

Evaluation of pain and patient satisfaction by music therapy in patients with endoscopy/colonoscopy

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ABSTRACT

Background/Aims: Endoscopy and colonoscopy are frequently performed procedures to evaluate the gastrointestinal system. These procedures are sometimes disturbing and painful for the patient. In gastrointestinal suits, endoscopy and colonoscopy may be performed on awake or sedated patients. Music therapy is a common and non-pharmacological treatment for various medical conditions, pain, and anxiety. The aim of the present study was to add music therapy to sedation administered during endoscopy and colonoscopy. The effect of music treatment on drug consumption, anxiety, and pain was investigated.

Materials and Methods: American Anesthesiologist Association I-III adult patients scheduled for endo/colonoscopy were randomized to music treatment and no music treatment groups. Patients with endoscopic ultrasound and endoscopic retrograde colangiopancreatography were excluded from the study. Anxiety score and pain severity were evaluated before and after the procedure. Heart rate, mean arterial pressure, and oxygen saturation were recorded before, during, and after the procedure. Total drug consumption was recorded. Patient satisfaction and desire for the same protocol for recurrent procedures were investigated.

Results: Music therapy added to deep sedation administered by anesthesiologists provided decreased anxiety score and propofol consumption. Patient satisfaction was increased, and patients reported a desire for the same protocol for recurrent procedures.

Conclusion: The present study may serve as the beginning of using music therapy for pain treatment in gastroenterology procedures in our hospital with/without sedation. Music and other non-pharmacological treatment methods must be remembered to increase patient comfort during endo/colonoscopies and other painful procedures.

Keywords: Colonoscopy, endoscopy, sedation, music

INTRODUCTION

Endoscopy and colonoscopy are major diagnostic and therapeutic tools for cancer screening. Fear and anxiety are very common concerns when patients need endo/colonoscopy. Usually sedation is needed for patient comfort and procedural success. In our endoscopy unit, most of the colonoscopies are performed under sedation either by gastroenterologists or by anesthesiologists. Non-pharmacological methods are usually beneficial for anxiolysis and pain reduction. Music, an ancient cure for pain and anxiety, has been used during operations and painful interventions in modern medical practice. There is evidence of increased patient satisfaction and decreased stress, anxiety, and pain with the help of music treatment (1-5). Anesthesiologist-associated sedation is considered time consuming and expensive (6-9). Music therapy can be an easy alternative.

In our endoscopy unit, non-pharmacological methods are not available. Therefore, the aim of the present study was to evaluate the effect of music treatment add-on sedation on drug consumption, anxiety, and pain severity for endo/colonoscopies.

MATERIALS AND METHODS

This was a randomized controlled double-blinded study conducted between June and October 2017 in a hospital gastroenterology unit after obtaining approval from the ethical department (ET: 5.6.2017/261).

Patients who were 18-70 years old, American Anesthesiologist Association (ASA) status I-III, and scheduled for endoscopy/colonoscopy were included in the study after verbal and written approval was obtained. Patients

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scheduled for endoscopic ultrasound or endoscopic retrograde colangiopancreatography and having difficulty in communication were excluded from the study. In our endoscopy unit, patients were sedated either by gastroenterologists (conscious sedation) or by anesthesiologists (deep sedation). Music therapy was added to both groups of sedation. Data on age, sex, education level, marital status, and endoscopy type (endoscopy, colonoscopy, or endocolonoscopy) were recorded. Patients were randomized to music treatment or control groups by drawing of lots. An endoscopy personnel applied music administered through headphones so that the investigator and the endoscopist were blinded. All endoscopies were performed by experienced endoscopists.

In the music group, a questionnaire to identify the patient's favorite music type was applied. The options included classical music, pop music, rap music, Turkish classical music, Turkish folk music, and traditional religious music. In the music group, patients listened to a 30-minute recording of their favorite music. In the control group, the headphone was on without any music.

