



REVIEW ARTICLE

IMMEDIATE EFFECT OF MUSIC ON PAIN AND ANXIETY IN POST-OPERATIVE TOTAL KNEE REPLACEMENT PATIENTS

Manasa Nair and *Dr. Sachin Gawande

Physical Therapy, Sancheti Institute College of Physiotherapy, Pune, India

ARTICLE INFO

Article History:

Received 15th June, 2017
Received in revised form
26th July, 2017
Accepted 20th August, 2017
Published online 30th September, 2017

Key words:

Corecra cephalonica,
Larval diet,
Moth emergence,
Egg production,
Mass rearing.

ABSTRACT

Objective: Post total knee replacement patients experience severe pain, anxiousness & discomfort which interfere with the patients' functional mobility leading to slower recovery & increased pharmacological requirements. This study aims to find the effect of unconventional techniques, namely music on pain and anxiety in post-operative total knee arthroplasty patients.

Design: Randomized control trial

Methods & Findings: 54 subjects who underwent total knee arthroplasty were selected and randomly assigned into experimental and control group with 27 subjects in each through simple random sampling technique. The study was performed on post-operative day 1 or 2. A pre assessment of pain using VAS, anxiety & physiological parameters i.e. heart rate, respiratory rate, blood pressure & oxygen saturation was done in both the groups, following which both the groups received their scheduled exercise session, thereafter which the experimental group received 10 minutes of music in contrast to the control group who received 10 minutes of rest & a post intervention assessment was done. Results showed that even though there were some positive changes within the experimental group, there was no significant difference in pain ($p=0.273$), anxiety (0.498), or physiological parameters between the two groups.

Conclusion: Music is clinically significant in reducing pain and anxiety post- Operatively there is no statistical difference in the results between the two groups.

Copyright©2017, Manasa Nair and Dr. Sachin Gawande. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Manasa Nair and Dr. Sachin Gawande, 2017. "Immediate effect of music on pain and anxiety in post-operative total knee replacement patients", International Journal of Current Research, 9, (09), 57799-57803.

INTRODUCTION

It has long been established since ancient times that music has a relaxing effect on our body and serves an outlet for our emotions. The idea of music as a healing therapy, which has an effect on health and behaviour dates back to the end of the Second World War where community musicians were hired to play their music for veterans suffering from both physical and emotional trauma following the war. When significant changes in physical, physiological and emotional parameters were noted in response to the music, it led to the employment of musicians in hospitals by various doctors and nurses.(American music therapy association. <http://www.musictherapy.org/about/history>) Recently many studies have been conducted to study the effect of music on pain as well anxiety in various variety of settings such as during the peri-anesthesia period, within the operating room & in post-operative units. The efficiency of music in reducing anxiety as well as pain is thought to occur through the release of endorphins and by creating a distraction (Pellion *et al.*, 2005). It has been suggested that the neural

pathway of audition occurs through the amygdala via an inhibitory process, which helps to improve mood and decrease anxiety. The amygdala is associated with the emotional aspect of pain and anxiety. (Kay and Juanita, 2001) Total knee arthroplasty is a major surgery with high risks and may lead to substantial post-operative pain, discomfort and hence anxiety. Pain and anxiety being one of the major symptoms, may interfere with the performance and the mobility of the patient following surgery, thereby reducing its efficacy. This leads to increased requirements of pharmacological interventions as well physiotherapeutic modalities for pain management. This increased demand may lead to increased incidence of side effects from the pharmacological drugs as well as the anxiety caused by the anticipation of treatment by physiotherapeutic modalities. Therefore this study is being performed to gain an insight on the effect of non- pharmacological interventions namely music on postoperative management of pain and anxiety. (Allred *et al.*, 2010)

Research question

Is there any immediate effect of music in reducing the pain and anxiety in post-operative total knee replacement patients ?

*Corresponding author: Dr. Sachin Gawande,
Physical therapy, Sancheti Institute College of Physiotherapy, Pune, India.

Hypothesis: There is an immediate effect of music in reducing the pain and anxiety in post-operative total knee replacement patients.

