

Music Therapy with Female Surgical Patients: Effect on Anxiety and Pain

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Abstract: Pain and anxiety are common phenomena for surgical patients. Although music has been shown to be useful and have advantages, as an intervention for managing anxiety and pain, no study was located, using repeated measures. This study examined the effect of music therapy, at multiple times, on reducing pre- and post-operative anxiety, and post-operative pain sensation and pain distress, in 102 Malaysian female surgical patients. A pre/post-test design, with subjects randomly placed into either the music therapy group ($n = 51$) or the control group ($n = 51$), was used. Those in the music therapy group listened to self-selected music twice daily the day before surgery and for 3 days post-operative. Visual Analogue Scales were used to measure anxiety before and after the music intervention, as well as pain sensation and pain distress during the post-operative period. State-trait anxiety, during the pre- and post-operative periods, also was measured. Data were analyzed using the T-test and F-test for comparison between groups and across time.

The results showed that the music group reported lower pre-operative anxiety than the control group. The music group demonstrated reduced post-operative anxiety, pain sensation and pain distress. Music was found to have a cumulative effect, post-operatively, across the variables. In summary, listening to self-selected music the day before surgery and continuing for 3 days post-operatively was effective in reducing anxiety, pain sensation and pain distress. The findings suggest the use of music, as a complementary empirically-based nursing intervention, for reducing pre-operative anxiety, post-operative pain sensation and post-operative pain distress among female adult surgical patients.

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Introduction

Surgical patients experience stress and anxiety pre-operatively¹, intra-operatively², and post-operatively.^{3, 4} Contributing factors of pre-operative anxiety include fear of both regional and general anesthesia, and fear of events that could occur during surgery (i.e. whether surgery will work, being awake during the procedure, possible brain damage, and fear

of dying during surgery or while under anesthesia).⁵ Intra-operatively, patients express fear of the surroundings and the unfamiliar environment, as

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well as loss of control.⁶ Post-operatively, pain is the most expressed fear.^{2, 3, 7}

In addition, previous studies have documented that female surgical patients had higher incidence and severity of postoperative pain, as compared to male surgical patients.⁸⁻¹⁰ A review by Unruh,¹¹ on gender differences with clinical pain, found that women experience more frequent pain and more severe pain. In addition, female surgical patients have been found to experience greater anxiety than male patients in elective surgery.^{5, 12}

Review of Literature

Anxiety and pain have been shown to be correlated and impact each other.^{5, 13} Anxiety can diminish one's pain threshold, provoke noxious stimulation and muscular spasm, and invoke pain. In addition, pain can cause one to feel more anxious. Therefore, effective interventions to decrease either pain or anxiety may also decrease the other. Reduction both in pain and anxiety has been shown to enhance the comfort level of surgical patients.^{14, 15}

Pain and anxiety among patients, undergoing moderate to major surgery, should be relieved by both pharmacological and non-pharmacological interventions.¹⁶ Prior research, however, has found inadequate usage of analgesics, such as opioids, in the treatment of post-operative pain.^{17, 18} This may be due to patients' desiring to avoid the side effects of increased doses of opioids;^{17, 19} their dislike of injections; nausea and drowsiness; or fear of possible addiction, if opioids are administered.²⁰

An elevated level of pre-operative anxiety is known to affect one's need for additional pre-operative medication and anesthesia.¹⁶ Thus, the use of an effective, alternative, non-pharmacological intervention appears needed as an adjunctive treatment to facilitate pain relief, manage anxiety, achieve a balance between

opioid administered and related side effects, and decrease the amount of required pre-anesthetic medication and anesthesia.¹⁵

There is increasing evidence of the benefits and effectiveness of various alternative and complementary therapies for anxiety and pain relief.¹⁵ Music intervention is one such therapy. Compared to other therapies, music therapy is recognized as being easy, safe, inexpensive, requiring no special skills to administer, and having no adverse effects.

