

Effectiveness of Preoperative Education and Music Intervention on Postoperative Outcomes among Patients Undergoing Abdominal Surgery: A Quasi-experimental Study

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ABSTRACT

Introduction: The preoperative phase includes various procedures that aim to prepare the patient physically and psychologically to promote postoperative recovery. Preoperative education and music intervention may play an important role in improving the postoperative outcomes.

Aim: To study the effectiveness of preoperative education and music intervention on postoperative outcomes, such as anxiety and pain, and to assess the satisfaction of patients, regarding surgical experience on discharge. Study also aims to initiate early feeding and its effects on postoperative recovery.

Materials and Methods: A quasi-experimental study was conducted in Surgical Wards of Yenepoya Medical College Hospital, Mangaluru, Karnataka, India, between January 2021. A total of 52 patients undergoing major abdominal surgery were selected and divided into intervention and control groups. Two days before the surgery, patients in the intervention group were given preoperative education and were encouraged to listen to preferred music in the evening. Music intervention was given for two days before the surgery and continued in the postoperative phase for three days. Immediately after the music intervention, the anxiety was assessed by State-Trait Anxiety Inventory (STAI) and severity of pain using numerical rating scale. Early feeding was initiated postoperatively and the patients were observed

for discomfort and complications. The patients satisfaction was evaluated for their surgical experience on discharge using a patient satisfaction questionnaire. An independent t-test and Mann-Whitney U test were used to compare the variables between the groups.

Results: The mean age in the intervention group was 43.46±14.89 years and control group 44.07±12.64 years. The majority of subjects in the both groups were males. A reduction in anxiety scores was observed among patients in the intervention group that was statistically significant ($p < 0.05$) at preoperative day 1, 2, postoperative day 1, 2 and 3. The mean pain scores decreased from preoperative day 1 to postoperative day 3 in the intervention group than in the control group. In the intervention group, 7.7% of the patients received oral feed within an hour of surgery whereas, 26.9% were in the fourth hour and 26.9% were in the sixth hour of surgery. They did not report discomfort and complications such as nausea and vomiting. In the intervention group, the mean satisfaction was 60.30±5.00, indicating a higher level of satisfaction among patients.

Conclusion: Preoperative education and music intervention reduces the severity of anxiety and pain. Early oral feeding is safer and effective in patients undergoing elective abdominal surgery. These interventions help in improving the postoperative outcomes and satisfaction with surgical experience.

Keywords: Anxiety, Early feeding, Pain, Perioperative care

INTRODUCTION

Preoperative anxiety is the unpleasant emotional state experienced by patients who are posted for surgery. It can be due to fear of anaesthesia, surgical instrumentation, previous experience of surgery and the strange environment of the operation theatre [1-3]. After major surgery, patients may experience discomfort and anxiety that can adversely affect the postoperative recovery of patients [4]. Preoperative anxiety also influences postoperative well-being and recovery [5-7]. The studies suggest that, the psychological preparation of the patient is necessary for a better outcome and early recovery [8,9]. Preoperative education decreases anxiety, increases confidence and minimise the postoperative pain. In addition to this, it reduces the length of hospital stay, anxiety and rate of postoperative complications. Thus, it promotes healing and improves the outcome of surgery [8,9]. A study reported that patients prepared with preoperative education experienced a low levels of postoperative pain, and also preoperative patient information has showed a positive effect on the postoperative pain. It is considered as a valuable addition to the pain management [10]. The music intervention also plays an important role in relaxation of mind and body [11]. The studies have shown that, instrumental music such

as guitar, piano and flute had substantial effects on pain and anxiety [12,13]. The use of natural sounds such as, the waterfall sounds of birds and rain was used in 1984 in the management of anxiety and pain in patients [14]. Enhanced Recovery After Surgery (ERAS) is a program with multimodal interventions for better preoperative and postoperative outcomes in surgical patients. Implementation of this program results in major improvements in patient related outcomes and reduction in hospital cost [2,3].

