Guided Imagery Relaxation Therapy in Malaysian Patients with Knee Osteoarthritis: A Randomized Controlled Trial

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Abstract

Introduction: There is limited data regarding the use of relaxation technique in managing knee osteoarthritis in Asian population.

Aims and Objectives: The efficacy and acceptance of relaxation therapy in improving symptoms, physical functions and quality of life of patients with primary knee osteoarthritis was examined in this study.

Methods / Study Design: Sixty patients with knee osteoarthritis were randomly assigned to an intervention group using relaxation therapy (n=30) or to a control group of usual care (n= 30) for eight weeks. The intervention consisted of listening to 13 minutes of an MP3 player with pre-recorded Guided Imagery with Relaxation Therapy. Changes from baseline on pain, symptoms, physical functions and quality of life using the Knee injury and Osteoarthritis Outcome Score (KOOS) was determined using ANCOVA analysis. The difference of analgesic consumption using analgesic score was also calculated.

Findings: A total of 60 patients enrolled in the study, however only 59 patients completed the study (98.3%). The mean age of the patients was 52.2 (SD 7.08). There were significant improvements in the pain ($p<0.004$), daily living activities ($p<0.02$), sports and recreational activities ($p<0.005$) and quality of life ($p<0.01$) scores in the intervention. Overall there was good acceptance of the therapy among the participants.

Conclusion: Guided Imagery with Relaxation Therapy has significantly reduced pain and improved daily living activities and health-related quality of life with good acceptance by the participants. These results justify further investigation into Guided Imagery with Relaxation Therapy as self-management in patients with knee osteoarthritis in Asian patients.

Introduction

Osteoarthritis is one of the most common causes of disability among older patients, especially those with knee and hip osteoarthritis. A study conducted in the Asian population showed the estimated prevalence of symptomatic knee arthritis in individuals over 65 years old to be about 30%.[1] The standard management for knee osteoarthritis is symptom control with analgesics. However, chronic uses of analgesics result in numerous adverse effect namely gastrointestinal bleeding and renal impairment. Because of this there have been multiple studies which look into alternative therapy in managing osteoarthritis. One of the emerging alternative treatments is relaxation therapy with guided imagery.

Progressive muscle relaxation therapy (PMR) was first introduced in 1932 by Jacobsen.[2] It is a series of technique involving cycles of tension and release in 50 different muscle groups aiming to increase awareness of muscular tension in the human body and also to learn to release the tension.[3] This relaxation technique was expanded to address several physical and also psychobehavioural problems. The original protocol of muscle relaxation therapy was produced by Bernstein and Borkovec in 1979 and was called Abbreviated Progressive Relaxation Technique (APRT).

Individualized Guided Imagery (GI) technique is another type of muscle relaxation therapy. The content of GI usually includes scenery or places using information obtained during the initial session. Participants are guided to create a place in their mind using their senses of touch, sound, smell, sight and taste and to use these to transform the pain and tension into other forms of objects or creative energy and increase their sense of control over the pain.[4] Guided Imagery may also result in a reduction of autonomic nervous system response.[5] It blocks the transmission of painful stimuli through higher brain centres and is widely used in managing patients with chronic pain such as recurrent abdominal pain, cancer, chronic headaches, fibromyalgia, etc.

Even though there have been a few studies which have shown that relaxation therapy with guided imagery may be beneficial as alternative or adjunct treatment for osteoarthritis, these studies were mainly done in the western countries and there is insufficient data regarding the use of the treatment in Asian community.[6-10] This study would provide information about the acceptance of this treatment in the Malaysian context which might be different due to different cultural and social values. Therefore this study not only attempt to look into the efficacy of the treatment in Asian patient but also seek to determine the acceptance of the treatment among this group of patient.

Materials and Method

Study design and setting

This randomized controlled pilot study sought to compare the efficacy of relaxation therapy among patients with knee osteoarthritis attending a primary care clinic in north eastern Malaysia.