A systematic review of clinical research literature reveals that music effectively reduces anxiety among hospitalized patients during normal care delivery, but does not reduce their anxiety, nor alter their perception of pain, when undergoing invasive or unpleasant procedures.¹⁵ Music has been shown to have a more consistent, positive, therapeutic effect on psychological variables (i.e. anxiety and stress) than on one's physiological variables (i.e. pulse, respirations, blood pressure and galvanic skin responses).¹⁴ Although music has been shown to be useful and have advantages as an intervention for managing anxiety and pain, no study was located, in Thai and English language healthcare journals, in which the effect of music on anxiety and pre- and post-operative pain (using repeated measures) was investigated. In addition, no previous research was found whereby music therapy was used at multiple points in time, among female surgical patients, for simultaneous reduction of anxiety and pain. Thus, the objectives of this experimental study, of two groups of female surgical patients, were to: (a) compare, between groups, the effects of music therapy in reducing pre-operative anxiety, and (2) compare, between groups, the effects of music therapy on post-operative anxiety, post-operative pain sensation and post-operative pain distress across time.

Method

Permission to conduct the study was obtained from the Institutional Review Board (IRB) of the researchers' academic institution and the IRB of the hospital used for data gathering. In addition, permission to gain access to potential subjects was obtained from head nurses on the surgical wards and in the operating suites, and from the Heads of the Surgical and Anesthesiology Departments.

Sample: One hundred thirteen women, who met the inclusion criteria and were scheduled for surgery in a 750-bed university hospital in northeastern Malaysia, were approached after review of the next day's operating schedule. Criteria for inclusion consisted of women: (1) at least 18 years of age; (2) having ability to speak and write Malay; (3) free of any known hearing impairment; (4) able to hear music played from a compact disk (CD) player via headphones; (5) scheduled for moderate or major elective surgery, under general anesthesia, the following day; (6) determined to have American Society of Anesthesiologists (ASA) physical health status I and II (ASA I denotes a person, presenting for surgery, who is otherwise healthy and ASA II denotes people having mild co-morbidity, such as adequately treated hypertension or diabetes); (7) hospitalized for at least one day pre-operatively, and three days post-operatively; and (8) oriented to person, time and place at the time of data collection. (9) with no known mental disability (psychosis, depression or opioid dependency); and (10) not scheduled for endoscopic surgery or surgery of the face, eyes or ears.

Potential subjects, who met the inclusion criteria, were approached about taking part in the study. They were informed: about the study's purpose, procedures, risks and benefits; that their anonymity and confidentiality would be maintained; and that they had the right to withdraw at anytime without repercussions. Written consent to participate was

obtained from 108 women. Five (4.4%) of those approached refused to participate, while six (5.3%) selected to drop out of the study. Among the six who dropped out, 3 were from the music group and 3 were from the control group. In addition, four of those who left did so pre-operative and two post-operative. Thus, data were obtained on 102 subjects, giving a response rate of 90.3%.

Design: An experimental, 2-group pre/post-test, repeated measures design was used to examine the effect of music therapy on pre- and post-operative anxiety, and post-operative pain sensation and pain distress. To maximize the chances of group equivalence among potential confounders, as well as to reduce selection threats,²¹ subjects were randomly assigned, using the "envelope method," to either the music therapy group or the control group. Sample size was considered adequate when a power of 0.80 and effect size of 0.52 were reached for each group.

Instruments: Data were collected using the: (1) Demographic Data Questionnaire; (2) Pain Medication Record; and (3) Self Report Measure of Anxiety and Pain Level. The Demographic Data Questionnaire (DDQ) consisted of three sections: demographic characteristics, clinical information data and the Trait-Anxiety Scale. The first two sections were researcher-designed. The demographic characteristic section sought to obtain information regarding the subjects' age, marital status, religion, educational level, occupation and monthly income. The clinical information was data obtained, by the researchers, from the subjects' charts and consisted of: presence of medical health problems; pain prior to admission; pain after admission; previous use of pain medications; previous use of non-pharmacological pain intervention; prior use of non-pharmacological anxiety interventions; number of previous surgeries; whether pre-operative teaching was carried out and by whom (nurses/physicians); types of prior surgeries; reason for current surgery; type of anesthesia used;

duration of surgery; site of surgical incision; direction of surgical incision; presence of incision drains; and length of surgical incision.

The State-Trait Anxiety Inventory (STAI), developed by Speilburger and colleague,²² was used as the third section of the DDQ to measure patients' trait anxiety, as a potential covariate. This scale consists of 20-item statements, each rated on a 4-point Likert scale with 1 = almost never (no anxiety) to 4 = almost always (high anxiety). The total score, which is obtained by summing all items, can range from a minimum of 20 to a maximum of 80. In this study, the instrument's test-retest reliability coefficient was .90.

