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Research Article

The Effect of Music on Anxiety and Pain in Women Undergoing Gynecological Exam and Smear Test

Jinekolojik muayene ve smear testi uygulanan kadınlarda müziğin anksiyete ve ağrı üzerine etkisi

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Abstract

Aim: The screening for cervical cancer is a standard procedure at the gynecology outpatient clinic. Although a smear test is a simple process for gynecologists, patients might experience anxiety during a gynecological examination and smear test. The aim of this study is to determine the complementary value of music before and during the smear test on patients' pain and anxiety during and after the procedure

Material and Methods: This randomized controlled study included 160 Turkish-speaking women over 30 years old undergoing smear tests, divided into music and control groups. Music or no music was played during the procedures using a speaker system to maintain communication between the patient and the physician. Data on anxiety and pain were collected using the State-Trait Anxiety Inventory (STAI) and the Visual Analogue Scale (VAS) before and after the exams.

Results: A total of 160 patients were included in the study, 80 patients in the music group and 80 patients in the control group. The mean State-Trait Anxiety Inventory (STAI) score in the music therapy group was 36 (SD = 13) and 41 (SD = 17) in the control group ($p = 0.042$). According to the STAI score, 28 patients (35%) in the control group had a high level of anxiety, whereas only 15 patients (19%) in the music therapy group had a high level of anxiety. Similarly, in the post-smear test evaluation, visual analogue scale scores were statistically lower in the music therapy group (4.3 vs. 2.7, $p = 0.001$).

Conclusion: Our study showed that music therapy during gynecological examination and smear test can reduce anxiety and pain. As a non-invasive intervention, music intervention is a safe, low-risk, cost-effective, and easy-to-perform intervention with no apparent harmful effects.

Keywords: anxiety, gynecological exam, music, pain, smear test

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Öz

Amaç: Serviks kanseri taraması, kadın hastalıkları polikliniklerinde rutin olarak uygulanan bir işlemdir. Her ne kadar smear testi jinekologlar açısından basit bir işlem olsa da, hastalar bu süreçte anksiyete yaşayabilmektedir. Bu çalışmanın amacı, smear testi öncesinde ve sırasında uygulanan müzik müdahalesinin hastaların işlem sırasındaki ve sonrasındaki ağrı ve anksiyete düzeylerine olan tamamlayıcı etkisini değerlendirmektir.

Gereç ve Yöntemler: Bu randomize kontrollü çalışmaya, smear testi yapılacak olan ve Türkçe konuşan, 30 yaş üzeri 160 kadın dahil edilmiştir. Katılımcılar rastgele müzik ve kontrol grubu olmak üzere ikiye ayrılmıştır. İşlem sırasında, hasta ve hekim arasındaki iletişimi korumak amacıyla hoparlör sistemi aracılığıyla müzik çalınmış ya da müzik çalınmamıştır. Anksiyete ve ağrı düzeyleri, işlem öncesi ve sonrası Devlet-Sürekli Kaygı Envanteri (STAI) ve Görsel Analog Skala (VAS) ile değerlendirilmiştir.

Bulgular: Çalışmaya toplam 160 hasta dahil edilmiştir; 80'i müzik grubunda, 80'i kontrol grubundadır. Müzik grubundaki ortalama STAI skoru 36 (SD = 13) iken, kontrol grubunda 41 (SD = 17) olarak saptanmıştır (p = 0,042). STAI skorlarına göre, kontrol grubundaki 28 hastada (%35) yüksek düzeyde anksiyete saptanırken, müzik grubunda bu sayı yalnızca 15 (%19) olarak bulunmuştur. Benzer şekilde, işlem sonrası yapılan değerlendirmede müzik grubunda VAS skorları anlamlı derecede daha düşüktür (4,3'e karşı 2,7, p = 0,001).

Sonuç: Çalışmamız, jinekolojik muayene ve smear testi sırasında uygulanan müzik terapisinin anksiyete ve ağrıyı azaltabileceğini göstermektedir. İnvaziv olmayan bu yöntem, zararlı bir etkisi bulunmayan, düşük riskli, maliyeti düşük ve uygulanması kolay tamamlayıcı bir müdahale olarak değerlendirilebilir.