Nutritional status is an important aspect for a successful postoperative outcome. Surgical patients are at high risk for malnutrition, which can lead to delayed wound healing and increase the rate of postoperative infections [15]. ERAS program strongly recommends starting a liquid diet within 24 hours after surgery [16]. El Nakeeb A et al., showed that, 80%-90% of patients tolerated early oral feeding which is started within a day following colorectal resection [16]. The lowest level of satisfaction was seen in patients who were not provided with education in the preoperative phase. A higher percentage of satisfaction was seen in the patient-staff relationship and less satisfaction in subarea of fear and concern in the studies conducted in Eretria and the United Kingdom. These studies revealed patient education and preparation for surgery is

necessary to reduce the fear and thus, improves the satisfaction [17,18]. In this regard, the authors hypothesised to assess the effectiveness of preoperative education and music intervention on postoperative outcomes in an attempt to improve the patient satisfaction and to initiate early feeding and to study its effects on postoperative recovery. The authors hypothesised that, there will be a significant difference in the pretest and post-test anxiety, pain scores in the intervention and control groups and there will be no significant difference in the early feeding status, satisfaction scores between the intervention and control groups.

MATERIALS AND METHODS

This quasi-experimental study was conducted in Surgical Wards of Yenepoya Medical College Hospital Mangaluru, Karnataka, India, between January 2021. The study protocol has been reviewed by the Institutional Scientific Review Board (SRB) and approved by the expert panel of the Institutional Ethics Committee I (Protocol no. YEC-I/2019/221) which functions following the declaration of Helsinki, national ethical guidelines for biomedical and health research involving human subjects. An informed consent was taken from all the participants before data collection. A participant information sheet was provided and the patients were explained about the study purpose, duration, details of the intervention, voluntary participation/withdrawal, and benefits/harm involved in the present study.

Inclusion criteria: Patients aged between 18-60 years, who underwent surgeries involving organs such as the stomach, pancreas, gall bladder, spleen and bowel were included in the present study. Patients, who hospitalised two days before surgery and were available for 3 to 5 days postoperatively, were included.

Exclusion criteria: Patients with hearing impairment, chronic treatment with analgesics, with a history of surgery, lower segment cesarean section and abdominal hysterectomy were excluded.

Sample size calculation: The sample size was calculated with a 5% level of significance and 10% marginal error using the formula. "Effects of music therapy under general anaesthesia in patients undergoing abdominal surgery" is used as a reference article to estimate sample size [19].

Pooled variance $\alpha^2=222.45$, difference in mean scores $d=13.3$ $Z_{1-\alpha/2}=1.96$, $Z_{1-\beta}=1.28$ $\alpha=5\%$ level of significance, $\beta=10\%$ marginal error

$$n = \frac{2(Z_{1-\alpha/2} - Z_{1-\beta})^2(\sigma^2)}{(d^2)}$$

Total 52 patients undergoing abdominal surgery were enrolled by non probability purposive sampling technique. 26 patients were enrolled in each intervention and control groups.

Study Procedure

The present study involves interventions to minimise anxiety and improve postoperative outcomes. These include education to the patients and listening to prerecorded music. An educational module was prepared by the investigator for teaching the patients about various aspects of surgical experience [4,8,10,14]. The areas covered in the module were preoperative preparation, orientation to the surgical suite, postoperative care and discharge plan. This module was validated by seven subject experts. The patients were explained about preoperative preparation using education materials during the preoperative phase on day 1 for a duration of 20 minutes. It included informed consent, necessary medical investigations that are carried out, skin preparation, bowel preparation, nil per oral status (not to take solids for 6 hours and clear fluids for 2 hours before anaesthesia), hygiene, preoperative medications and transportation to the operating room. It also highlighted the importance of cognitive coping strategies which are useful for relieving anxiety, decreasing fear and achieving relaxation.

Patients were encouraged to listen to the music intervention to achieve these goals. A music gallery was prepared based on an extensive review of the literature [11-13]. The music was validated and approved by a professional music therapist. The music gallery was composed of nature sounds and instrumental collections. The instrumental music such as flute, sitar, jazz and piano were selected. Nature's music such as sound of birds, forests, waterfalls and the ocean were included in the music gallery. Patients were asked to listen to music during the two days preoperatively and postoperative three days in the evening for 15 minutes using headphones. The demographic proforma consists of age, gender, marital status, type of family and kind of surgery. A music preference questionnaire was used to know about the likes and preferences for music among patients in the intervention group. It consists of 'do you like to listen to the music?', 'Which form of music do you like the most?', and 'Which type of music you would like to listen to during your surgical experience?'

State-Trait Anxiety Inventory (STAI): is a self-evaluation questionnaire to determine anxiety which consists of 40 items [20]. Each statement in the state scale has four choices numbering 1=not at all, 2=somewhat, 3=moderately so, 4=very much so. Each statement in the trait scale has four choice numbering, 1=almost never, 2=some times, 3=often, 4=almost always respectively. Maximum score is 160 and minimum 40.

