfort, minimal pain, and severe pain. Next, the participants were asked to compare the level of pain of the amniocentesis with a venipuncture described as less than, equal to, or more than. Lastly, the participants were interviewed for their opinions for a repeat of the procedure if indicated in the future.

Statistical analysis

Statistical analysis was performed with STATA version 10.0 (Stata Corp, College Station, TX, USA). Descriptive data were presented as numbers, percentages, median, ranges, and means, standard deviations (SD). Chi-square test and Wilcoxon-Rank Sum test were applied to detect the differences between groups as appropriate and p-value <0.05 was considered as statistically significant. Pre-, anticipated-, and post-procedure pain/anxiety VAS score were compared between both groups using Wilcoxon Rank Sum test. Percentage of pain rating, future decision, and pain compared to venipuncture were compared by using Chi-square test.

Results

Three hundred thirty two pregnant women were enrolled and randomized in our study; 161 women listened to music and 171 women did not listen to music during the amniocentesis. All participants continued until the end of the study. No participant was punctured more than one time. Thus, no withdrawal participant found after enrollment. Demographic characteristics of the 332 participants were shown in Table 1. No significant differences of the demographic variables, including patient's age, gestational age, BMI, education, occupation, religion, and history of previous abdominal surgery were detected between the groups. No complications were found during and/or immediately after the procedure.

The pre-procedure anxiety median VAS score, the anticipated pain median VAS score, post-procedure

pain/anxiety VAS score, pain rating, future decision, and level of pain compared to a venipuncture in the music-listening and non-music-listening groups were shown in Table 2. The pre-procedure anxiety median VAS scores were 1.3 and 0.5 in the music-listening and non-music-listening groups, respectively and the anticipated pain median VAS scores were 4.8 and 4.5 in the music-listening and non-music-listening groups, respectively. The post-procedure median VAS pain/anxiety scores were 2.7 and 2.5 in the music-listening and non-music-listening groups, respectively. There were no statistically significant differences in the

Table 1. Characteristics of the patients

	Music-listening (n = 161)	Non-music-listening (n = 171)	*p*-value (95% CI)
Age (years), mean ± SD	37.40±2.50	37.10±2.37	0.35 (-0.68 to 0.37)
Range	34 to 46	34 to 44	
Gestational age (weeks), mean ± SD	17.27±0.86	17.23±0.83	0.60 (-0.14 to 0.23)
Range	15 to 19	15 to 19	
BMI (kg/m^2), mean ± SD	25.27±4.33	24.8±4.26	0.18 (-0.46 to 1.39)
Range	18 to 38.6	18.4 to 38.5	
Education, n (%)			0.183
Less than primary school	61 (37.89)	70 (40.94)	
Primary school-bachelor	97 (60.25)	101 (59.06)	
Higher than bachelor	3 (1.86)	0	
Occupation, n (%)			0.775
Housewife	28 (17.39)	34 (19.88)	
Agriculture	13 (8.07)	17 (9.94)	
Government officer	40 (24.84)	44 (25.73)	
Other	80 (49.69)	76 (44.44)	
Religious, n (%)			0.572
Buddhist	138 (85.71)	146 (85.38)	
Muslim	22 (13.66)	25 (14.62)	
Other	1 (0.62)	0	
Previous abdominal surgery, n (%)			0.461
Yes	79 (49.07)	77 (45.03)	
No	82 (50.93)	94 (54.97)	

BMI = body mass index

Table 2. Pre-procedure, anticipated, post-procedure visual analogue scores of pain and anxiety, pain rating, future decision, and pain compares to venipuncture

	Listen (n = 161)	Non-listen (n = 171)	*p*-value (95% CI)
Pre-procedure anxiety, median (range)	1.3 (0, 4.6)	0.5 (0, 4.6)	0.34 (-0.37 to 0.81)
Anticipated-pain, median (range)	4.8 (3.8, 5.7)	4.5 (3.1, 5.2)	0.20 (-0.49 to 0.76)
Post-procedure pain/anxiety, median (range)	2.7 (1.6, 4.2)	2.5 (1.4, 4.5)	0.72 (2.81 to 3.25)
Pain rating, n (%)			0.224
No pain	1 (0.62)	4 (2.34)	
Minimal pain	42 (26.09)	51 (29.82)	
Pain	116 (72.05)	116 (67.84)	
Very pain	2 (1.24)	0	
Future decision, n (%)			0.622
Yes	150 (93.17)	158 (92.4)	
Uncertain	11 (6.83)	12 (7.02)	
No	0	1 (0.58)	
Pain compared to venipuncture, n (%)			0.556
Less than	43 (26.71)	50 (29.24)	
Equal	72 (44.72)	81 (47.37)	
More than	46 (28.57)	40 (23.39)	

pre-procedure anxiety, the anticipated pain, and the post-procedure pain/anxiety median VAS scores.

The differences of subjective pain rating, future decision to undergo a similar procedure if indicated and the degree of pain when compared with venipuncture were not statistically significant.