Patient anxiety was measured by State-Trait Anxiety Inventory (STAI), and pain severity by Numerical Rating Scale (NRS) (0-10). All patients were monitored by electrocardiogram. Nasal O₂ 4 L/h was administered. Heart rate (HR), mean arterial pressure (MAP), and oxygen saturation were monitored before, during, and after the intervention. At the end of endoscopy, patients were transferred to the recovery room, and recovery was evaluated by Aldrete score (10). When Aldrete score was ≥ 9 , patients were re-evaluated by STAI and NRS. Satisfaction was assessed by Likert scale (1, very satisfied; 2, satisfied; 3, undetermined; and 4, not satisfied). In addition, the patients' choice to repeat endoscopy using the same protocol was rated by Likert scale (1, wants to repeat; 2, probably keen to repeat; 3, undetermined; and 4, does not want to repeat).

In the conscious sedation groups (Groups 1 and 2), only 2 mg of midazolam was administered. In the deep sedation groups (Groups 3 and 4), patients were administered 1-2 mg of midazolam, 0.1-0.3 mg/kg of ketamine, and 1-3 mg/kg of propofol. Incremental 20 mg of propofol was administered when the patient moved or felt pain. Total drug dose was recorded. Depth of sedation was rated according to the Ramsay Sedation Scale (10). Over sedation due to midazolam was treated by intravenous 0.2 mg of flumazenil.

Statistical analysis

Statistical analysis was performed by Statistical Package for Social Sciences (SPSS) software. Nominal values were evaluated for normality using histogram and Kolmogorov-Smirnov test. Non-parametric tests were used for non-normal distribution. Two group comparisons were made by Mann-Whitney U test, and four group comparisons by Kruskal-Wallis test. Definitive statistics were expressed as mean \pm standard deviation. Categorical data analysis was made by chi-square test. A p value <0.05 was accepted as statistically significant.

RESULTS

Patients in four groups were classified as Group 1, conscious sedation without music; Group 2, conscious sedation with music; Group 3, deep sedation without music; and Group 4, deep sedation with music. No significant difference was found between patients' age, sex, marital status, and educational level. There were more women than men in all groups (Table 1). In Groups 2, 3, and 4, HR and MAP values were significantly higher before intervention compared to during and after intervention (Table 2).

Conscious sedation was performed under the supervision of gastroenterologists, and 2 mg of midazolam was administered. In Groups 1 and 2, drug dose was the same. In the deep sedation groups performed by anesthesiologists, drug doses were compared. Midazolam, propofol, and ketamine doses were significantly lower in Group 4 than in Group 3 (Table 3).

No patients in Groups 1 and 3 had pain before intervention. In these patients, post-intervention pain was significantly higher than before intervention (p=0.001). In

Table 1. Demographic data of patients

| | Number of patients Male/ Female | Marital status Married/ Single/ Widow | Age Median (min-max) | p |
|---------|---------------------------------------|--|----------------------------|----|
| Group 1 | 25 4/21 | 21/2/2 | 46 (28-69) | NS |
| Group 2 | 33 13/21 | 26/6/1 | 44 (28-65) | NS |
| Group 3 | 55 26/29 | 50/5/0 | 44 (28-60) | NS |
| Group 4 | 41 15/26 | 26/14/1 | 42 (24-65) | NS |

Group 1: conscious sedation without music; Group 2: conscious sedation with music; Group 3: deep sedation without music; Group 4: deep sedation with music
NS: not significant

Table 2. Comparison of HR and MAP among the groups (mean±SD)

| HR (bpm) MAP(mmHg) | Group 1 | Group 2 | Group 3 | Group 4 | p (in group) |
|---------------------|---------------------------|---------------------|----------------------|------------------------|-----------------|
| Before intervention | 117.50±3.53 90.00±0.00 | 110±7.63 95±5.00 | 100±12.31 85±5.45 | 101.50±17.2 95±7.38 | 0.617 0.310 |
| During intervention | 117.50±3.53 90.00±0.00 | 90±12.58 90±2.88 | 95±13.02 85±6.02 | 83±12.70 81±7.69 | 0.0001 0.348 |
| After intervention | 115.00±7.07 90.00±0.00 | 90±2.88 90±2.88 | 95±12.49 85±6.02 | 80±10.44 80±5.60 | 0.0001 0.288 |

