

Evaluation of Effect of Self-selected Music Therapy on Pain, Patient Comfort and Satisfaction During Colonoscopy in a Tertiary Care Hospital in Nepal

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Introduction: During the colonoscopy procedure without sedation, pain and discomfort can negatively affect procedural success and patient satisfaction. This study aimed to evaluate the effect of music therapy on pain, comfort, and vital signs during colonoscopy.

Methods: This Quasi-experimental study enrolled patients undergoing colonoscopy without sedation, during a nine months period after Institute Review Committee clearance equally into two group – music and non-music group. Demographic data, pre- and post-colonoscopy vital signs, pain, comfort and satisfaction scores were recorded in either group in pre-formed proforma. Data were analysed using SPSS v16. Statistical significance was set at $p < 0.05$.

Results: A total of 112 patients were included with 56 in each group. The mean age of the patients was 47.55 ± 16.22 and 53.6% were male. The post-procedure mean rank Numeric Rating Scale (NRS) was 5 in the music group compared to 7 in the non-music group ($p < 0.05$). The comfort and satisfaction levels as measured by modified Glasgow comfort score were significantly higher in the music group compared to the non-music group ($p < 0.001$). The post-procedure vital signs (systolic and diastolic blood pressure, pulse rate, and respiratory rate) were non-significantly lower in the music group compared to the non-music group ($p > 0.05$). The mean procedure duration in the music group was 24.23 ± 9.17 minutes compared to 23.25 ± 5.98 minutes in the non-music group ($p = 0.5$).

Conclusions: Self-selected music therapy during un-sedated colonoscopy reduced pain, improved patient's comfort, and satisfaction. However, music therapy had no significant impact on the patient vital signs and the average duration of the colonoscopy procedure.

Keywords: Colonoscopy; Comfort; Music; Pain; Satisfaction

Introduction

Colonoscopy is used for screening as well as diagnosis of various gastrointestinal diseases like colorectal polyp, adenoma and carcinoma.¹ However, moderate to severe pain and anxiety experienced during the un-sedated procedure can negatively impact procedural success and patient satisfaction, while triggering adverse physiological changes such as tachycardic and hypertensive spikes.² Carefully performed colonoscopy can help in reducing these problems associated with the procedure.³

While conscious or deep sedation can also be used to mitigate these issues, sedatives are associated with an increased incidence of cardiopulmonary complications, escalated operational costs, and prolonged post-procedure recovery times.³ An anesthetist will be necessary to administer these sedatives which will increase the need of manpower as well as an advance setup.⁴ The stress, anxiety and discomfort experienced before and during the procedure can even lead to patient refusal and need for higher doses of sedatives.⁵

Music therapy has gained attention as a safe, non-pharmacological intervention address the above-mentioned concerns. Within

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gastroenterology, music therapy is hypothesized to reduce anxiety during stressful procedures; however, published studies have conflicting outcomes. Furthermore, there are not enough evidence-based studies that evaluate the effects of music therapy on pain, and patient comfort during colonoscopy in Nepal. Therefore, this study aimed to determine the effect of self-selected music therapy on pain, vital signs, and patient comfort during an un-sedated colonoscopy in tertiary care setting.

Methods

This quasi-experimental study was conducted between February 2025 to November 2025 in the Endoscopy Unit of the Department of Gastroenterology at Tribhuvan University Teaching Hospital (TUTH), Kathmandu, Nepal. The ethical approval was obtained from the Institutional Review Board (IRB) of Maharajgunj Medical Campus (MMC), Kathmandu, Nepal. A prior written informed consent was obtained from all the participants after explaining the nature and purpose of study.

The sample size was calculated using the pain scores reported in the study by Costa et al.⁶ The minimum sample size was calculated as 112 (n=56 for the music group and n=56 for the non- music group) at 95% power and $\alpha = 0.01$ error levels.

The inclusion criteria were patients 18 years or older undergoing colonoscopy who gave consent to participate in the study. Patients with history of previous abdominal and pelvic surgery, known case of psychiatric or neurological illnesses, patients who received analgesics and sedatives 12 hours prior to the procedure, patients with American Society of Anesthesiologists (ASA) and its Physical Status Classification System (ASA) III or more and patients who needed additional therapeutic procedure (i.e. polypectomy, dilatation) during the same setting or difficult colonoscopy who needed change in the procedure performer were excluded.