The Pain Medication Record Form was researcher-developed and used to record the type, amount and frequency of pain medication used throughout the study procedure. In addition, the subjects' pain medication consumption, including all opioids and non-steroidal anti-inflammatory drugs (NSAID) prescribed, as well as their route, dose, time and amount, were recorded to measure the combined effects of music intervention. Total pain medication consumption was calculated by converting opioid and non-opioid analgesics into morphine equianalgesic (ME) doses. For example, Pethidine and tramadol (opioids), and diclofenac (NSAID) were converted into morphine equianalgesic (ME) doses, using the conversion of Pain Medication to Morphine Equianalgesic Doses, based on the information given by: the Acute Pain Management Guideline Panel,²³ the American Pain Society's (APS) Principles of Analgesic Use in the Treatment of Acute Pain and Chronic Cancer Pain,²⁴ Acute Pain Management: A Practical Guide,² as well as consultation from experts. The other pain analgesics were compared using frequency and percentages. All medication information was obtained from patients' charts and records of the patient-controlled-analgesia (PCA) infusion pumps or syringes.

The Visual Analogue Scale for Anxiety (VASA)⁴ was used to measure the subjective anxiety level of subjects. The scale consists of a 10 cm. horizontal line, with a 1 cm. vertical line at each end. To the left side of the horizontal line was the verbal anchor, "no anxiety," and to the right side was the verbal anchor, "high anxiety." Subjects were asked to place a mark on the horizontal line to indicate their respective level of anxiety. Scores were obtained by measuring the distance, in centimeters, from the "no anxiety" end of the 10 cm. line to the subjects' respective vertical marks. Scores could range from 0 to 10 with the higher the score the higher the level of anxiety. The reliability coefficient for the VASA, for this study, was .96 ($p < .001$).

The Visual Analogy Scale of Pain Sensation and Distress (VASPSD)⁴ was used to measure patients' post-operative pain sensation and post-operative pain distress. It consists of two 10-cm horizontal lines, with a 1 cm. vertical line at each end. The horizontal line for pain sensation was colored red, while the horizontal line for pain distress was colored green. The verbal anchors for pain sensation were "no pain sensation," which was at the left end of the horizontal line, while the verbal anchor, at the right end of the horizontal line, was "most pain sensation imaginable." The verbal anchor of the pain distress analogy scale was "not distressed," at the left end of the line, while with the verbal anchor, "highly distressed," was at the left end of the line. Subjects were asked to make a mark on each of the two horizontal lines (pain sensation and pain distress) to indicate their respective level of pain sensation and pain distress. Both scales were scored by measuring the distance, in centimeters, from the left end of each horizontal line to the patients' marks. Scores for both pain sensation and pain distress could range from 0 to 10. The higher the score, for each scale, the higher the levels of pain sensation and pain distress, respectively. The reliability for the VASPSD, for this study, was found to be .94 ($p < .001$).

Music Intervention

The intervention, which consisted of eight 30 minutes sessions of music, was administered to only those in the experimental group. Twelve music CDs were made available to subjects for selection. Each CD consisted of a 30-minute session, so as to ensure standardization, of Western, Malay or Chinese music. All three types of music were offered, so as to provide a culturally acceptable selection for the multi-national participants. Subjects were allowed to select two music CDs they felt would be relaxing to them. However, they were able to interchange the two music CDs, from the collection of 12 CDs, over the eight music intervention sessions. All 12 CD's were evaluated by three music experts (an Englishman, a Thai and a Malaysian) for similarity of characteristics (soothing and relaxing sound, minimum percussion and slow rhythm of 60-80 beats per minute). The music was administered via audio CD-players (Fantasia FS-8116), using headphones. Each audio CD-player and set of headphones was checked, by a technician and the investigators, to assure good working order prior to use.

Procedure

Prior to data collection, a research assistant was trained, by the researchers, regarding the music therapy administration procedure, as well as the use and timing of the administration of the instruments used for data collection. Each subject, in both the experimental and the control group, received standard pre- and post-operative nursing and medical care. Pre-operatively and prior to implementation of music therapy with

the experimental group, both the experimental group and the control group were administered the demographic questionnaire and the State-Trait Anxiety Inventory (STAI). Subjects in the experimental group were requested to select two music CDs from the music collection and listen to the music CDs on the portable audio CD-player for 30 minutes.