Group 1: conscious sedation without music; Group 2: conscious sedation with music; Group 3: deep sedation without music; Group 4: deep sedation with music
HR: heart rate; MAP: mean arterial pressure

Table 3. Comparison of drug doses among Group 3 and Group 4 (mean±SD)

| | Group 3 | Group 4 | p |
|----------------|--------------|--------------|--------|
| Midazolam (mg) | 2±0 | 1.3±0.48 | 0.0001 |
| Ketamine (mg) | 19.63±2.69 | 16.12±4.45 | 0.0001 |
| Propofol (mg) | 204.54±42.24 | 146.34±32.38 | 0.0001 |

Group 3: deep sedation without music; Group 4: deep sedation with music

Table 4. Comparison of anxiety of patients in the groups before and after intervention (mean±SD)

| Anxiety Score | Before intervention | After intervention | p |
|---------------|---------------------|--------------------|--------|
| Group 1 | 48.88±7.63 | 48.80±7.61 | 0.56 |
| Group 2 | 50.72±9.15 | 46.42±7.15 | 0.0001 |
| Group 3 | 47.94±3.93 | 47.63±3.75 | 0.039 |
| Group 4 | 52.17±10.72 | 45.43±7.30 | 0.0001 |

Group 1: sedation without music; Group 2: sedation with music; Group 3: deep sedation without music; Group 4: deep sedation with music

Group 2 and 4 some patients had pain although mild before the procedure and was similar after the procedure (Figure 1).

In Groups 2, 3, and 4, anxiety score was significantly lower after the procedure than before the procedure, but not in Group 1 (Table 4).

Flumazenil was never needed in patients to reverse prolonged sedation or respiratory depression. Laryngospasm and respiratory depression were never recorded. No perforation, bleeding, and other complications due to endo/colonoscopy were observed.

In the sedation and music groups, patients were satisfied with their procedure and declared that they would prefer the same method for their next endoscopy. No significant difference was found in patient satisfaction between the groups.

No significant difference was found in patients according to sex for drug dose, anxiety score, and pain severity.

DISCUSSION

The hemodynamic alterations confirmed the benefit of music treatment added to sedation during endoscopy and/or colonoscopy. Pain after the procedure was higher than pain before the procedure in conscious sedation apart from music therapy. In deep sedation, patients' anxiety score as rated by anesthesiologists was significantly lower after the procedure than before the procedure in the music group. In addition, sedative drug dose was lower in this group than in patients with deep sedation without music.

In the literature, it is common to find that music therapy decreases drug doses for sedation and decreases complications during colonoscopy (5,11). The European gastroenterology guide recommends patients with endoscopy to listen to their favorite music during the procedure and reported that propofol doses are decreased (5). The

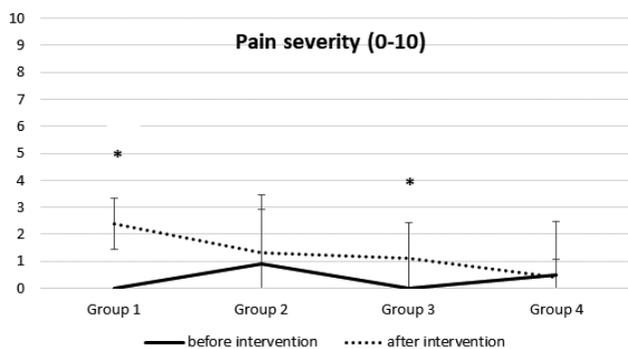


Figure 1. Comparison of pain severity of patients in the groups before and after intervention

Group 1: conscious sedation without music; Group 2: conscious sedation with music; Group 3: deep sedation without music; Group 4: deep sedation with music

*p<0.05

mechanism of music treatment is related to many stimuli antagonist to each other transferred to the cortex. The thalamus decreases the contraction of the muscles and levels of the adrenocorticotrophic hormone and alters the sympathetic system activation. Music stimulates the hypophysis to secrete more endorphins to help to decrease pain and anxiety. Music decreases pain and discomfort (11).