Discussion

The present study demonstrated that listening to music did not relieve the pain sensation during the second trimester genetic amniocentesis measured by post-procedure pain/anxiety VAS scores and subjective pain ratings by the pregnant women. Listening to music did not affect the future decision to repeat the procedure if indicated. Lastly, when compared to the pain level of a venipuncture, the pregnant women's pain perceptions were not significantly different between the music-listening group and the non-music-listening group.

The present study was the first study which evaluated the effectiveness of listening to music to relieve pain and anxiety during a second trimester genetic amniocentesis. The effectiveness of music as an adjunctive in pain control in hospitalized adults as intra- and post-operative analgesic control has been reported[7,8]. The sensory-discriminative and affective-motivational properties were explained as the mechanisms of music therapy in relieving the pain[9]. However, similar to our results, the ineffectiveness of music therapy for pain and anxiety has been reported in postoperative pain and anxiety control in cesarean section[10].

The potential of music to reduce pain and anxiety during the second trimester genetic amniocentesis was not found in the present study. We can explain the result by three reasons. Firstly, we concluded that the length of music-listening in our study was probably too short to affect the pain and anxiety sensation. Previous studies found the benefit of music listening during abdominal laparotomy and laparoscopic cholecystectomy were noted when the listening time was more than three hours after laparoscopic cholecystectomy and with 30-minute listening sessions repeated seven times after abdominal laparotomy[5,10]. Secondly, the music listening using earphones may have caused interference of patient-doctor communication during the procedure. The doctor usually talked continuously with the patient during the procedure, especially just before the puncture and at the withdrawal of the needle. Because the patient could not hear the doctor's voice, it made them anxious. Lastly, the benefit of listening to music may be obscured by our sample randomized effectiveness because the mean anticipated pain VAS score in the music-listening group was higher than the non-listening, which was nearly statistically significant (p-value = 0.06). Therefore, there may be slight bias of the pain threshold of the patients in the music-listening group. In the future, we suggest evaluating the benefit of listening to music by prolonging the period of listening time. The music should start at the beginning of the ultrasonographic examination and the loudspeaker should be placed behind the pillow not too loud or too soft. The level of sound volume should be appropriate to maintain patient-doctor communication.

Based on the present study, we concluded that listening to music was not effective in reducing pain during second trimester genetic amniocentesis. Further studies should use different music genre and a loudspeaker rather than a set of earphones. A loudspeaker at a low volume behind the pillow may be better to allow good patient-doctor communication.

What is already known on this topic?

Needle puncture at the upper third of the uterus and cryoanalgesia were effective in reducing the pain sensation during second trimester genetic amniocentesis.

What this study adds?

Music was not effective in reducing pain during second trimester genetic amniocentesis.

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Potential conflicts of interest

None.

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การศึกษาทดลองแบบสุ่มโดยใช้เสียงเพลงเพื่อลดความเจ็บระหว่างการเจาะตรวจน้ำคร่ำช่วงไตรมาสที่สองของการตั้งครรภ์

ธารางรัตน์ หาญประเสริฐพงษ์, อุ่นใจ กออนันตกุล, เรืองศักดิ์ ลีธนาภรณ์, จิตเกษม สุวรรณรัฐ, ฐิติมา สุนทรสัจ, นิลภา พฤกษานุศักดิ์, สาวิตรี พรานพนัส

วัตถุประสงค์: *เพื่อศึกษาประสิทธิภาพของเสียงเพลงในการลดความรู้สึกเจ็บปวดระหว่างการเจาะตรวจน้ำคร่ำช่วงไตรมาสที่สองของการตั้งครรภ์*

วัสดุและวิธีการ: *เป็นการทดลองแบบสุ่ม โดยเปรียบเทียบระดับความเจ็บปวดก่อนและหลังทำหัตถการด้วยมาตรวัดความเจ็บปวดด้วยสายตา ระหว่างกลุ่มที่ได้รับและไม่ได้รับการระงับปวดด้วยเสียงเพลง และวัดขั้นความเจ็บ ความรู้สึกเจ็บเมื่อเทียบกับการเจาะเลือดจากหลอดเลือดดำและการตัดสินใจเข้ารับการเจาะน้ำคร่ำซ้ำหากมีข้อบ่งชี้ในอนาคตภายหลังการเจาะน้ำคร่ำระหว่างทั้งสองกลุ่ม*

ผลการศึกษา: *มีผู้เข้าร่วมการศึกษา 332 คน ระดับความเจ็บก่อน ความเจ็บปวดที่คาดหมาย และความเจ็บปวดหลังการเจาะน้ำคร่ำขั้นความเจ็บ ความรู้สึกเจ็บเมื่อเทียบกับการเจาะเลือดจากหลอดเลือดดำและการตัดสินใจเข้ารับการเจาะน้ำคร่ำซ้ำหากมีข้อบ่งชี้ในอนาคตภายหลังการเจาะน้ำคร่ำ ไม่แตกต่างระหว่างสองกลุ่มทดลอง*

สรุป: *เสียงเพลงไม่สามารถลดความเจ็บปวดจากการเจาะตรวจน้ำคร่ำช่วงไตรมาสที่สองของการตั้งครรภ์ได้*