Null hypothesis: There is no immediate effect of music in reducing pain and anxiety in post-operative total knee replacement patients.

Aim and objectives

Aim:

To study the immediate effect of music on pain and anxiety as well as physiological parameters in post-operative total knee replacement patients in the initial two days.

Objectives:

- (1) To assess the pre and post immediate effect of music on pain in total knee replacement patients on post-operative day 1 or 2 in group A (experimental group).
- (2) To study the immediate effect of music on anxiety in total knee replacement patients on post-operative day 1 or 2 in group A.
- (3) To study the immediate effect of music on physiological parameters such as heart rate, respiratory rate, mean arterial blood pressure and oxygen saturation in total knee replacement patients on post-operative day 1 or 2 in group A.
- (4) To assess the pre and post effect of rest on pain, anxiety, physiological parameters in group B (control group).
- (5) To compare the results obtained of both the groups.

Method and methodology

Study design

The study performed is a Randomized Control Trial. It is a parallel study performed between two groups i.e. control group & experimental group with an allocation ratio of 1:1.

Participants

Inclusion criteria:

- (1) Unilateral & bilateral TKR patients
- (2) Post-operative day 1 or 2.

Exclusion criteria

- (1) Patients with post-operative complications
- (2) Patients with known history of anxiety or psychological disorders

Study setup:

The study was performed in Hospitals in Pune city.

Materials used:

- (1) Visual Analogue Scale
- (2) 6 point State Trait Anxiety Inventory
- (3) Sphygmomanometer
- (4) Pulse Oximeter
- (5) Headphones

Procedure

- A total of 54 subjects who underwent total knee replacement and who fulfilled the above mentioned inclusion criteria were selected using simple random sampling technique.
- An informed written consent was taken from the subjects for the study
- Out of the 54 subjects, 27 subjects were randomly assigned in either the experimental group (group A) or control group (group B) each.
- The intervention was performed on post-operative day 1 or 2
- A pre intervention assessment of pain using the visual analogue scale, anxiety using the 6 point state trait anxiety inventory and the physiological measures such as heart rate, respiratory rate, blood pressure and oxygen saturation was taken in both groups (group A and group B)
- After taking the pre assessment parameters both the groups received their scheduled exercise session following which the control group received 10 minutes of scheduled relaxation or rest, whereas the experimental group received predetermined standardized music in stipulated time.
- The music provided was instrumental and did not contain any lyrics, with beats lesser than 60 per minute. The music was administered via headphones, keeping the eyes closed & avoiding any external disturbance. Maximum efforts were taken to keep the environmental parameters the same in both the groups.
- The post intervention measurements were recorded in both groups & the results were analysed.

Outcome measures

- (1) Visual Analogue Scale
- (2) 6 point state trait anxiety inventory
- (3) Heart rate using a pulse oximeter
- (4) Oxygen saturation using a pulse oximeter
- (5) Respiratory rate
- (6) Mean arterial blood pressure using a sphygmomanometer.

Sample size: 54

Sampling technique

Simple random sampling was done using a computer generated random allocation sequence.

Statistical methods

- Descriptive statistics (mean and standard deviation), Paired t test, Unpaired t test, Wilcoxin Signed Rank test & Mann Whitney U test were used at p=0.05 level of significance.
- Paired t test was used to compare the pre and post data of Respiratory rate, Heart Rate, Mean arterial blood pressure & Oxygen saturation within the same groups
- Unpaired t test was used to compare the data of Respiratory rate, Heart Rate, Mean arterial blood pressure & Oxygen saturation between both the groups.