Anahtar Kelimeler: ağrı, anksiyete, müzik, jinekolojik muayene, smear testi

Introduction

The screening for cervical cancer is a standard procedure at the gynecology outpatient clinic. Although a smear test is a simple process for gynecologists, patients might experience anxiety during a gynecological examination and smear test. However, pain and anxiety are factors that can cause the patient to avoid the examination and have a negative experience [1]. Therefore, the development of methods to reduce the patient's anxiety will increase treatment compliance.

Listening to music may be proposed as a primary non-pharmacological and cost-effective intervention for the reduction of pain, with a particular emphasis on reducing anxiety [2]. There are contradictory studies in the literature that investigate the effects of music on procedures performed in office-based settings. In a study conducted on patients undergoing hysteroscopy, it was reported that music significantly reduced anxiety during the procedure, resulted in lower heart rate and systolic blood pressure, and was also associated with decreased postoperative pain scores [2]. However, in a meta-analysis compiling studies related to colposcopy, it was reported that music had no effect on anxiety score [3]. A systematic review of studies on gynecology patients revealed that music therapy is effective for reducing procedure-related pain and anxiety [4]. Similarly, it has been shown that music contributes to the reduction of nausea in patients undergoing radiotherapy for gynecological cancer [5]. Due to conflicting results in studies, music therapy has not been a standard method used in gynecology practice.

Listening to music can be presented as the first method for reducing pain and especially anxiety [6]. Inconsistent data exists between listening to music before or during treatment and anxiety [7-9]. In a study involving oncology patients, it was determined that playing classical music in the waiting room prior to chemotherapy reduced anxiety and lowered the average heart rate [10]. Also several studies have evaluated the association between music and the pain and anxiety associated with gynecological surgical procedures. In a prospective study conducted by Labrague et al., patients undergoing gynecological surgery listened to relaxing music prior to and after surgery [8]. The group listening to music experienced significantly less anxiety than the group not listening to music. In another study with a similar design conducted in Korea, it was found that patients who listened to music required fewer post-operative analgesics [11]. On the other hand, it has been shown that the music played during minimally invasive procedures (hysteroscopy, colposcopy) has no role in reducing the patient's anxiety and pain [7].

Previous studies have evaluated the relationships between gynecological surgery, cancer treatments, office-based treatments, and music therapy. However, there are not enough studies examining the relationship between gynecological examination and music therapy. In addition, there is an inconsistency in the results of previous studies. The aim of this study is to determine the complementary value of music before and during the smear test on patients' pain and anxiety during and after the procedure. Another aim of the study is to evaluate the effects of different music genres on patients.

Material and Methods

The study was conducted in the Department of Obstetrics and Gynecology at the tertiary referral university hospital. Before entering the outpatient clinic, the patients were informed about the study. Patients who agreed to participate in the study were prospectively assigned to two different arms. Ethical approval for this study was obtained from the Lokman Hekim University Scientific Research Ethics Committee (Approval No: 2025/042; Date: February 28, 2025). The data of the patients were obtained from them and from the hospital file.

All patients who applied to the outpatient clinic for gynecological examination and cervical cancer screening were evaluated to be included. Inclusion criteria were Turkish-speaking women, aged over 30 years and scheduled for a smear test. Exclusion criteria were hearing impairments, blindness, with a diagnosed psychiatric disorder, the presence of any anatomic pathology that could complicate performing the procedure, a previously known cervical cytology abnormality, or a history of cervical surgery.