Participants and instruments

The participants included those with unilateral or bilateral knee osteoarthritis as diagnosed according to the American College of Rheumatology .[11] The exclusion criteria included patients with connective tissue diseases such as rheumatoid arthritis or systemic lupus erythematosus, patients with active gouty arthritis, patients currently using of guided imagery or acupuncture, patients with psychiatric illness, patients with grade 4 knee osteoarthritis according to the radiological criteria by the Kellgren Lawrence Classification and those with a body mass index (BMI) more than 35 kg/m^2. A power analysis using standard deviation of 11 and detectable difference of 13 for guided imagery and knee osteoarthritis symptom score, and considering 10% drop out rate indicated that a total sample size of 60 was needed for power greater than 0.90.[9]

The Knee Injury and Osteoarthritis Outcome Score (KOOS) was used to assess the patients' opinions regarding their knee pain and associated problems.[12] It is a valid, reliable, and responsive self-administered instrument in the follow-up of short-term and long-term osteoarthritis and knee injuries.[13] The Malay version of KOOS was validated with Cronbach alpha ranged from 0.94 to 0.96 and factor loading of 0.25 to 0.89 (Maryam, unpublished thesis, 2013)

 It comprises 42 items in five separately scored subscales, which include pain, other symptoms, function in daily living (ADL), function in sports and recreation (Sport/Rec) and knee-related quality of life (QOL).[12] The last week before the questionnaire was administered was taken into consideration when answering the questions. Standardized answer options were given (five Likert boxes), and each question received a score from 0 to 4. A normalized score (100 indicating no symptoms and 0 indicating extreme symptoms) was calculated for each subscale. A higher normalized score indicated a better outcome for the patient. For patients with bilateral osteoarthritis, the most compromised knee was used as the reference.

A rescue-analgesic diary was developed to assist the participants in documenting the types, dosage, and number of analgesia tablets they had been taking during the study period. In this study, all participants were prescribed either tablets of acetaminophen (1000 mg) or ibuprofen (400 mg) for rescue analgesia. A 1000mg of Acetaminophen for was scored as 1, and a 400mg of Ibuprofen was scored as 2.5 (i.e. per tablet consumption) as recommended by the Ibuprofen, Paracetamol Study in Osteoarthritis (IPSO).[14] Participants were informed that any intake of other forms of analgesia need to be informed to the investigators and recorded accordingly.

In preparing the GIR audio for patients with OA in Bahasa Malaysia, an imagery-induced relaxation script was developed by a clinical psychologist based on an extensive review of the literature [6,8,10,15,16]   and thorough analysis of a locally, validated GIR audio developed for children with chronic illness.[17]The script, narration and recording quality were assessed through multiple 'listening sessions'. Listening and evaluation were conducted at different stages by a panel of experts including a psychiatrist, medical officer, trained nurses and patients. Comments and suggestions for improvement were taken into consideration and changes were made accordingly. The scripts was then narrated by a female voice and recorded into audio version. The whole script runs for approximately 13 minutes, with no background music.

The GIR technique in this present study consists of five major steps started with brief orientation and induction, deepening, coping strategies, positive suggestions and closure. The script starts with directing the listener to sit comfortably and to breathe deeply for several times. The listeners are brought into an induction phase via eye-fixation technique and counting method. Then, the relaxing experience is deepened through deep breathing instructions and passive progressive muscle relaxation. The script guides the listeners through a fantasy place where they would find their peace, relaxation and preferences there. They are encouraged to experience physical, mental, and emotional relaxation through imagination and utilization of multiple senses including vision, touch, taste, smell and hearing. Again through deep breathing instructions, the listeners are assisted to sustain their focus and state of relaxation. Incorporated in the script are suggestions on coping strategies using modelling technique whereby the listeners are guided to witness a person having similar problems and pain, however manage to cope successfully, using GIR techniques. The person is illustrated to be able to function in their life satisfactorily, and be active. The script convinces the listeners to believe that they could be this person they witness, or better. It also incorporated suggestion of the power of the creator to promote the power of healing, feeling of reliant and subsequent perceived strength. Finally, positive end-state suggestions recommend sustainable relaxation, gradual reduction in pain, higher self-control and mobility. Through a sequence of deep breathing, the listeners are gradually brought back to reality. The GIR script is audio-recorded in a MP3 player, which is given to the participants in the intervention group. Accompanied the player is a notebook for participants to record their listening session, throughout the study period

