

Gender Differences When Using Sedative Music During Colonoscopy

ABSTRACT

Colonoscopy is a procedure often experienced as uncomfortable and worrying. Music has been reported to reduce discomfort during colonoscopy; however, no study in a Swedish setting has been found. The purpose of this randomized controlled trial was to analyze the effects of sedative music on patients' experience of anxiety, pain, relaxation, and well-being during colonoscopy. Prior to colonoscopy, adult patients ($n = 120$), aged 18–80 years, were randomly assigned to either an intervention group ($n = 60$) who listened to sedative instrumental music with 60–80 beats per minute during the colonoscopy or a control group. After the colonoscopy, both groups completed a questionnaire on anxiety, the State Trait Anxiety Inventory, and an anxiety Visual Analogue Scale. Pain, relaxation, and well-being were also measured with Visual Analogue Scales. Women in the intervention group had a lower level of anxiety during the colonoscopy than those in the control group ($p = .007$) and well-being was significantly higher in the intervention group, especially among men, than in the controls ($p = .006$ and $p = .025$, respectively). Men in the intervention group were more relaxed during the colonoscopy than those in the control group ($p = .065$). Listening to sedative music decreased anxiety among women and increased well-being among men during colonoscopy.

Throughout history, music has been used as a nursing intervention to relieve sickness and suffering. Even in the 19th century, Florence Nightingale used music to calm her patients. It is known that music is a unique experience for the individual and may influence breathing, heart rate, blood pressure, and the need for oxygen. The choice of

music is important, and the response to music is influenced by earlier experience of music as well as by gender, age, culture, mood, and attitude. Consequently, nurses ought to consider the individual's preferred music to achieve a good therapeutic effect (Engwall & Sörensen Duppils, 2009).

Background

Music acts as a distractor, occupying the mind with something pleasant, and takes patients' attention away from negative experience and replaces it with encouraging thoughts (Nilsson, 2008). Instrumental music having about 60–80 beats per minute without significant rhythms or beats can be defined as sedative, relaxing music. A rate of beats per minute that mimics the heart rate has previously been found to have the most relaxing effect (Bonny, 1986). Factors such as tempo, volume, and genre may have an influence on how the music is perceived by the listener (Vanderboom, 2007). Sedative music may be played through either speakers or earphones. When using earphones, the patient may change the volume as he or she likes, and outer sounds consequently are reduced (Chan, Lee, Ng, Ngan, & Wong, 2003; Harikumar et al., 2006; Smolen, Topp, & Singer, 2002; Vanderboom, 2007).

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Sedative music is shown to have a beneficial effect on anxiety, pain, and stress (Engwall & Sörensen Duppils, 2009; Nilsson, 2008). In preoperative settings, relaxing music is reported to reduce preoperative anxiety to a greater extent than sedative oral premedication (Bringman, Giesecke, Thörne, & Bringman, 2009). Furthermore, having children listen to music before and during procedures such as lumbar puncture (Nguyen, Nilsson, Hellström, & Bengtsson, 2010) and when going through day surgery is reported to reduce their anxiety (Nilsson, Kokinsky, Nilsson, Sidenvall, & Enskär, 2009).

In this study, anxiety was based on the definition expressed by Spiegelberg (Johnson & Spiegelberg, 1968). He stressed that anxiety is an emotion associated with circumstances that are expected to be threatening. It is based on experience and may change in intensity over time (Johnson & Spiegelberg, 1968). In healthcare, anxiety is sometimes related to fear of pain or experience of the pain itself. Like anxiety, pain is always a subjective feeling, but it may be influenced by experiences of pain. The International Association for the Study of Pain has defined *pain* as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage (Mersky & Bogduk, 1994).

The opposite feeling (i.e., a sense of well-being) refers to a feeling of pleasure that may be experienced on different levels. The concept of well-being is understood in different ways, but based on the hedonic perspective, subjective well-being is composed of the presence of positive mood, the absence of negative mood, and life satisfaction (Carlisle, Henderson, & Hanlon, 2009). This feeling is subjective; it emerges within the individual and could be seen as being very close to happiness, meaningfulness, and satisfaction (Keifer, 2008).