The researchers informed patients who met the inclusion criteria before entering the outpatient clinic, and their informed consent was obtained. Eligible participants were informed that they would participate in a study on anxiety at the time of a gynecological examination and smear test. Considering that the emotional state of the patients may be affected, no information was given that the study was related to music therapy. Before entering the examination room, patients completed a questionnaire containing demographic data, the expected visual analogue scale (VAS), and the State-Trait Anxiety Inventory (STAI), which would take approximately 10 minutes. Data on the patients' age, height, weight, medications, parity, and expected pain of the procedure, measured by the visual analogue scale (VAS), were collected. The Turkish validation of the State-Trait Anxiety Inventory was used [12]. The STAI is an inventory consisting of a total of 20 items, and the result score varies between 20 and 80 (20–37 low anxiety or no anxiety, 38–44 moderate anxiety, >44 high-level anxiety). During the procedure, the VAS was filled by the doctor. The VAS ranges from 0–10 points, with higher scores representing more severe pain [13].

The researchers randomly divided the participants into the music group or the control group. Participants were randomly assigned to either the music or control group using a computer-generated randomization list, ensuring equal allocation without stratification. The procedure was carried out in exactly the same way in both groups, differing only in whether music was applied. Both groups received necessary information before the procedure. Music lists were created for classical music and spa music. Music was chosen randomly for patients who would receive music therapy. A loudspeaker was used instead of a headset to ensure communication between the patient and the physician. The volume of the speakers was adjusted by the doctor or researchers so that the music could be heard without disturbing the interaction between the participant and the doctor or nurse. For participants in the music group, music playback began as soon as the patient entered the examination room and continued uninterrupted throughout the entire procedure, including both the preparatory phase and the smear test, until the patient left the room. During the procedure, the patient's heart rate was measured with the help of a pulse oximeter. The patient's highest heart rate was recorded during the procedure. A gynecologist performed the procedure. After the procedure, the participants were again asked to fill out a questionnaire on VAS and STAI.

Statistical Analysis

A priori power analysis was performed using G*Power software, which indicated that a minimum of 128 participants (64 per group) was required to detect a medium effect size ($d = 0.5$) with 80% power and a significance level of 0.05; thus, our final sample size of 160 was deemed adequate. IBM SPSS (Statistical Package for Social Science) Statistics 25 program was used. Kolmogorov Smirnov and Shapiro Wilk tests were used to analyze the distribution of data (parametric/nonparametric). Paired-T test for the variables where parametric test conditions are met in the comparison of two dependent groups; Wilcoxon test was used in non-parametric conditions. In the comparison of two independent groups, the Student-T test was used under parametric conditions; Mann-Whitney U test was used in non-parametric conditions. The relationship between categorical variables was compared with Chi-Square and Fisher exact tests. The direction and severity of the relationship between two different variables were evaluated with the Spearman correlation test. A p value of < 0.05 was considered statistically significant in all analyses.

Results

A total of 160 patients were included in the study. There were 80 patients each in the group that received and did not receive music therapy. Table 1 displays demographic information about the patients. The patients' ages and body mass indices were similar. In the study group, 25 patients, and in the control group, 27 patients had a history of prior smear screening ($p = 0.560$). There was no significant difference between the mean values of the STAI and the heart rates used to assess anxiety before the gynecological examination. Again, the results of the VAS before the procedure were similar.

Anxiety and pain levels were compared in both arms during and after the examination. The mean heart rate in the music therapy group was 78 (SD = 14), while it was 80 (SD = 16) in the non-music

therapy group (p=0.248). The degree of pain was significantly lower in the group listening to music during the examination (3.0 vs. 4.9, p= 0.001), according to the VAS pain assessment. Similarly, in the post-smear test evaluation, VAS scores were statistically lower in the music therapy group (4.3 vs. 2.7, p = 0.001). When the STAI results completed by the patients after the examination were examined, it was revealed that the group listening to music experienced less anxiety. The mean STAI in the music therapy group was 36 (SD = 13) and 41 (SD = 17) in the control group (p = 0.042). According to the STAI score, 28 patients (35%) in the control group had a high level of anxiety, whereas only 15 patients (19%) in the music therapy group had a high level of anxiety. Table 2 summarizes the results of the anxiety and pain indices during and after treatment. Patients in the control arm had a mean STAI score of 37 (SD = 14) before the smear test, but this score increased to 41 (SD = 17) after the smear test (p = 0.024). Before the smear test, the STAI score in the music arm was 39 (SD = 16), but it decreased to 36 (SD = 13) after the smear test (p = 0.036).