Participants' feedback on the method was assessed through questionnaire developed from extensive literature review.[16,18,19] The questionnaire consists of three sections. The first section asked about the quality of the script itself, the voice, narrator and the quality of recording. The second part of questionnaire asked the appropriateness of the script, and the last part of questionnaire asked regarding their respond towards the scripts.

Study procedure

The study participants were acquired from the Outpatient and Orthopaedic Clinic at the Hospital Universiti Sains Malaysia. Informed consent was obtained from participants who agreed to be involved in the study. Patients were required to complete social demographic data. Patients' history regarding knee pain and previous treatments received were documented through a standardized questionnaire.

Basic physical examinations including body weight and height were taken and knee x-rays were performed. Patients were then required to complete the KOOS and were randomly placed into two groups using a computer-generated table of random numbers. Subjects in the intervention group were then taught how to use the guided imagery relaxation (GIR) technique using the MP3 player. They were required to perform the GIR on their own at least once a day at home and to record this in a book that was provided. Patients were allowed to continue taking pain relief medication for their symptoms; however, they were allowed to take only 1 gram of acetaminophen or 400 mg of ibuprofen as rescue analgesia. Patients were required to write the dose of the analgesia in the diary provided.

Phone calls were made to the intervention group at Week 2 and Week 4 of the study to encourage compliance and to record the intervention used. At Week 8, all participants were asked to complete the KOOS again. The analgesic score was also calculated. The diaries in which patients recorded the frequency of relaxation therapy use and medication use were also retrieved by the researchers.

Statistical analysis

Analysis was conducted using SPSS statistics software version 19. Baseline data analysis was done to compare between intervention and control group to see if there are significant difference. For age, BMI, duration of symptoms and income, Independent t Test was used. For race, sex, marital status, osteoarthritis grading and the presence of medical illness, Chi Square Test was used. If the assumption for Chi Square test is not met i.e. less than 5, Fisher's exact test was used. The level of statistical significance was set at 0.05.ANCOVA analysis was used to compare the mean of the KOOS scores between the control and intervention groups at two months post-intervention.

Results

Sixty subjects were enrolled in the study; however, only 59 subjects completed the study. One of the subjects from the intervention group developed a transient ischaemic attack during the intervention period. Due to this event, the response rate was 98.3%. the baseline data is presented in table 1. There were no significant differences in term of age, sex, occupation, BMI, osteoarthritis grading and previous nonsteroidal anti-inflammatory drugs (NSAIDs) usage between the intervention and control groups. The female gender was prominent in this study, whereby more than 90% of the participants were female in both the intervention and control groups. For osteoarthritis grading using Kellgren Lawrence X ray classification, grade 2 represented the majority of participants in both the intervention and control groups. Sixty-seven percent and 70% of participants in the intervention group and control group, respectively, had previously taken NSAIDs for their knee pain. There were also no significant differences between the intervention and control groups in terms of pain, symptoms, sports and recreational activities, daily living activities and quality of life scores at baseline.

Table 2 shows the comparison of KOOS scores between groups at the completion of the study. Analysis of covariants (ANCOVA) showed there is significant difference between the intervention and control groups in terms of the pain, daily living activities, sports and quality of life scores. Regarding the symptoms score, even though there was a difference between these two groups, the value did not reach statistical significance. There was no significant difference in the analgesic score between the groups throughout the study.

There were generally positive feedbacks from the participants regarding the use of the therapy as shown in table 3. Majority of participants agreed that Imagery Induced Relaxation was beneficial, the scripts was well written, they would like to hear it again, able to imagine well and

follow the thoughts, the description given was clear and they were able to focus until the end of the session. Majority of them also felt relaxed after hearing the audio and enjoyed it.