For the experimental group, music interventions were scheduled for specific times in order to measure cumulative effects, including the: (a) evening prior to surgery (Time 1: 16 hours \pm 1 hour); (b) morning of surgery (Time 2: two hours \pm 1 hour, prior to surgery); (c) evening after surgery was completed (Time 3: six hours \pm 1 hour after surgery); (d) morning of the first post-operative day (Time 4: eighteen hours \pm 1 hour after surgery); (e) evening of the first post-operative day (Time 5: thirty hours \pm 1 hour after surgery); (f) morning of the second post-operative day (Time 6: forty-two hours \pm 1 hour after surgery); (g) evening of the second post-operative day (Time 7: fifty-four hours \pm 1 hour after surgery); and (h) morning of the third post-operative day (Time 8: sixty-six hours \pm 1 hour after surgery). Both prior to and after each music intervention (Time 1 - Time 8), subjects in the experimental group were administered the VASA and the VASPSD. At Time 8 only, and just prior to the music intervention, subjects also were administered the Trait-Anxiety Scale. Those in the control group were administered the VASA and the VASPSD, at each of the designated times (Time 1 -Time 8) indicated in the procedure, as well as the Trait-Anxiety Scale, at Time 8 only. The experimental protocol and data collection procedures of the study are shown in **Figure 1**.

Days	Day 1		Day 2		Day 3		Day 4		Day 5		
	Preoperative Period			Postoperative Period							
	Before Surgery		Surgery Day		After Surgery						
					← POD 1 →	← POD 2 →	← POD 3 →				
Music intervention /Data collection points		T1 16±1 hr before surgery Evening	T2 2±1 hr before surgery Morning	T3 6±1 hr after surgery Evening	T4 18±1 hr after surgery Morning	T5 30±1 hr after surgery Evening	T6 42±1 hr after surgery Morning	T7 54±1 hr after surgery Evening	T8 66±1 hr after surgery Morning		
	Music group	*O ₁ X ₁ O ₂	O ₃ X ₁ O ₄	O ₅ X ₁ O ₆	O ₇ X ₁ O ₈	O ₉ X ₁ O ₁₀	*O ₁₁ X ₁ O ₁₂	O ₁₃ X ₁ O ₁₄	*O ₁₅ X ₁ O ₁₆		
R	←→										
	Control group	*O ₁ X ₀ O ₂	O ₃ X ₀ O ₄	O ₅ X ₀ O ₆	O ₇ X ₀ O ₈	O ₉ X ₀ O ₁₀	*O ₁₁ X ₀ O ₁₂	O ₁₃ X ₀ O ₁₄	*O ₁₅ X ₀ O ₁₆		

Day 1-5 = 5 days study period

= Pre-surgery

= Post-surgery

POD = Postoperative days after surgery

T1-T8 = multiple data collection time points for outcome measures

R = Random assignment to either music group or control group

X1 = Music intervention

X0 = Standard routine care

(*) = Trait-anxiety

O₁, O₃, = Pretest data for preoperative anxiety

O₂, O₄, = Posttest data for preoperative anxiety

O₅, O₇, O₉, O₁₁, O₁₃, O₁₅, = Pretest data for postoperative anxiety, postoperative pain sensation and postoperative pain distress

O₆, O₈, O₁₀, O₁₂, O₁₄, O₁₆, = Posttest data for postoperative anxiety, postoperative pain sensation and postoperative pain distress

Figure 1 Experimental protocol and data collection procedures of the study

Data Analysis

Descriptive statistics were used to analyze demographic characteristics and clinical information data. T-tests were carried out to compare, between groups: (a) trait anxiety before the music intervention at Time 1 and Time 8; (b) pre-operative anxiety, post-operative anxiety, post-operative sensation and post-operative distress at Time 1 through Time 8; and (c) total pain medication usage, in morphine equianalgesic doses, from Times 3 through Time 8. Repeated measures were done to compare differences between groups, across time and intervention, and between times and groups. The Roy-Borgman step-down F-test was performed to compare, between

groups, the overall changes in mean differences of the three ordered dependent variables (post-operative anxiety, post-operative pain sensation and post-operative distress) at Times 3 through Times 8.