Half of the patients who were given music therapy were listened to classical music, while the other half listened to spa music. There was no difference in the anxiety and pain states of the patients according to the music played. Table 3 shows the results of the pain and anxiety indices based on the types of music.

Table 1. Patient characteristics.

	Control Group (n=80)		Music Group (n=80)		p values
	mean	SD	mean	SD	
Age (years)	41	11	43	9	0.926
Height (m)	165	13	166	8	0.982
Weight (kg)	75	12	73	12	0.879
Body Mass Index (kg/m2)	27	4.6	26.1	4.1	0.453
Heart Rate (bpm)	73	13	77	12	0.548
Expected pain (VAS)	4.1	2.0	4.0	2.0	0.842
STAI score (%)	38	14	39	16	0.764

Abbrev.: SD: Standard Deviation, bpm: beats per minute, VAS: Visual Analog Scale, STAI: State-Trait Anxiety Inventory

Table 2. Comparison of pain and anxiety outcomes during and after treatment.

	Control Group (n=80)		Music Group (n=80)		p values
	mean	SD	mean	SD	
Heart Rate (bpm)	80	16	78	11	0.248
Pain during treatment (VAS)	4.9	2.8	3	1	< 0.001
Pain after treatment (VAS)	4.3	2.1	2.7	1.1	< 0.001
STAI score after treatment (%)	41	17	36	13	0.042

Abbrev.: SD: Standard Deviation, bpm: beats per minute, VAS: Visual Analog Scale, STAI: State-Trait Anxiety Inventory

Table 3. Comparison of pain and anxiety results during and after treatment by type of music.

	Classical Music (n=40)		Spa Music (n=40)		p values
	mean	SD	mean	SD	
Heart Rate (bpm)	78	12	77	11	0.546
Pain during treatment (VAS)	3	2	3.0	1.1	0.755
Pain after treatment (VAS)	3	1	3.0	1.2	0.925
STAI score after treatment (%)	36	14	36	12	0.946

Abbrev.: SD: Standard Deviation, bpm: beats per minute, VAS: Visual Analog Scale, STAI: State-Trait Anxiety Inventory

Discussion

Before the hospital visit, patients may increase their stress and anxiety due to the unfamiliar environment and the staff they do not know. This situation might cause patients to avoid coming to gynecological examinations and controls. In addition, increased anxiety will directly affect the communication between the patient and the doctor. Therefore, the application of simple interventions that can reduce the anxiety and pain of the patients will increase the patient's compliance with the treatment. Music intervention can serve as a primary non-pharmacological and cost-effective method, particularly in patients with high levels of anxiety. In this study, the effect of music on reducing anxiety and pain levels was determined in women who will have a gynecological examination and smear test.

Music intervention during the pre-PAP smear test period was found to be effective in reducing anxiety levels in our study. When compared to the control group, patients in the music therapy group had lower levels of anxiety and pain. In fact, a few other small studies have looked into the relationship between music and anxiety in gynecological practice [8,14,15]. A systemic review published in 2013 found that music listened to before surgery might well contribute to anxiety reduction [16]. In another randomized controlled clinical study, Angioli et al. found that music therapy during hysteroscopy statistically reduced the patient's anxiety [2]. Similarly, Chan et al. revealed that music can reduce anxiety and pain associated with colposcopy [17]. Aside from these encouraging results, some clinical trials failed to show a link between music and anxiety levels [7,18]. Mak et al. discovered no relationship between the relaxing music played before colposcopy and hysteroscopy and the patient's anxiety level in a prospective clinical study [13]. The differences in these results could be due to a variety of factors. The use of different anxiety and pain scales in the studies, as well as differences in the education and age levels of the patients, may explain the heterogeneity of the results.

On the other hand, sedation and different analgesics can be applied to patients in some minimally invasive procedures, and these treatment agents can also affect anxiety and pain parameters. We believe that because the patients in our study had gynecological examinations and smear tests, they did not have these limitations. In addition, because the procedure times were similar and the procedures did not require experience, it can be said that a standard was achieved between the groups.