There is not yet enough evidence to validate that music has a positive effect on anxiety and well-being. This is due to the variety of instruments used in different studies, which makes it difficult to compare results (Engwall & Sörensen Duppils, 2009; Nilsson, 2008). There is evidence, however, that suggests the level of pain and amount of medical drugs required decrease when patients undergoing surgery or painful procedures are listening to music (Cepeda, Carr, Lau, & Alvarez, 2010; Wilson, Wong, & Twinn, 2008).

Colonoscopy is a painful procedure used to diagnose inflammatory bowel diseases or colon cancer. Colon cancer, the fourth leading cause of death among all cancer diagnoses, has a good prognosis if detected early, often through the use of colonoscopy (World Health Organization, 2006). The colonoscopy procedure is often experienced as uncomfortable, although normally the procedure causes no complications (Messman & Barnet, 2006). Many patients experience

colonoscopy as both stressful and painful (Bechtold et al., 2009; Harikumar et al., 2006), which is why it is equally important to sustain the patients' subjective experience as well as to establish a diagnosis during the procedure.

Some patients may feel violated by the situation (Messman & Barnet, 2006). Because of the patients' vulnerable situation, nurses have a great responsibility to maintain their well-being (Harikumar et al., 2006). Prior to colonoscopy, it is important to give the patient sufficient information about the procedure and use methods to reduce anxiety and pain. Sedative and analgesic drugs are usually offered (Messman & Barnet, 2006), but there are also nonpharmacological methods available (e.g., listening to music) that aim to reduce the experience of discomfort during the colonoscopy (Ylinen, Vehviläinen-Julkunen, & Pietilä 2007). Nevertheless, the benefits of listening to music during colonoscopy are not clearly supported (Cepeda et al., 2010; Wilson et al., 2008), which is why further studies on this subject are needed (Engwall & Sörensen Duppils, 2009; Nilsson, 2008). The purpose of this study, therefore, was to analyze the effects of sedative music on patients' experience of anxiety, relaxation, well-being, and pain during colonoscopy.

Methods

A randomized intervention was performed in an outpatient setting at an endoscopy department in a university hospital in Southern Sweden.

Sample and Design

Patients scheduled for colonoscopy due to either suspected inflammatory bowel disease or colon cancer were asked to participate in the study. Inclusion criteria were that the subjects should be adult outpatients on the waiting list for colonoscopy and over 18 years of age, with normal hearing, sight, and ability to read and understand the Swedish language. Patients with dementia were excluded to minimize the risk of misunderstanding.

An information letter was sent to the subjects along with the endoscopy department appointment. The study information letter included information about the study and stated that participation was voluntary, withdrawal from the study was possible whenever the subject wished, and nonparticipation would not influence the subject's care. It also guaranteed the confidentiality of data provided and included a form for informed written consent. Through the informed consent form, the subjects were notified that information about drug administration during the colonoscopy would be collected. Calculation of sample size based on power analysis determined that 60 subjects in each group would obtain a power of 80% with $p < .05$.

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The nurses who worked at the endoscopy department collected data from 120 subjects.

The nurses randomized the subjects to groups, using sealed envelopes. Before the endoscopy, after informed consent was provided, the nurses drew an envelope from previously randomly mixed envelopes consisting of an equal number of allocations to both groups. The subjects were given the envelope including information about which group they were assigned to (intervention or control) as well as a questionnaire. While waiting for the colonoscopy to start, subjects were instructed to answer the State Trait Anxiety Inventory (STAI) questions as a baseline measure.

A nurse instructed subjects in the intervention group on how to listen to the music when the subject was on the colonoscopy table. The music was played during the entire procedure until the endoscopist ended the colonoscopy. The control group received the usual care with drugs administered when needed. The nurse filled out a medication list if drugs were administered during the colonoscopy and put this in an envelope along with the questionnaire that the subject had filled out after the colonoscopy. The envelope was then sealed for delivery to the researchers.