Results

The demographic and clinical characteristics, between the two groups, suggested homogeneity with the subjects having a mean age of 40.3 years. Subjects in both groups tended to: be married and of Islamic faith; have a high school education; be employed; have a monthly income of less than 1,000BM; have no medical problems; have no pain after admission; have no previous non-pharmacological

pain intervention or anxiety intervention; have had pre-operative teaching by either nurses or physicians; be undergoing gynecological surgery; not have cancer; not have surgery for exploratory reasons; have only general anesthesia during surgery; have a surgical duration of 1–2 hours; and have an abdominal, transverse, midline 15–18 cm. incision, without incision drains. In addition, there were no differences in Trait Anxiety scores between the two groups, prior to the music intervention at Time 1 and Time 8, which suggested group homogeneity.

Table 1 shows the differences of pre-operative and post-operative anxiety, post-operative pain sensation, and post-operative pain distress between the groups, at Time 1 through Time 8. The mean

differences of pre-operative anxiety, in the music group, at Time 1 and 2, were found to be greater than the mean differences in the control group. Paired t-tests revealed significant changes of the mean differences of post-operative anxiety at all 6-time points in the music group, but not in the control group. In regards to post-operative pain sensation, the mean differences in the control group were significant only at Time 3 and Time 6, but significant across all 6-time points in the music group. In terms of postoperative pain distress, paired t-tests revealed significant mean differences in the music group at all the six time points, while the mean differences in the control group were not significant.

Table 1 Comparison of preoperative and postoperative anxiety, postoperative pain sensation, and postoperative pain distress between groups, at Time 1 – Time 8

Variables	Control Group n = 51			Music Group n = 51			MD Groups	SE	Indep-t
	MD	SD	Paired-t	MD	SD	Paired-t			
Pre-op Anxiety									
T1	.43	1.04	.97**	2.67	1.23	15.44***	2.24	.23	9.91***
T2	-.03	1.26	.18 ^{ns}	3.01	1.52	14.10***	3.04	.28	10.97***
Post-op anxiety									
T3	-.20	1.33	-1.09 ^{ns}	.87	.80	7.74***	1.07	.22	4.93***
T4	-.12	1.00	-.83 ^{ns}	1.14	1.47	.53***	1.26	.25	5.04***
T5	-.05	.82	.29 ^{ns}	.84	1.84	2.67*	.88	.29	2.99*
T6	.18	1.26	1.02 ^{ns}	.73	1.76	2.99**	.55	.30	1.84 ^{ns}
T7	-.09	.76	-.87 ^{ns}	.86	1.46	4.23***	.96	.23	4.14***
T8	.00	.64	.48 ^{ns}	.45	.72	6.51***	.45	.14	3.23***
Post-op Pain Sensation									
T3	.50	1.38	2.60**	2.52	1.71	10.56***	2.02	.31	6.54***
T4	.13	.73	.31 ^{ns}	2.67	1.79	10.93***	2.54	.28	9.20***
T5	.16	.73	.50 ^{ns}	1.79	1.45	8.81***	1.64	.23	7.06***
T6	.54	1.10	3.49**	1.38	1.22	8.09***	.85	.23	3.67***
T7	.10	.69	1.04 ^{ns}	.92	1.31	4.99***	.82	.21	3.95***
T8	-.02	.58	-.34 ^{ns}	.37	1.22	2.28*	.40	.19	2.09*
Post-op Pain distress									
T3	.21	1.37	1.10 ^{ns}	1.24	1.46	6.06***	1.03	.28	3.68***
T4	-.15	.85	-1.28 ^{ns}	1.09	1.33	5.83***	1.24	.22	5.60***
T5	-.15	.85	-2.18 ^{ns}	.93	1.01	6.64***	1.08	.29	5.26***
T6	.19	1.04	1.29 ^{ns}	.80	1.16	4.91***	.61	.30	2.80*
T7	-.14	.67	-1.47 ^{ns}	.84	1.16	5.16***	.98	.23	5.21***
T8	-.08	.70	-.91 ^{ns}	.25	.58	3.21**	.33	.14	2.53*

*p < .05; ** p < .01; ***p < .001

ns = non-significant

T = time point

MD = mean difference between pretest–posttest scores

MD Groups = mean difference between groups,

SE = standard error difference,

Indep-t = independent t-test

No differences were found between the groups in regards to pain medication usage (See **Table 2**). **Table 3** shows differences of outcome measures between groups, across times, and with time and group interaction. Since there was a significant time and group interaction, a follow-up analysis was done, using the Roy-Barman step down F-test, (See **Table 4**) to evaluate the effect of each dependent

variable (DV) at each time point. Each DV was analyzed, in turn, with higher priority DVs treated as covariates and with the highest-priority DV tested in univariate ANCOVA. Surgical patients in the music group reported a significantly lower postoperative pain sensation at Times 3 to 7, lower postoperative pain distress at Times 4 and 7, and lower postoperative anxiety at Time 3 than the control group across time.