Our findings further support correlation between anxiety and pain perception. It is important to recognize that pain is almost invariably accompanied by emotional disturbance and distress. Moreover, it is well established that anxiety can amplify painful sensations at all levels of the nervous system [2]. The VAS scores were different between the treatment arms. There are conflicting findings in the literature regarding the effect of music on the pain parameter [2,14]. The fact that there are so many variables that can influence pain could explain why the results are so divergent. There are many confounding factors, such as the patient's analgesic treatments, previous gynecological examination experiences and emotional state, as well as their communication with the physician these results should be evaluated with different studies. Aside from determining anxiety and pain through patient-completed questionnaires, physiological parameters are also evaluated as an additional method. Studies focused at systolic and diastolic blood pressure, as well as heart rate, and found contradictory results. In one study, Labrague et al. encountered that patients undergoing gynecologic surgery who received pre-operative music therapy had lower systolic blood pressure and heart rate [8]. Similarly, Yung et al. demonstrated that music significantly lowers blood pressure and heart rate in patients undergoing transurethral prostate resection[19]. However, the evaluation of patients who underwent hysteroscopy and colposcopy, as well as the effect of music on physiological parameters, were not determined in some studies [7]. Only heart rate was evaluated as a physiological parameter in our study, and no difference was found between treatment arms. Because our study only included a gynecological examination and smear test, and the procedure was relatively short, it is possible that there is no association between heart rate and music therapy. In addition, pain was evaluated in both our study and the literature. A previous study reported that women experienced higher levels of anxiety than men, highlighting the potential importance of music as an intervention for women undergoing medical procedures [20]. Notably, despite the well-established presence of pre-procedural anxiety in gynecological settings, our study revealed unexpectedly high levels of anxiety among patients prior to the procedure, as reflected in baseline STAI scores.

Limitations of the study

Our study has several significant limitations. First, it was conducted in a single-center setting, which may restrict the generalizability of the findings to other populations and healthcare environments. Second, unlike in some previous studies, music was delivered through speakers rather than headphones. While headphones can provide a more immersive experience, they were avoided in this study to maintain effective communication between the patient and physician and to allow real-time volume control. Third, the music intervention involved pre-recorded, researcher-selected music, which may not align with each patient's personal preferences or mood, potentially limiting its impact on anxiety. Lastly, only pulse was used as a parameter for anxiety assessment, while variables such as blood pressure or respiratory rate were not assessed. Future studies comparing the effects of self-selected versus researcher-selected music are warranted. Additionally, the lack of blinding in the study design may have introduced observer or performance bias. A possible Hawthorne effect where patients alter their behavior due to awareness of being observed cannot be ruled out. Finally, the use of self-reported outcomes such as the Visual Analog Scale (VAS) and the State-Trait Anxiety Inventory (STAI), though validated tools, inherently involves subjective assessment and inter-individual variability.

In conclusion, our study showed that music therapy during gynecological examination and smear test can reduce anxiety and pain. As a non-invasive intervention, music intervention is a safe, low-risk, cost-effective and easy-to-perform intervention with no apparent harmful effects. Music can be used by health care practitioners in general as a complementary intervention to promote comfort and relaxation and to reduce pre-exam anxiety. In this way, reducing anxiety in patients will increase the rate of patients undergoing screening tests and increase treatment compliance.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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Ethics approval

This study was approved by the Lokman Hekim University Scientific Research Ethics Committee (Approval No: 2025/042; Date: February 28, 2025).