The primary objective was to evaluate the effect of music therapy on pain, comfort and satisfaction. The secondary objective was to evaluate the effect of music therapy on vital signs (heart rate, respiration, systolic and diastolic blood pressure); which are physiological indicators of pain. The data were collected using a proforma sheet which contained questions to inquire about socio-demographic characteristics, indication of colonoscopy, comorbidities. Clinical data regarding ASA score, vital signs (pulse rate, respiratory rate, systolic and diastolic blood pressure and Oxygen saturation), pain score [Numeric Rating Scale (NRS)] were taken before the procedure.

Patients were allocated alternately into either the music or the non-music control group. Due to the nature of the intervention, blinding was not feasible. For patients in the music group, headphones were applied and the music of their choice was started and continued till the end of the procedure. The patients in either group were monitored throughout the procedure and their vital signs, NRS, Modified Glasgow Comfort Scale (MGCS) and 5-point Likert satisfaction scales were documented. Additionally, the duration of colonoscopy and colonoscopy findings were recorded in either group. All the colonoscopies were performed by the principal investigator, an experienced endoscopist with a baseline track record of more than 300 independent colonoscopies.

Data were initially managed in Microsoft excel and subsequently exported to SPSS version 16 (SPSS Inc., Chicago, IL, USA) for formal analysis. The Shapiro-Wilk test was used to determine whether the data were normally distributed. Continuous variables are expressed as Mean $\pm$ SD (Standard Deviation) or median with interquartile range (IQR), as appropriate. Categorical variables are presented as absolute frequencies and percentages. Student's t-test, the Mann-Whitney U test, and the chi-square test were used for comparisons between the groups, and the Wilcoxon signed-rank test for intra-group comparisons. The results were considered statistically significant when $p < 0.05$.

Results

A total of 150 patients were assessed for eligibility, of whom 38 were excluded based on pre-defined criteria. The remaining 112 participants were assigned alternately to either the music therapy group (n = 56) or no music therapy group (n = 56) by the endoscopy staff (Figure 1). The demographic and clinical characteristics of the study population were well-balanced across both cohorts (Table 1). The mean age was 46.64 $\pm$ 17.46 years in the music therapy group and 48.43 $\pm$ 14.99 years in the control group ($p = 0.56$). Male participants represented 55% and 52% of the music and non-music groups, respectively ($p=0.85$). Regarding procedural indications, gastrointestinal bleeding (32%) and abdominal pain (23%) were most frequent in the intervention group, whereas colorectal cancer (CRC) screening (21%) and abdominal pain (14%) predominated in the control group. Hypertension was the most prevalent comorbidity, affecting approximately 25% of all participants. Furthermore, most subjects in both groups (approximately 66%) were classified as ASA Physical Status I.

The post-procedure mean rank NRS score in music group was significantly lower in the music group compared to the non-music group (5 vs 7, $p=0.01$). The post-procedure vital signs—including SBP, DBP, PR, RR, and SpO2 showed a downward trend in the music group compared to the control group, but these differences did not achieve statistical significance (Table 2).