Table 2 Comparison of total pain medication usage in morphine equianalgesic (ME) doses between groups, from Time 3 – Time 8

Variables	Music group n = 51	Control group n = 51		t	p
		\bar{X}	SD		
Total IV morphine doses in ME	24.38	38.68	35.50	69.24	1.00 .319
Total IM pethidine doses in ME	2.38	9.74	.97	3.38	.91 .366
Total oral tramadol doses in ME	5.27	5.50	4.98	5.04	.27 .786
Total oral and rectal diclofenac doses in ME	.52	.96	.30	.61	1.36 .177

Table 3 Repeated-measures multivariate analysis for mean differences between groups, across time, and interaction between time and groups.

	Test name	Value	F	df	p	η^2	Power
Groups	Pillai's trace	.52	35.20	3,98	.000	.52	1.00
Time	Pillai's trace	.20	7.28	15,1500	.000	.07	1.00
Time * groups	Pillai's trace	.14	4.97	15,1500	.000	.05	1.00

Table 4 Roy-Bargman step-down F- test analysis of three ordered dependent variables across time, from Time 3 – Time 8

Variable	MS	Error MS	Stepdown F	df	p	η^2	Power
T3							
Postoperative pain sensation	104.21	243.10	42.87	1,100	.000	.30	1.00
Postoperative pain distress	3.30	178.93	1.86	1, 99	.176	.02	.12
Postoperative anxiety	8.28	112.63	7.21	1, 98	.009	.19	.98
T4							
Postoperative pain sensation	163.91	193.70	84.62	1,100	.000	.31	.90
Postoperative pain distress	12.35	122.14	10.01	1, 99	.002	.09	.70
Postoperative anxiety	.27	119.19	.22	1, 98	.636	.00	.02

Variable	MS	Error MS	Stepdown F	df	p	η^2	Power
T5							
Postoperative pain sensation	68.19	136.76	49.86	1,100	.000	.301	.00
Postoperative pain distress	2.78	84.19	3.33	1, 99	.074	.03	.21
Postoperative anxiety	2.03	206.44	.97	1, 98	.329	.21	.00
T6							
Postoperative pain sensation	18.21	135.81	13.40	1,100	.000	.12	.85
Postoperative pain distress	1.64	99.74	1.63	1, 99	.205	.02	.09
Postoperative anxiety	.03	1.65	.02	1, 98	.895	.02	.09
T7							
Postoperative pain sensation	17.13	110.00	15.56	1,100	.000	.14	.90
Postoperative pain distress	9.73	73.64	13.08	1, 99	.000	.12	.84
Postoperative anxiety	1.67	99.19	1.65	1, 98	.201	.02	.09
T8							
Postoperative pain sensation	4.04	92.19	4.38	1,100	.309	.04	.30
Postoperative pain distress	2.44	43.63	5.66	1, 99	.190	.05	.41
Postoperative anxiety	2.41	44.04	5.37	1, 98	.230	.05	.38

T = time point

MS = mean square

Discussion

The findings suggest that music intervention was more effective in reducing pre-operative anxiety at Time 2 than at Time 1. This may be due to the subjects having repeated exposure to the music and becoming familiar with it. This is congruent with prior research regarding music therapy significantly reducing pre-operative anxiety among those undergoing surgical procedures.^{1, 25, 26} Not only was the use of two 30-minute music therapy sessions found to be beneficial in the reduction of pre-operative anxiety in the immediate pre-operative period, it also was found to be integratable at Times 1 and 2, or immediately after one's admission to the ward. This is helpful information for nurses, since it suggests times in which the use of music may be most effective during the pre-operative period.

Post-operatively, subjects in the music group, compared to the control group, reported significantly lower anxiety only at Time 3; significantly lower

pain sensation at Times 3 to 7; and significantly lower pain distress at Times 4 and 7. The significance of music intervention in reducing post-operative anxiety, pain sensation and pain distress, at these time points, could be due to several factors.