Discussion

It has been proven that there is a vicious cycle between pain and emotion. Stress and anxiety might decrease the pain threshold and make subjects more aware of and more sensitive to pain.[20] Relaxation therapy is effective in breaking this cycle and will reduce feelings of anxiety, hence making the subjects experience less pain.[20] According to the evidence above, the use of relaxation therapy has an advantage in clinical practice in managing patients with chronic pain, particularly those with knee osteoarthritis.

Our results also showed there was improvement in KOOS scoring in terms of the pain score, daily living activities score, sport and recreational score and also quality of life score in the patients using GIR. There are many studies which have reported the use of relaxation therapy in reducing pain, particularly in musculoskeletal pain such as osteoarthritis, anterior cruciate ligament reconstructions and others.[6-10,20]

The result of our study is supported by the finding in a study by Baird and Sands.[8] Their study compared intervention using GI with sham intervention (an audio without GI). The length of their study was up to 12 weeks of intervention, and most of the participants used GI at least once a day – some of them listened to GI up to four times per day. The study showed that pain and mobility problems improved significantly after 12 weeks of intervention compared with the control group. They concluded that guided imagery is easy to teach, even in elderly patients, and is an inexpensive option for self-management of knee problems due to osteoarthritis. However the majority of the studies done including ours were only short duration. This is an important issue in management of knee osteoarthritis which is a chronic, lifelong condition. Further studies need to be done on the acceptability and effectiveness of the therapy for long term.

The results from the quality of life score also indicated improvement in the intervention group. In contrast, the results for the control group were more variable but did show deterioration at the end of intervention. These results are also consistent with earlier research showing similar improvements in the quality of life score after intervention using progressive relaxation therapy such as in patients with knee osteoarthritis, cancer pain, chronic headaches and also after operations for ligament reconstruction.[8,10, 21]

A review of previous studies using GIR revealed that they were mainly carried out in western countries namely United States, Norway and Australia.[22] It is important to see the effect and acceptance of relaxation therapy in Asian patients since this technique is not as well known in the region. There are two studies done recently using relaxation technique in Taiwan and Turkey with positive outcome.[23,24] However they were carried out among post knee arthroplasty patients. Our participants generally showed good acceptance of the therapy. This can promote compliance and patient's self management of their illness.

One of the strength of our study was the incorporation of local belief and custom in the guided imagery script. The participants were guided to feel and sense the power of the creator in helping them heal and having the strength to manage the symptoms. None of the previous studies have used the same technique in their therapy. [6-10,20] It is arguable that this technique may not work for everyone and may only be beneficial in the settings where such belief is held and practiced.

One of the main concerns regarding the treatment of knee osteoarthritis is the reliance on over the counter pain medication which can have deleterious health effect. Any adjunct or alternative treatment which can result in the decrease in the consumption of pain medication would be very valuable for the long term care of patients. Previous study by Baird et al did not find any significant reduction in the medication intake.[9] Even though our study showed a lower analgesic consumption in the intervention group, the result was also not statistically significant. This result might be due to the fact that analgesic consumption was too small for statistical significance. Furthermore, the severity of knee pain in our participants ranged from mild to moderate pain, and most of them did not take medication for pain relief. On the other hand, it can also be concluded that the improvement in the KOOS score in the intervention group was not influenced by difference in analgesic use.

There are several limitations in this study. The results of this study cannot be generalized to patients with grade 4 osteoarthritis and those with a BMI of more than 35 kg/m^2 as both of these groups of patients were excluded from this study. The results from this study also might have information bias due to self-reporting, which is common when using questionnaires to measure results. Even though most of the participants were compliant with the intervention lasting over eight-week duration, it is important to determine whether it is reasonable to expect patients with knee osteoarthritis to use this therapy for extended periods of time. Therefore, studies of longer duration should be carried out to evaluate the long-term efficacy of GIR in the management of knee osteoarthritis.