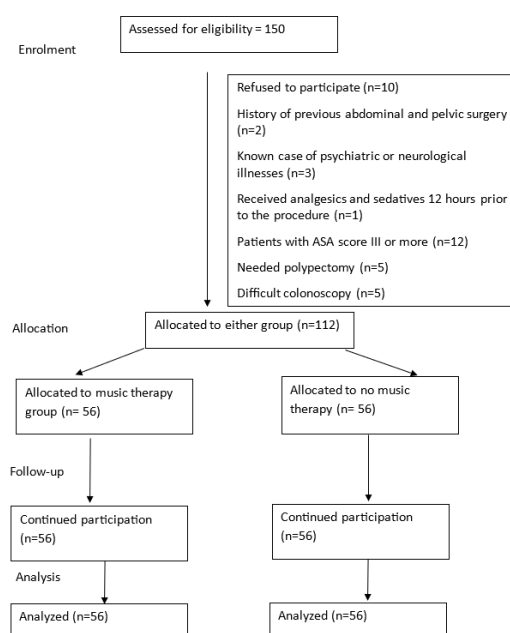


Figure 1: Flow chart of the study participants

Table 1: Demographic characteristics of the patients

Characteristic	Music group (n=56)	No music group (n=56)	P value
Age in years (Mean±SD)*	46.64±17.46	48.43±14.99	0.56
Gender n (%)#			
Male	31(55%)	29(52%)	0.85
Female	25(45)	27(48%)	
Indication n (%)#			
CRC Screening	4(7%)	12(21%)	0.08
GI Bleeding	18(32%)	9(17%)	
Polyp	0(0%)	3(5%)	
Inflammatory Bowel Disease	5(9%)	6(12%)	
Pain abdomen	13(23%)	8(14%)	
Diarrhoea	6(11%)	3(5%)	
Anemia	7(13%)	8(14%)	
Ascites	2(3%)	4(7%)	
Constipation	1(2%)	3(5%)	
Comorbid disease n (%)#			
Hypertension	10(18%)	16(29%)	0.26
Heart disease	2(4%)	4(7%)	0.67
Diabetes	3(5%)	12(21%)	0.02
Thyroid disorder	4(7%)	4(7%)	1.00
Malignancy	0(0%)	4(7%)	0.11
Kidney disease	3(5%)	7(13%)	0.32
COPD	0(0%)	1(2%)	1.00
ASA score#			
1	44(79%)	35(63%)	0.09
2	12(21%)	21(37%)	

* Student t test, # Chi square test, CRC: Colorectal Carcinoma, GI: Gastrointestinal, COPD: Chronic Obstructive Pulmonary Disease, ASA: American Society of Anesthesiologists (ASA) and its Physical Status Classification System

Table 2: Comparison of parameters before and after colonoscopy between two groups

Parameter	Music group (n=56)	No music group (n=56)	P value
NRS Score			
Before colonoscopy	0	0	0.24*
After colonoscopy	5 (5-6)	7 (5.25-7.75)	0.01*
Before-After p value#	< 0.001	<0.001	
SBP (mm of Hg)			
Before colonoscopy	127.52±19.62	127.29±21.72	0.95 ^e
After colonoscopy	128.86±19.94	134.96±22.79	0.13 ^e
Before-After p value ^e	0.56	<0.001	
DBP (mm of Hg)			
Before colonoscopy	75.96±13.89	76.45±13.48	0.85 ^e
After colonoscopy	80.66±13.45	83.71±13.05	0.22 ^e
Before-After p value ^e	0.01	<0.001	
SpO ₂			
Before colonoscopy	96.54±2.01	95.93±2.44	0.15 ^e
After colonoscopy	96.43±2.58	96.27±2.81	0.75 ^e
Before-After p value ^e	0.74	0.33	
PR (beats/min)			
Before colonoscopy	83.21±19.75	84.45±19.36	0.73 ^e
After colonoscopy	85.09±14.52	88.61±18.12	0.25 ^e
Before-After p value ^e	0.44	0.07	
RR (breath/min)			
Before colonoscopy	14.86±2.11	14.66±1.86	0.60 ^e
After colonoscopy	16.68±1.86	17.11±2.12	0.25 ^e
Before-After p value ^e	<0.001	<0.001	
Duration of procedure (minutes)	24.23±9.17	23.25±5.98	0.50 ^e

* Mann Whitney U test, #Wilcoxon Signed rank test, ^ePaired t

test, ^eStudent t test, NRS: Numeric rating scale, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, PR: Pulse rate, RR: Respiratory rate.

Table 3: Comparison of MGCS and Likert scale between two groups

Parameter	Music group (n=56)	No music (n=56)	P value*
MGCS			
1	0	1	<0.001
2	41	19	
3	13	33	
4	2	3	
Likert scale			
Very unsatisfied	0	0	<0.001
Unsatisfied	2	5	
Neutral	13	30	
Satisfied	41	21	
Very satisfied	0	0	

* Chi square test, MGCS: Modified Glasgow Comfort Score

Patients in the music group demonstrated significantly superior satisfaction and comfort profiles, as evaluated by the Likert Scale and Modified Glasgow Comfort Scale, respectively (p < 0.001) (Table 3).

Approximately half of the patients in both groups presented with normal colonoscopic findings. There were no statistically significant differences in primary endoscopic diagnoses between the two arms (Table 4).