Authors' contribution

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by BMS,MG. The first draft of the manuscript was written by BMS,MG and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

References

1. Seval MM, Yuce T, Kalafat E, Duman B, Aker S, Kumbasar H, et al. Comparison of effects of digital vaginal examination with transperineal ultrasound during labor on pain and anxiety levels: a randomized controlled trial. Wiley Online Libr; 2016.
2. Angioli R, Nardone CDC, Plotti F, Cafà EV, Dugo N, Damiani P, et al. Use of music to reduce anxiety during office hysteroscopy: prospective randomized trial. J Minim Invasive Gynecol. 2014; 21: 454-9.
3. Abdelhakim AM, Samy A, Abbas AM. Effect of music in reducing patient anxiety during colposcopy: A systematic review and meta-analysis of randomized controlled trials. J Gynecol Obstet Hum Reprod. 2019; 48: 855-61.
4. Wang MC, Zhang LY, Zhang YL, Zhang YW, Xu XD, Zhang YC. Effect of music in endoscopy procedures: systematic review and meta-analysis of randomized controlled trials. Pain Med. 2014; 15: 1786-94.
5. Alcântara-Silva TR, de Freitas-Junior R, Freitas NMA, de Paula Junior W, da Silva DJ, Machado GDP, et al. Music therapy reduces radiotherapy-induced fatigue in patients with breast or gynecological cancer: a randomized trial. Integr Cancer Ther. 2018; 17: 628-35.
6. Nilsson U. The anxiety-and pain-reducing effects of music interventions: a systematic review. AORN J. 2008; 87: 780-807.
7. Mak N, Reinders I, Slockers S, Westen E, Maas J, Bongers M. The effect of music in gynaecological office procedures on pain, anxiety and satisfaction: a randomized controlled trial. Gynecol Surg. 2017; 14: 1-8.
8. Labrague LJ, McEnroe-Petitte DM. Influence of music on preoperative anxiety and physiologic parameters in women undergoing gynecologic surgery. Clin Nurs Res. 2016;2 5: 157-73.
9. Wang S-M, Kulkarni L, Dolev J, Kain ZN. Music and preoperative anxiety: a randomized, controlled study. Anesth Analg. 2002; 94: 1489-94.
10. İriağaç Y, Çavdar E, Karaboyun K, Avci O, Tuna N, Şeber ES. The influence of visual objects and music on anxiety levels of breast cancer patients scheduled to experience chemotherapy for the first time: a prospective randomized clinical study. Support Care Cancer. 2022; 30: 4355-62.
11. Good M, Ahn S. Korean and American music reduces pain in Korean women after gynecologic surgery. Pain Manag Nurs. 2008; 9: 96-103.
12. Oner N, Le Compte A. Sureksiz durumluk/surekli kaygi envanteri el kitabi. Istanbul: Bogazici Universitesi Yayinlari; 1998.
13. Cline ME, Herman J, Shaw ER, Morton RD. Standardization of the visual analogue scale. Nurs Res. 1992; 41: 378-80.
14. Sin WM, Chow KM. Effect of music therapy on postoperative pain management in gynecological patients: a literature review. Pain Manag Nurs. 2015; 16: 978-87.
15. Good M, Anderson GC, Stanton-Hicks M, Grass JA, Makii M. Relaxation and music reduce pain after gynecologic surgery. Pain Manag Nurs. 2002; 3: 61-70.
16. Bradt J, Dileo C, Shim M. Music interventions for preoperative anxiety. Cochrane Database Syst Rev. 2013; 2013: CD006908.
17. Chan Y, Lee PW, Ng T, Ngan HY, Wong L. The use of music to reduce anxiety for patients undergoing colposcopy: a randomized trial. Gynecol Oncol. 2003; 91: 213-7.
18. Danhauer SC, Marler B, Rutherford CA, Lovato JF, Asbury DY, McQuellon RP, et al. Music or guided imagery for women undergoing colposcopy: a randomized controlled study of effects on anxiety, perceived pain, and patient satisfaction. J Low Genit Tract Dis. 2007; 11: 39-45.
19. Yung PMB, Chui-Kam S, French P, Chan TMF. A controlled trial of music and pre-operative anxiety in Chinese men undergoing transurethral resection of the prostate. J Adv Nurs. 2002; 39: 352-9.
20. Shim JS, Chae JY, Kang SG, Park JY, Bae JH, Kang SH, et al. Can listening to music decrease pain, anxiety, and stress during a urodynamic study? A randomized prospective trial focusing on gender differences. Urology. 2017; 104: 59-63.