Numeric pain rating scale: is used to assess the severity of pain at that moment using a 0-10 scale, with 0 meaning "no pain" and 10 meaning the "worst pain" on a 10 point rating scale [21].

Patient satisfaction questionnaire: which is a 5-point rating scale was prepared by the investigator after reviewing the literature, consisted of domains such as satisfaction with the information received, meeting physical needs, professional relationship, fear and anxiety [17, 18]. This scale had 12 statements and each had five choices numbering which is indicated 1=completely dissatisfied, 2=dissatisfied, 3=neutral, 4=satisfied, 5=completely satisfied.

The tools were pretested on 10 study populations based on patient selection criteria. The internal consistency of the STAI ($r=0.9$), numeric pain scale ($r=0.8$) and patient satisfaction questionnaire ($r=0.8$) were assessed by the test-retest method using Cronbach's α . The study tools were found to be reliable to measure the variables. Anxiety and pain level was assessed immediately upon listening to the music on the preoperative day 1 and 2, postoperative day 1,2,3. Early oral feeding was initiated within 4-6 hours following surgery or as early as possible. The passing of the first flatus has been used as an indication for bowel function and to initiate feeding postoperatively. Along with this, return of bowel sounds was assessed through auscultation and feeding was initiated with the order of the surgeon. Initially, the patients were given sips of water followed by clear fluids, a soft diet and subsequently were changed to a regular diet as tolerated. An observational checklist was used to assess the immediate postoperative complications. The patients were observed for the occurrence of any complications on postoperative days. On the day of discharge patient satisfaction with surgical experience was assessed. Both the intervention and control groups received standard care such as administration of antibiotics and analgesia.

STATISTICAL ANALYSIS

Descriptive statistics such as frequency and percentage describe the sociodemographic characteristics of patients. Repeated measure Analysis of Variance (ANOVA) was performed to compare the scores of dependent variables by measurement time. An independent t-test and Mann-Whitney U test were used to compare the variables between the groups. The p-value <0.05 was considered to be statistically significant. Data were analysed using Statistical Package for Social Sciences (SPSS) version 22.0.

RESULTS

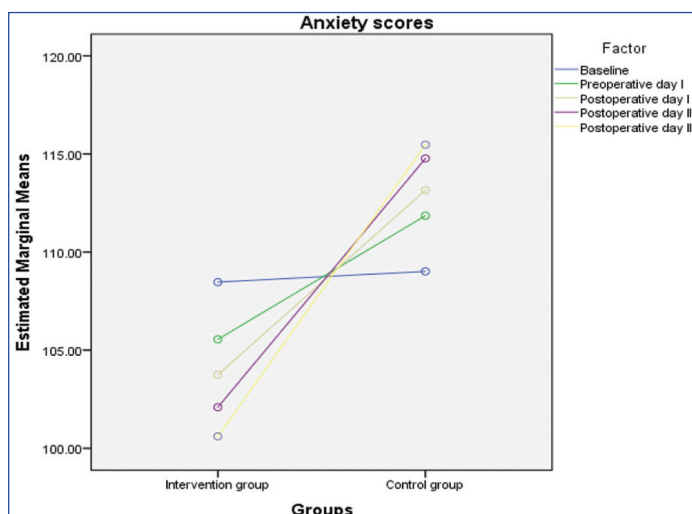
The mean age in the intervention group was 43.46 ± 14.89 and control group 44.07 ± 12.64 . The majority of subjects in the both groups were males. 17 (65.4%) subjects in each group were married with majority in each group belonged to joint family [Table/Fig-1].

S. No.	Variables	Study groups		p-value
		Intervention group f (%)	Control group f (%)	
1	Age (years)	43.46±14.89	44.07±12.64	0.14
2	Gender			
	Male	19 (73.1)	16 (61.5)	0.37
	Female	7 (26.9)	10 (38.5)	
3	Marital status			
	Single	4 (15.4)	6 (23.1)	0.63
	Married	17 (65.4)	17 (65.4)	
	Widow/widower	5 (19.2)	3 (11.5)	
4	Type of family			
	Nuclear	12 (46.2)	10 (38.5)	0.57
	Joint	14 (53.8)	16 (61.5)	
5	Name of surgery			
	Appendectomy	5 (19.2)	3 (11.6)	0.19
	Hernioplasty	8 (30.8)	4 (15.4)	
	Cholecystectomy	1 (3.8)	9 (34.6)	
	Colon repair	1 (3.8)	-	
	Whipple procedure	1 (3.8)	2 (7.7)	
	Gastrectomy	1 (3.8)	2 (7.7)	
	Hemicolectomy	2 (7.7)	2 (7.7)	
	Gastrojejunostomy	2 (7.7)	1 (3.8)	
	Splenectomy	1 (3.8)	-	
	Pyloroplasty	2 (7.7)	-	
	Jejunioileostomy	-	2 (7.7)	
	Sigmoidectomy	2 (7.7)	-	
	Cystogastrostomy	-	1 (3.8)	

[Table/Fig-1]: Distribution of patients according to the demographic characteristics (N=52).