Intervention

The involved staff, nurses, student nurses, and physicians received verbal and written information about the study prior to study initiation. All subjects in the intervention group listened to sedative instrumental music with a slow tempo of 60–80 beats per minute, which is reported to be calming and relaxing (Miluk-Kolasa, Matejek, & Stupnicki, 1996; Miluk-Kolasa, Obminski, Stupnicki, & Golec, 1994). The music was played on a compact disk (CD) player with earphones so the subjects would not be disturbed by any other sounds, and the physician and the nurses would not be disturbed by the music. The subjects could control the volume themselves.

Measurements

All participants answered the same questionnaires, irrespective of whether they were in the intervention or control group. The questionnaire contained questions that were developed for this study regarding demographic variables such as gender, age, and previous experience of colonoscopy. Age was divided into five different groups: (1) 18–30 years, (2) 31–50 years, (3) 51–65 years, (4) 66–80 years, and (5) >80 years. The intervention group was also asked to answer questions regarding their desire to listen to music again if undergoing a new colonoscopy, and in that case, if they would then want to choose the music themselves.

The questionnaire contained the STAI short form, which was used to measure the level of anxiety

experienced by the subject before and after colonoscopy (Chan et al., 2003; Marteau & Bekker, 1992; Van der Bij, de Weerd, Cikot, Steegers, & Braspenning, 2003). The STAI short form consists of six statements regarding anxiety: being calm, tense, upset, relaxed, content, or worried. The six statements are graded on a 4-point scale, ranging from 1 to 4, with a higher number of points indicating a higher degree of anxiety and a total range from 6 to 24 points. The STAI short form has high reliability and acceptable validity (Marteau & Bekker, 1992; Van der Bij et al., 2003) and was included because of its use in similar research, thus allowing the possibility of comparison with other study results.

Visual Analogue Scales (VAS), where the participants mark their answer on a line graded from 0 to 100 mm (left to right), were used to measure anxiety, well-being, relaxation, and pain during the colonoscopy. The subjects filled out the VAS after the procedure and were asked to mark a line on the scales to indicate how they felt during the colonoscopy. The VAS were graded, 0–100 mm, with higher values indicating a higher degree of anxiety, well-being, pain, and relaxation (Huskisson, 1974). The VAS for measuring pain has been tested for reliability and validity in Sweden with good results (Lundeberg et al., 2001). Also, the VAS used in similar studies have been found to be appropriate, offering an opportunity for comparison of data from this study to other research results.

Data Analysis

Descriptive data are presented as percentages, numbers, mean, and standard deviation. Differences between groups were assessed by Student's *t* test for continuous data. Categorical data were assessed by the chi-square test and ordinal data by Mann-Whitney *U* test. A *p* value of $\leq .05$ was regarded as statistically significant. For statistical analysis, the Statistical Package for the Social Sciences (version 17.0, SPSS Inc, Chicago, IL) was used.

Ethical Considerations

Permission to carry out the study was given by the head of department at the university hospital. The study was carried out according to the principles of the Declaration of Helsinki. According to Swedish law (2003:460), no ethical approval from the Ethics Committee is necessary when no influence on the subject is expected (CODEX, 2010).

Results

There were 120 subjects participating in the study, of which 36% were in the age group of 31–50 years. Sixty (50%) were randomized to the intervention group listening to sedative music during colonoscopy.

TABLE 1. Characteristics of Subjects in the Intervention and Control Groups Undergoing Colonoscopy

	All Patients (N = 120)	Intervention Group (N = 60)	Control Group (N = 60)	p
Men/women, n (%)	52 (43)/68 (57)	24 (40)/36 (60)	28 (47)/32 (53)	.463
Age groups, n (%)				
18–30 years	29 (24)	10 (17)	19 (31)	NS
31–50 years	43 (36)	22 (37)	21 (35)	NS
51–65 years	32 (27)	22 (37)	10 (17)	NS
66–80 years	15 (13)	5 (8)	10 (17)	NS
>80 years	1	1 (1)		
Previous colonoscopy, n (%)	49 (42)	27 (46)	22 (37)	.352

Note. NS = nonsignificant.

There was no statistical difference between the intervention group and the control group, regarding experience of colonoscopy (see Table 1).