Conclusion

In conclusion, Guided Imagery with Relaxation Therapy is feasible, is easy to use, is cost–effective, has minimal side effects and is significantly proven to improve pain, daily living activities, sports and recreational activities and quality of life in patients with knee osteoarthritis. Medication intake was also lower in the intervention group as compared to control group even though it was not statically significant. The results from this study justify further investigation of the effectiveness of GIR as a self management technique to reduce the pain and mobility difficulties that are commonly encountered by patients with knee osteoarthritis.

Conflict of interest statement
The author(s) declare that they have no competing interests.

Authors contributions:
AE, AAK ,LHY, AO participated in the design of the study.
AO prepared the script for the GIR

AE and AAK performed the data collection and the statistical analysis.
LHY, AE, AAK and AO drafted the manuscript.
All authors read and approved the final manuscript.

Approval by the research and ethics committee
This study was approved and accepted by the Universiti Sains, Malaysia, Human Ethics Committee (Ref: USM/PPP/JEPeM [241.3[2]])

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Table 1: Baseline clinical and sociodemographic data

Variables	Intervention group n(%)	Control group n(%)	*p* value
Age	52.8(7.16)[‡]	51.6 (7.05)	0.516[*]
Sex			
Female	27(90.0)	28(93.3)	0.313[§]
Male	3(10.0)	2(6.7)	
Body Mass Index (BMI)	25.8(3.11)[‡]	25.8(1.99)	0.953[*]
Duration of OA	3.6(2.51)[‡]	3.2(2.12)	0.544[*]
OA severity[‖]			
Grade 1	5(16.7)	6(20.0)	0.939[†]
Grade 2	15(50.0)	14(46.7)	
Grade 3	10(33.3)	10(33.3)	
KOOS Domain			
Pain	73.6 (10.57)	75.1 (7.49)	0.485
Symptom	67.7 (9.66)	66.8 (9.71)	0.574
Sport	54.1 (15.12)	47.7 (11.12)	0.085
ADL	77.8 (10.49)	76.2 (8.45)	0.472
Quality of life	55.6 (14.71)	49.2(12.79)	0.075
Using NSAIDs for knee pain			
Yes	20(66.7)	21(70.0)	0.781[†]
No	10(33.3)	9(30.0)	

[*] Independent T test   [†]Chi square Test   [§] Fisher's Exact Test   [‡]Mean (±SD)

[‖](Based on Kellgren Lawrence X ray classification)

Table 2: Between group comparisons of the KOOS score at the post intervention.

KOOS domain	Intervention		Control		F stat	*p* value
	Adjusted mean	95% CI	Adjusted mean	95% CI		
Pain	78.8	76.6, 81.0	74.2	72.0, 76.3	9.198	**0.004**
Symptoms	70.2	68.1, 72.2	68.9	66.9, 71.0	0.728	0.397
Activity daily living	80.7	80.0, 82.4	77.8	6.1, 79.5	5.567	**0.022**
Sport	57.1	53.6, 60.7	49.6	46.1, 53.1	8.782	**0.005**
Quality of life	55.8	52.8, 58.8	50.0	45.9, 52.0	7.220	**0.01**

*ANCOVA analysis with age, OA severity, body mass index, duration of the illness and baseline KOOS score as covariates.

Table 3: Participants' responses regarding mp3 use

Item Agree	Disagree	Neutral
		n(%)
Hearing this mp3 gives advantages to me	0(0)	9(30)	21(70)
I like to hear the words	0(0)	11(36.7)	19(63.3)
I will listen again in the future	2(6.7)	11(36.7)	17(56.7)
I will suggest this mp3 to my friends and relatives	4(13.3)	11(36.7)	15(50)
I can imagine picture illustrated in the mp3	3(10)	13(43.3)	14(46.7)
My thought wanders during listening to this mp3	6(20)	11(36.7)	13(43.3)
The description said in this mp3 was real/clear	2(6.7)	11(36.7)	17(56.7)
I feel relax after listening to this mp3	0(0)	4(13.3)	26(86.7)
I can concentrate during listening to this mp3	0(0)	9(30)	21(70)
I enjoyed listening to this mp3	0(0)	13(43.3)	17(56.7)