The data represented is the frequency with percentage and χ^2 /Fisher's-exact Test value $p > 0.05$, which shows homogeneity between the groups. Age and gender was matched in both the group

In the intervention group, 10 (38.5%) patients were interested to listen to nature sounds and 16 (61.5%) were interested to listen to instrumental music. The line diagram indicates a reduction in estimated marginal means of anxiety from the first preoperative day 1 to postoperative day 3 [Table/Fig-2].



[Table/Fig-2]: Line diagram showing the anxiety scores at individual time points in the intervention and control groups.

Mauchly's Test of Sphericity was significant (p -value=0.001) which suggest that, there was significant relationship between every observations within each study groups. This reveals that, there was change in the scores of anxiety at every observation from preoperative to postoperative days. Anxiety scores were observed to be significantly decreasing in intervention group and increasing in control group at every follow-up [Table/Fig-3]. There was a significant difference in anxiety scores between the intervention and control groups except on preoperative day 1. Reduction of anxiety score was seen in the intervention group after the intervention hence, it is proved that preoperative education with music intervention is very helpful in reducing anxiety in the intervention group [Table/Fig-4]. There was a significant relationship between every observation within each study groups. This reveals the change in the pain scores at every observation from preoperative to postoperative days. Pain scores were observed to be significantly decreasing in intervention group at every follow-up postoperatively [Table/Fig-5]. A significant difference in the pain scores between the intervention and control group was found. The mean pain score was lower from preoperative day 2 to postoperative day 3 in the intervention group than in the control group [Table/Fig-6].

Time points	Intervention group (Mean±SD)	p-value	Control group (Mean±SD)	p-value
Preoperative day 1	103.61±11.18	0.001*	106.65±8.61	0.001*
Preoperative day 2	99.96±10.90		109.69±8.21	
Postoperative day 1	98.11±10.54		110.30±8.10	
Postoperative day 2	96.5±11.19		111.34±7.53	
Postoperative day 3	95.00±10.64		111.69±8.05	

[Table/Fig-3]: Comparison of anxiety scores in the intervention and control group at different time points (N=52).

The statistical test used: Two-way repeated measures ANOVA. Level of significance: $p < 0.05$
*significant $p < 0.05$

In the intervention group, 2 (7.7%) patients received oral feed within an hour of surgery whereas, 7 (26.9%) in the fourth hour and 7 (26.9%) in the sixth hour of surgery. In the control group 6 patients (23.1%) received oral feed within four hours of surgery [Table/Fig-7]. There was no discomfort and complications such as nausea, and vomiting were reported among the intervention group but in control group 3 (11.5%) cases had vomiting on the immediate postoperative day. In the intervention group 4 (15.38%) and control group 6 (23.07%) cases had epidural analgesia in the postoperative phase for the pain management. In the intervention group, the mean satisfaction score was 60.30 ± 5.00 , which indicates at higher level of satisfaction among patients. The mean satisfaction was 55.53 ± 5.25 in the control group. The satisfaction score were statistically significant when calculated between the groups [Table/Fig-8].

DISCUSSION

The aim of preoperative nursing is to identify and manage patients' anxiety as it has been associated with higher postoperative pain intensity, morbidity and mortality rates [22]. Patient education is challenging for the nurses working in surgical wards. Research studies have shown that, preoperative education can improve patient outcomes, recovery and satisfaction with their surgical experience [22,23]. The traditional postoperative analgesia commonly adopts opioid analgesics that involve considerable side effects. Music is an effective intervention to slow down the rate of pain stimulation and it lowers the conduction of painful nerve impulses to achieve relief from pain [24]. The studies have shown that, music therapy is more effective for postoperative pain regardless of the time points of application and found a considerable reduction in postoperative pain scores following music therapy [25,26]. The International guidelines for intensive care units recommend music therapy to reduce pain and anxiety [25].