When rating the desire to listen to music during a future colonoscopy, 86% of the subjects in the intervention group wanted to listen to music again compared with 67% in the control group. Thirty-five percent of the subjects in the intervention group wished to choose music themselves before the next colonoscopy, compared with 75% of the subjects in the control group. These findings were all statistically nonsignificant.

Drugs were administered to 54 of the subjects (45%). Midazolam was given to 58 (48%) subjects (1.8 ± 1.4 mg), dimethylaminodifenylbuten and ketobemidone (Ketogan) to 38 (32%) subjects (1.4 ± 1.5 mg), and alfentanil (Rapifen) to 67 (56%) subjects (0.3 ± 0.4 mg). There was no difference in drug administration between the intervention group and the control group or between men and women.

There were differences regarding anxiety, relaxation, and well-being, but no difference was found in experience of pain between the intervention group and

the control group. Among the subjects who received medication, without any significant difference in drug administration, women in the intervention group had a lower level of anxiety after the colonoscopy than those in the control group ($p = .007$).

There were also some gender differences in anxiety (Table 2). As measured with the STAI, women experienced a higher degree of anxiety before colonoscopy than men ($p < .0001$), especially women aged 18–30 years ($p < .0001$) and 31–50 years ($p = .057$). As measured with VAS, women also rated anxiety higher than men ($p = 0.004$), especially in the age group 51–65 years ($p = .027$), all without difference in analgesic or sedative medical treatment. There was a tendency for a higher degree of relaxation among men in the intervention group than among the men in the control group ($p = .065$), especially in the age group 31–50 years ($p = .077$) and 51–65 years ($p = .089$).

Well-being was significantly higher among the subjects in the intervention group receiving no medication than in the control group ($p = .006$) particularly among men in the intervention group ($p = .025$).

TABLE 2. Gender Differences in Anxiety, Relaxation, Well-being, and Pain Before and After Colonoscopy

	Men (n = 52), Median (Range)	Women (n = 68), Median (Range)	p
Anxiety STAI before colonoscopy (range 6–24)	11 (6–16)	13 (6–24)	<.0001
Anxiety STAI after colonoscopy (range 6–24)	9 (6–17)	9 (6–24)	.924
Anxiety, VAS after colonoscopy (0–100 mm)	19 (0–100)	32 (0–97)	.004
Relaxation, VAS after colonoscopy (0–100 mm)	47 (0–98)	50 (1–100)	.745
Well-being, VAS after colonoscopy (0–100 mm)	42 (0–97)	47 (4–97)	.689
Pain, VAS after colonoscopy (0–100 mm)	38 (0–88)	58 (2–95)	.012

Note. STAI = State Trait Anxiety Inventory; VAS = Visual Analogue Scale.

Women rated pain during the colonoscopy as higher than men ($p = .012$), especially in the age groups of 18–30 years ($p = .021$) and 51–65 years ($p = .006$), all without difference in analgesic or sedative medical treatment.

Discussion

The positive effect of music during colonoscopy has previously been demonstrated in different populations (Cepeda et al., 2010; Wilson et al., 2008), but as far as we know, no study has been undertaken under Swedish conditions. The results of this study show that women in the intervention group experienced a higher degree of anxiety before the colonoscopy than men, as measured with the STAI. This is congruent with results from a study by Ersöz et al. (2010), who reported women to have a significantly higher state of anxiety than men prior to colonoscopy. This is also in line with earlier findings showing both men and women to be more anxious than normal prior to a colonoscopy (El-Hassan, McKeown, & Muller, 2009).

In a randomized controlled trial, patients who listened to self-selected music 15 minutes prior to colonoscopy reduced their anxiety level significantly more than patients who did not listen to music prior to the colonoscopy (Haynes et al., 2003). Anxiety prior to colonoscopy may be explained by different reasons, such as anxiety that the procedure may be painful as well as concern related to the result of the colonoscopy as this result might lead to a diagnosis that, in turn, could cause anxiety. Women in the intervention group had a lower level of anxiety after the colonoscopy than those in the control group, which is supported by other studies showing a reduction of anxiety after listening to music during colonoscopy (Costa et al., 2010; El-Hassan et al., 2009; Ovayolu et al., 2006; Wilson et al., 2008). This is a reason for nurses to offer patients the simple intervention of listening to music both before and during colonoscopy.