In studies, music has been used in different ways: one sedative music was administered to all patients or patients were asked to bring their favorite music along (12-15). Music before the intervention decreased pain, anxiety, and need for analgesia (16). In our study, music type was determined by a questionnaire, and patients listened to a 30-minute recording of their choice through headphones. Headphones were preferred to distract patients from environmental noises.

Since 1980, colonoscopy is performed under sedation using opioids and benzodiazepines. Midazolam and fentanyl are the most common drugs used for colonoscopy (17,18). Propofol is the preferred agent alone or combined with opioids. It may only cause an increased side effect due to higher doses (17). In our study, the routine gastroenterologist-controlled conscious sedation in our unit was 2 mg of midazolam for adult patients. There is an option of deep sedation by anesthesiologists when ketamine is added to midazolam, propofol, and fentanyl-based anesthesia. This method has been confirmed for hemodynamic stability, better quality sedation, and decreased propofol dose and recovery time (10,17,19).

It is known that propofol-based sedation increases patient satisfaction and endoscopy quality and shortens recovery. Propofol is not allowed to be used by gastroenterologists in the absence of anesthesiologists; anesthesiologist-controlled sedation increases cost (20,21). In some hospitals, non-anesthetist-administered propofol (NAAP) is common. Non-anesthesiologists must be aware that they must be educated for NAAP and basic and advanced cardiac life support. Naturally, NAAP must only be used for ASA I-II patients with low Mallampati scores (22). The ASA declares more complications with endoscopist-directed sedation; therefore, patients with difficult airway must be treated by anesthesiologists.

In our study, sedation decreased HR and MAP. Anxiety was decreased before and after the intervention in the sedation groups. In music-administered deep sedation

patients, MAP and propofol dose was decreased, which is important to show the effect of music. In addition, pain severity was similar before and after the procedure attributed to music therapy, whereas post-procedure pain severity was increased in the groups without music therapy, suggesting the contribution of music. Similarly, decreased pain in music-treated patients are reported in the literature (12-14,23).

In some studies, there are sex-related differences to music therapy, although there are studies proving that sex difference is irrelevant in young population (24,25). Women are inclined to present higher anxiety scores and pain levels than men before the procedure (25,26). Although some authors declare more pain during colonoscopy in women than that in men (26,27), in our study, no difference between the groups due to sex was present. Women pelvic anatomy and longer intestines with loops sometimes cause difficulty during colonoscopy. In addition, gynecological operations and adhesions increase difficulty and decrease tolerance of patients during colonoscopy. After propofol administration for colonoscopy, women recovered faster than men did, although they needed higher a propofol dose (28). In our study, no difference in propofol dose was found between the sexes in the groups.

There are some limitations to the present study. Patients were informed about music therapy on the day of endoscopy, which was stressful. Men were fewer than women in our study, which may have prevented the differences due to sex. In some endoscopy studies, the quality of endoscopy was decided by cecum intubation time, endoscopy time, polyp recognition rate, endoscopist satisfaction, and recovery time (22); however, in our study, these were absent owing to rapid turnover. Aldrete score standardized patient recovery. Children were excluded in the present study, which might have been a valuable data.

In conclusion, gastroendoscopic interventions are mandatory to diagnose and treat various pathologies. Recurrent procedures may be needed during follow-up. Fear and anxiety of patients for these procedures are important factors to maintain comfort. In the present study, music add-on sedation was effective, decreased sedative drug doses, and increased patient satisfaction.

In our gastroenterology unit, music therapy has been used for the first time. We hope many patients can benefit from the encouraging effect of music with or without

sedative drugs during endo/colonoscopies. There is a long way for the investigation of music and other non-pharmacological treatments, also in children.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Gazi University School of Medicine (ET: 5.6.2017/261).

Informed Consent: Written informed consent was obtained from the patients who participated in this study.

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