Observation days	Groups	Mean±SD	Mean difference	95% CI of the difference		t value	p-value
				Lower	Upper		
Preoperative day 1	Intervention	103.61±11.18	-3.03	-8.59	2.52	-1.08	0.278
	Control	106.65±8.61					
Preoperative day 2	Intervention	99.96±10.90	-9.73	-15.11	-4.35	-3.63	0.001*
	Control	109.69±8.21					
Postoperative day 1	Intervention	98.11±10.54	-2.19	-17.43	-6.95	-4.67	0.001*
	Control	110.30±8.10					
Postoperative day 2	Intervention	96.50±11.19	-14.84	-20.16	-9.53	-5.61	0.001*
	Control	111.34±7.53					
Postoperative day 3	Intervention	95.00±10.64	-16.69	-21.95	-11.43	-6.36	0.001*
	Control	111.69±8.05					

[Table/Fig-4]: Comparison of anxiety scores between intervention and control group (N=52). SD: Standard deviation; CI: Confidence interval. The statistical test used: Independent sample t-test. Level of significance: p<0.05 *significant p<0.05

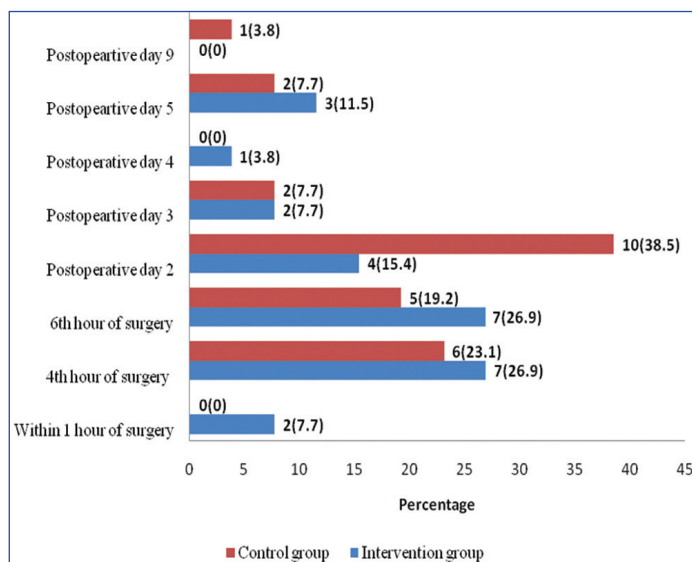
Time points	Intervention group (Mean±SD)	p-value	Control group (Mean±SD)	p-value
Preoperative day 1	5.00±11.29	0.001*	3.57±1.57	0.001
Preoperative day 2	2.69±1.22		3.80±1.44	
Postoperative day 1	3.57±1.06		5.23±1.24	
Postoperative day 2	2.69±1.01		4.57±1.17	
Postoperative day 3	1.23±0.90		4.15±1.04	

[Table/Fig-5]: Comparison of pain scores in the intervention and control group at different time points (N=52). The statistical test used: Two-way repeated measures ANOVA (Mauchly's Test of Sphericity). Level of significance: p<0.05 *significant p<0.05

Assessment of nutritional status is an important measure for successful postoperative outcomes. Unfortunately, certain factors such as comorbid conditions and complex surgical procedures can impair the nutritional status. Prolonged fasting before and after surgery may result in complications, such as postoperative nausea and vomiting, delayed wound healing, surgical site infections and increased insulin resistance [28]. The guidelines of European Society for Clinical Nutrition and Metabolism (ESPEN) suggest early oral feeding is the preferred way for better nutritional status. The focus of this guideline is to cover the nutritional aspects of the ERAS concept and to meet the special nutritional needs of patients undergoing major surgery [29]. Some of the studies report early intake of oral

Observation days	Groups	Mean±SD	Mean difference	95% CI of the difference		t value	p-value
				Lower	Upper		
Preoperative day 1	Intervention	5.00±11.29	1.42	-3.23	5.91	0.63	0.52
	Control	3.57±1.57					
Preoperative day 2	Intervention	2.69±1.22	-1.11	-1.86	-0.36	-3.00	0.004*
	Control	3.80±1.44					
Postoperative day 1	Intervention	3.57±1.06	-1.65	-2.29	-1.00	-5.15	0.001*
	Control	5.23±1.24					
Postoperative day 2	Intervention	2.69±1.01	-1.88	-2.49	-1.27	-6.20	0.001*
	Control	4.57±1.17					
Postoperative day 3	Intervention	1.23±0.90	-2.92	-3.46	-2.37	-10.75	0.001*
	Control	4.15±1.04					

[Table/Fig-6]: Comparison of pain scores between intervention and control group (N=52). SD: Standard deviation; CI: Confidence interval. The statistical test used: Independent sample t-test. Level of significance: p<0.05 *significant p<0.05



[Table/Fig-7]: Comparison of postoperative oral feeding between intervention and control group.