First, the statistical powers were large, thereby facilitating detection of differences between groups at time points. The power for post-operative anxiety at Time 3 was 0.98, for post-operative pain sensation at Times 3 to 7, it was 0.85 to 1.00, and for post-operative pain distress at Times 4 and 7, it was 0.70 and 0.84, respectively.

Secondly, the duration, intervals and timing of music intervention may have been contributing factors. Participants listened for 30 minutes without interruptions. This duration was therapeutic, based on previous music intervention studies,^{4, 27} in that it provided for continual modulation of the patients' pain sensation and pain distress, which were highly variable.¹⁷ The music intervention was administered constantly at 12-hour intervals for six post-operative

sessions, thereby providing a continuous therapeutic effect that may have contributed to its effectiveness.²⁸ In addition, the music provided in this study was administered at specific times because previous studies have reported that post-operative pain peaks, at about these same times, despite the use of pain medications.^{29,30} Providing music intervention at these specific times complemented the post-operative pain medications prescribed at fixed doses and times.

Thirdly, the type of music provided (western, Chinese and Malay) could have been a contributing factor. All the music had a slow rhythm, 60 to 80 beats per minute, with minimum percussion and lack of lyrics. These characteristics harmonize body rhythms, enhance relaxation response, provide soothing effects, calm emotions and tension, and lengthen time perception.^{17, 31} Providing culturally appropriate music to the mixed study sample of Malay and Chinese may have enhanced effectiveness of the music intervention.^{32, 33}

Fourthly, subjects were given a choice, from a list of 12 music CDs, of selecting two they preferred, which could be interchanged over the eight music sessions. Allowing the subjects to select music they found soothing and relaxing most likely added to the music intervention effectiveness.⁴ This is consistent with previous studies that provided music preference for subjects.^{19, 27, 35}

As patients focused on music, their attention may have been directed away from them experiencing fearful thoughts and perceiving threats, thereby, leading to a reduction in their anxiety. This study's findings are similar to previous music intervention studies that used the Gate Control Theory in explaining post-operative pain reduction^{19, 29} and post-operative anxiety reduction.¹

Although there were no significant differences in pain medication received postoperatively, music intervention appeared to result in less total intravenous morphine consumption in the music group, when compared to the control group. There

were slightly higher total intra-muscular pethidine doses, total tramadol doses, and total diclofenac doses consumed in the music group, when compared to the control group. A decrease use of pain medications has been reported in other studies when music interventions are provided.^{6, 17}

Although the current study has demonstrated the effectiveness of music intervention in reducing post-operative anxiety, pain sensation and pain distress at various time points, the effect of other variables (e.g., pain medication, individual personality, natural wound healing) also may have accounted for its significance. The systemic multi-modal analgesia that was used, in the first 48 hours of pain management, in this study, included an epidural analgesia cocktail, continuous morphine infusion, patient controlled epidural analgesia (PCEA) cocktail, and PCA morphine. The epidural analgesia cocktail and the PCA morphine provided effective and prolong analgesia, due to the synergistic effect combination of local anesthetics and low opioid doses.⁵ The multi-mode analgesia also protected patients from post-operative anxiety and emotional discomfort associated with pain sensation.⁵ As surgical wound healing occurs, there is natural decrease in pain sensation and pain distress, and patients feel less anxious. Thus, there is a possibility that these variables could have accounted for its significance.

The aim of post-operative pain management with a multi-modal pain system is to maintain patients' comfort with minimal sedation and impairment of respiratory function, with their VASA at 2.0 or less.³⁶ However, the findings suggested those in the music group reported moderate post-operative pain sensation during pre-tests at Times 3, 4 and 5. After music intervention, the post-test means scores were much lower, while those in the control group remained similar or slightly raised at Times 3, 4 and 5. This highlights the fact pain medication alone may not have been adequate to relieve the pain being experienced to a comfort level for some of

the subjects. Music intervention may be used, with no adverse effects, to compliment pain medications so as to decrease pain to a more tolerable level. In conclusion, the current study suggests that using eight 30-minute music interventions, involving culturally appropriate, easy-listening self-selected music for dealing with pre- and post-operative anxiety, post-operative pain sensation and post-operative pain distress, may prove to be an effective intervention.