Table 4: Colonoscopy findings of the patients

Finding	Music group (n=56)	No music (n=56)	P value*
Normal	31	33	0.628
Polyp	2	4	
Colonic U Growth	3	3	
Terminal ileal ulcer	6	2	
Terminal Ileitis	1	3	
Ulcerative colitis	3	1	
Sealed appendicular perforation	0	1	
Hemorrhoids	3	2	
Rectal growth	1	1	
Colonic ulcers	3	3	
Rectal ulcer	2	0	
Proctitis	1	3	

* Chi square test

Discussion

The study demonstrated that the introduction of self-selected music therapy during un-sedated colonoscopy significantly reduced pain and improved patient satisfaction and comfort. Colonoscopy is frequently associated with patient-reported pain and anxiety.⁷ Pain has multiple deleterious effects leading to procedural difficulty, raised heart rate and blood pressure and patient dissatisfaction.^{2,7}

Music therapy has been utilized across diverse disciplines of medicine, such as cardiology, radiology, pulmonology, and gastroenterology.⁸ Besides, it has also been used in the perioperative period, during labor pain, cancer treatment, intensive care and colonoscopy and is known to have positive

effects.⁹ It has positive effect on relaxation responses, triggering positive associations, and diverting attention from anxiety during these painful, uncomfortable and stressful procedures.¹⁰ Previous studies demonstrated that music therapy was a good non-pharmacological alternative to sedatives during colonoscopy and it reduced pain and anxiety levels in patients thereby and increasing overall patient satisfaction, which aligns with our study findings.¹¹⁻¹⁴

Due to its natural, physical, psychological and social effects, music therapy can be used as an alternative to sedatives during colonoscopy.¹⁵ Music affects the right hemisphere of the brain and causes psychophysiological responses through the limbic system. Physiologically, it reduces the severity and perception of pain with the release of enkephalin and endorphin. Brain waves can accelerate and decelerate with music, helping to coordinate muscle tension and movements and creating an anxiolytic effect.¹⁶ In a study by Bashiri et al., and Costa et al. music therapy is an effective non-pharmacological adjunct during colonoscopy and endoscopy that improves patient comfort, reduces anxiety, and lowers pain perception.^{6,16} Randomized controlled studies demonstrate that patient-selected music decreases physiological stress markers such as heart rate and blood pressure while reducing sedative and analgesic drug requirements, including midazolam, propofol, ketamine, and pethidine.²¹ Patients receiving music therapy report greater satisfaction and increased willingness to undergo repeat procedures using the same protocol. Music also improves procedural tolerance and may facilitate physician performance. The benefits are likely related to distraction, relaxation, and modulation of stress responses. Music therapy is safe, inexpensive, and easy to administer through headphones, making it a practical addition to both conscious and deep sedation protocols. Although larger studies are needed, current evidence strongly supports its incorporation as an adjunctive measure in gastrointestinal endoscopic procedures, and patient satisfaction increased; the findings are consistent with our study.^{17, 6} Similarly, Çelebi et al. reported that music therapy reduced pain and anxiety and increased comfort during colonoscopy.²³⁻²⁵

In our study, post-procedure evaluations revealed increases in diastolic blood pressure and respiratory rates across both groups, reinforcing the understanding that colonoscopy remains an inherently uncomfortable procedure when performed without sedation. In our study, we found that music therapy had no significant impact on the patient vital signs and the average duration of the colonoscopy procedure. These findings conflict several other studies conducted elsewhere.¹⁸⁻²² There studies reported that the music therapy did not have any positive effect on vital signs.²³⁻²⁵

This study has certain limitations. It was conducted in a higher volume tertiary care center in a fixed geographical area of Nepal where the gastroenterologists have a good expertise in performing colonoscopies. Furthermore, all procedures were completed by a single principal investigator, which limits the generalizability of our findings to other clinical settings. The study was unblinded, and the principal investigator was involved in both performing the procedure and recording the outcomes, which introduces potential observer bias. Additionally, the objective physiological stress markers, such as adrenocorticotrophic hormone (ACTH)

and cortisol levels, could not be analyzed due to budget constraints. Finally, while baseline anxiety is a known cofactor in procedural pain tolerance, structured anxiety scales were not utilized in this study.

Conclusion

Self-selected music therapy during un-sedated colonoscopy significantly reduced pain, improved patient's comfort, and satisfaction. However, it had no significant impact on the patient vital signs and the average duration of the colonoscopy procedure.

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Conflict of interest / Competing interests

The authors declare that they have no conflicts of interest.

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