There was a tendency for a higher degree of relaxation among men in the intervention group than among those in the control group. No studies on gender differences were found, but patients' overall experience was improved in the group listening to music as reported by a meta-analysis of eight randomized controlled studies on patients undergoing colonoscopy (Bechtold et al., 2009) as was satisfaction among patients in the music groups in two further studies of colonoscopy patients (Costa et al., 2010; El-Hassan et al., 2009). Relaxation, overall experience, and satisfaction are very closely related to the experience of well-being, which in the subgroup analysis was revealed to be higher among men in the intervention group who had not had any drugs administered. Altogether, this gives a clear indication of the efficacy of music in reducing discomfort

during colonoscopy, which is supported by several other studies (Bechtold et al., 2009; Costa et al., 2010; Leung, 2008; Ovayolu et al., 2006).

One might expect that the relaxation and well-being that was higher among men in the intervention group was influenced by experience of pain; however, in this study, no difference was found regarding the experience of pain between the intervention group and the control group. These findings are consistent with findings of Bechtold et al. (2009), who, in their review of eight randomized controlled trials, did not find any significant differences regarding experience of pain between patients listening to music or those in the control group. Similar findings were reported by Wilson et al. (2008) in their review of eight studies, where weak evidence of the influence of music on experience of pain was found; however, in their review of five studies, Cepeda et al. (2010) found that the discomfort of painful procedures was eased by listening to music. These opposite findings could not be explained by the use of sedative or analgesic treatment as no differences between the intervention group and the control group were reported regarding drug administration in this study.

Women experienced a higher degree of pain during the colonoscopy than men, which is similar to findings in an Italian study where women gave higher pain scores than men during colonoscopy (Costa et al., 2010). Ylinen et al. (2007) likewise reported that women who were not offered the opportunity to listen to music during colonoscopy also rated pain level significantly higher than men. This might be important to consider when caring for women during colonoscopy as they, because of both experience of anxiety and pain, may need more medical treatment than they usually receive, in addition to listening to music.

Men in this study who listened to sedative instrumental music were reported to feel relaxed, which may be considered in the future when offering patients the opportunity to listen to music. Thirty-five percent of the patients in the intervention group also wanted to choose music themselves before their next colonoscopy. Whether patients' own choice of music or a certain type of music should be selected for a certain therapeutic procedure or clinical situation has not yet been clarified (Thoorgard et al., 2005) but is important to consider in future studies.

In this study, a CD player with earphones was used, which in the future may be replaced by digital music players or mp3 players that can store a large amount of different music. This means that the choice of music can be increased and the music genre can be changed easily. Although it involves the use of technology, using music is cheap to offer and no harmful effects have been reported (Wilson et al., 2008).

One limitation of this study is that demographic data are limited. Another limitation with this study design is that ages were split into five age groups, which also might reduce the analysis options. Furthermore, no objective data were collected, which might reduce comparability with the results of other studies.

Clinical Implications

As there still is no clear clinical evidence for the effectiveness of the use of music before and during colonoscopy, nurses should consider asking outpatients whether they want to listen to music at these times. The best practice may be to offer the opportunity to listen to music in the endoscopic appointment letter. This would give patients the chance to bring their own choice of music. Patients undergoing colonoscopy during a stay in a hospital ward should also be offered the opportunity to listen to music during the colonoscopy as they must be presumed to experience similar levels of anxiety as outpatients.

It is challenging to pay attention to patients' degree of anxiety and individually adapt the nursing care accordingly, yet this intervention can be a simple way of addressing patient anxiety during colonoscopy. In the future, it will be necessary to further study the effect of music during colonoscopy in large randomized controlled studies. Preferably, patients should bring their own music, and the effects of different types of music can then be analyzed.

Conclusions

Listening to sedative music decreased anxiety among women and increased well-being among men during colonoscopy. This simple procedure, which improves well-being, should be offered to every patient prior to colonoscopy. ☀

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