Implications for nursing practice

The findings provide evidence that music intervention can be used as a non-pharmacological, complementary, non-invasive intervention to bring about greater relief of anxiety and post-operative pain. The cumulative effect of music may serve to compliment pain medication by acting as a “booster” to help maintain a subject’s pain threshold and increase comfort. In addition, the findings also provide a guide for nurses regarding the optimal times of effectiveness for using music intervention.

Limitations and recommendations

Regarding instrumentation, the VASA and VASPSD are one-dimensional instruments. Since pain and anxiety are multi-dimensional constructs with psychological and behavioral components, including multi-dimensional instruments, for measuring pain and anxiety, may provide a better description of the total pain and anxiety experience. Sensitization to the instruments, as a result of using repeated measures, may have increased the subjects’ familiarity with the measures, which could have lead to boredom when providing responses. In addition, all instruments were self-report, which could have contributed to elicitation of socially desirable responses. Incorporating non-self report measures (i.e. behavioral observations and physiological measures), in future studies, might offer less biased

estimates. During the music intervention, some subjects were still quite sedated at Time 3. Thus, the effect on their sensorium, during music listening, might have affected the effectiveness of the music at that point in time.

The researchers were aware of various techniques of pain management, in the study, which may have affected study outcomes. Standardizing pain management may provide a more homogeneous sample; however, doing so would confine the findings to those groups of patients with that specific type of pain management.

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การใช้ดนตรีบำบัดในสตรีที่ได้รับการผ่าตัด: ผลต่อความวิตกกังวลและความปวด

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บทคัดย่อ : ความปวดและความวิตกกังวลเป็นปัจจัยการณ์ที่พบบ่อยในผู้ป่วยทางศัลยกรรม แม้ว่า ตนตระใจได้รับการพิสูจน์ว่ามีประโยชน์ในการลดความวิตกกังวลและความปวด แต่ยังไม่สามารถบอก ถึงผลที่เกิดต่อเนื่อง การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาผลของดนตรีต่อการลดความวิตกกังวลก่อนและ หลังผ่าตัดและความปวดหลังผ่าตัดในระยะเวลาต่างๆของสตรีชาวมาเลเซียที่ได้รับการผ่าตัด โดยเป็น การวิจัยกึ่งทดลองแบบสุ่มตัวอย่างที่เป็นกลุ่มทดลอง 51 รายและกลุ่มควบคุม 51 ราย กลุ่มทดลองเป็น กลุ่มที่ได้รับการฟังดนตรีที่เลือกด้วยตนเองวันละสองครั้งตั้งแต่วันก่อนผ่าตัดจนถึงหลังผ่าตัดสามวัน ผู้ป่วยได้รับการประเมินทั้งความวิตกกังวลก่อนและหลังผ่าตัด และความรู้สึกปวดและไม่สุขสบายหลัง ผ่าตัด โดยใช้มาตราตัวตัด 0-10 รวมทั้งความวิตกกังวลแฝง วิเคราะห์ข้อมูลโดยเปรียบเทียบความแตกต่าง ระหว่างกลุ่มและระยะเวลาต่างๆด้วยค่าที่และอ�프

ผลการศึกษาพบว่า กลุ่มทดลองที่ได้ฟังดนตรีมีความวิตกกังวลก่อนผ่าตัดลดลงมากกว่ากลุ่มควบคุม รวมทั้งความวิตกกังวลหลังผ่าตัด ความรู้สึกปวดและไม่สุขสบายหลังผ่าตัดลดลง นอกจากนี้พบว่าตนตระ มีผลสะสมที่ต่อเนื่องในการลดความปวดและวิตกกังวลหลังผ่าตัด โดยสรุปพบว่า การฟังดนตรีที่เลือก ด้วยตนเองในวันก่อนผ่าตัดและฟังต่อเนื่อง 3 วันหลังผ่าตัดช่วยลดความปวดและวิตกกังวลอย่างชัดเจน การศึกษานี้จึงให้ข้อเสนอแนะว่า ตนตระสามารถใช้เป็นกิจกรรมพยาบาลที่เป็นทางเลือกหนึ่งในการผ่อนคลาย กับการรักษาในการลดความวิตกกังวลก่อนผ่าตัด รวมทั้งลดความรู้สึกปวดและไม่สุขสบายหลังผ่าตัด ในสตรีที่ได้รับผ่าตัด

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