Groups	Mean±SD	p-value
Intervention	60.30±5.00	0.001
Control	55.53±5.25	

[Table/Fig-8]: Comparison of patient satisfaction between intervention and control group (N=52). SD: Standard deviation. The statistical test used: Mann-Whitney U test. Level of significance: p<0.05 *significant p<0.05

feed leads to faster bowel function and recovery without increasing the incidence of complications [30,31]. Early postoperative feeding is challenging which can lead to dysmotility, paralytic ileus, respiratory distress and gastrointestinal dysfunction. Traditionally, postoperative oral intake is delayed and patients were kept nil per oral for long hours until clinical signs of the return of bowel function. Current ERAS practice emphasizes immediate postoperative initiation of oral feed as early as possible. Postoperative early oral feeding is a key factor in improving bowel function after surgery and reducing the incidence of paralytic ileus and multiple postoperative complications [32]. Comparison of the findings in present study with contrast studies are shown in [Table/Fig-9] [8,14,16,17]. The present study supports that,

Authors	Place and year of the study	Sample size	Tools used	Postoperative outcomes
Elkalashy RA and Masry SE [8]	Egypt 2018	100 Patients undergoing open cholecystectomy	Demographic data, beck anxiety inventory, Amsterdam Preoperative Anxiety and Information Scale (APAS), visual analogue pain scale and postoperative patient's outcome sheet	The educational intervention minimised anxiety and leads to better surgical outcome as early recovery, effective pain control and early mobility.
Amiri M et al., [14]	Iran 2017	90 patients undergoing coronary artery bypass graft surgery	Demographic questionnaire and the Spielberger State-Trait Anxiety Inventory (STAI)	The mean anxiety level of the intervention group has been found to be significantly lower than that of the control group half an hour after the intervention.
Nakkeeb A et al., [16]	Egypt 2009	120 patients underwent elective colonic anastomosis	Observation scale	The majority of patients (75%) tolerated the early feeding. Hospital stay was also significantly shorter in the early feeding group (6.2±0.2 days vs 6.9±0.5 days).
Andemeskel Y et al., [17]	Eritrea 2019	470 patients undergoing different type of surgeries	Leiden perioperative care patient satisfaction questionnaire	The overall satisfaction score was 68.8%. Less fear and concern was observed among patients with satisfaction scores of 87.5%.
Present study	India	52 patients undergoing elective abdominal surgery	Demographic proforma, music preference questionnaire, State-Trait Anxiety Inventory (STAI-adults), numeric pain rating scale, patient satisfaction questionnaire	Preoperative education and music intervention minimised the anxiety and pain. Early oral feeding was effective. These interventions also improved the patient satisfaction with surgical experience.

[Table/Fig-9]: Comparative analysis of postoperative outcomes among patients undergoing surgery [8,14,16,17].

oral intake should be initiated, as soon as, possible after the surgery. The hypotheses were stated as there will be a significant difference in the pretest and post-test anxiety, pain scores in the intervention and control groups. There will be no significant difference in the early feeding status, satisfaction scores between the intervention and control groups. The multimodal interventions such as preoperative patient education, music and early postoperative feeding are intended to improve the recovery of patients after surgery in terms of improved physiological and psychological functions.

Limitation(s)

The limitation of present study is that, the music intervention was not administered during the surgery. In addition to this, a few patients in the postoperative period had epidural analgesia which could interfere with the effects of music on pain intensity. The efforts were not made to study the effects of family support on anxiety and pain intensity during the surgical experience which could be incorporated in future research studies.

CONCLUSION(S)

Preoperative education and music intervention showed a significant reduction in anxiety and pain. Early feeding is safely tolerated and showed improvement in postoperative outcomes, thus, accepting the hypothesis. Implementation of music intervention in patient care could be made possible with the availability of professional music therapists in every healthcare system as a member of the healthcare team. This is also possible with the enrichment of the curriculum with an added component of therapeutic music and the introduction of short term courses on music therapy for healthcare professionals. The study concludes that, multiple interventions enhance the recovery of patients and improve the satisfaction with surgical experience. Preoperative education and music are effective interventions that could be incorporated into routine practices for optimal perioperative care among patients undergoing open abdominal surgery.

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