Table 1. Pre & post data for both the groups along with their p values

Outcome	Group A (experimental group)		P value	Group B (control group)		P value	Post-intervention p values between both groups
	pre	post		pre	post		
PR	84.04±13.11	82.33±11.74	0.204	80±10.29	79.73±9.63	0.42	0.42
RR	19.90±3.80	17.23±3.67	0.000	15.86±2.74	15.13±2.24	0.67	0.025
SPO ₂	94.52±2.60	96.14±2.32	0.000	95.13±2.80	95.47±2.19	0.247	0.32
Systolic BP	128.95±8.68	126.76±3.2	0.019	129.82±6.97	130.43±4.89	0.390	0.702
Diastolic BP	76.47±6.92	74.19±6.28	0.008	74±6.43	73.91±5.923	0.833	0.643
Pain	5.38±1.53	4.95±1.59	0.084	5.56±1.72	5.47±1.83	0.793	0.273
Anxiety	35.05±9.51	28.80±7.50	0.000	33.30±7.16	30.11±7.13	0.002	0.498

- Values for pre and post anxiety and pain were compared using the Wilcoxin Signed Rank test.
- Values for anxiety and pain between both the groups were compared by using the Mann Whitney U test.

RESULTS

- 54 subjects were recruited for the study, out of which 27 subjects were randomly assigned in each group i.e. experimental (Group A) & Control (Group B).
- However the study had 9 dropouts in total, 5 belonging to Group A & 4 belonging to Group B. The reasons for this were severe pain & agitation post-operatively or unanticipated complications such as soakage etc.
- In the experimental group, significant difference was seen between the baseline and post-intervention parameters, namely in respiratory rate, oxygen saturation, mean arterial blood pressure & anxiety. (Table 1)
- In the control group, besides anxiety, no significant difference was seen between the baseline parameters & the parameters following the rest period. (Table 1)
- On comparison of the post-intervention results between both the groups, it was found that there was no significant difference in any of the above parameters. (Table 1).
- Respiratory rate could not be commented upon as the baseline parameters for respiratory rate prior to intervention were non-homogenous.

DISCUSSION

Total knee arthroplasty is a commonly performed surgery in the geriatric population owing to the growing incidence of arthritic changes due to a variety of reasons such as obesity, sedentary lifestyle, lack of exercise and so on. However the surgery performed involves a variety of risks and can lead to substantial post-operative pain, anxiety and hence lack of functional independence. Post-surgical requirement of pharmacological management is high to control pain so that adequate rehabilitation is allowed to take place. Since music is believed to have a relaxing effect and reduce anxiety, this study aimed at using it as an adjunct to pharmacological management and physical rehabilitation. In this study, all parameters were measured prior to intervention & the baseline parameters of both the groups did not show any significant difference expect for respiratory rate. The group which received music post their scheduled exercise session i.e. Group A showed some positive changes in the respiratory rate ($p=0.000$), systolic as well as diastolic blood pressure ($p=0.019$, $p=0.008$), oxygen saturation ($p=0.000$) and anxiety ($p=0.000$), without any significant change in pain or heart rate, as compared to the group which received a quiet rest period, keeping all environmental

parameters the same. The respiratory rate cannot be commented upon when the post intervention parameters of both the groups are compared, this is so because the baseline respiratory rate prior to intervention of both the groups was non homogeneous. However even though the changes obtained in the experimental group after receiving music may be clinically significant, no statistically significant difference was obtained in the concerned parameters on comparison between the two groups. Similar results were obtained in a study performed by Kelly Allred *et al.* (2007) which too was performed on patients of total knee arthroplasty in association with their first post-operative ambulation. In this study as well, no statistically significant difference was obtained in pain, anxiety, physiological parameter as well as opioid consumption when the intervention was provided once. The reasoning suggested for this was that the intervention provided was around a known anxiety provoking event i.e. first day of ambulation, which lead to anticipation of pain as well and hence this lead to their inability to concentrate on the music or during the quiet rest period. (Allred *et al.*, 2010) However, on repeated intervention statistically significant difference was obtained in pain, anxiety and physiological parameters. These results also held true when a study performed by Chen HJ *et al.* (2015) showed that there was no significant difference in heart rate, pain & opioid consumption when music was provided to patients' post total knee arthroplasty, however some statistically significant changes were seen in respiratory rate in the experimental group in the surgical waiting area. On repeated intervention it provided results similar to that obtained by Kelly Allred *et al.* (2007) where there was significant decrease in the systolic blood pressure on repeated intervention throughout the period of post-operative recovery. (Chen *et al.*, 2015) The results of these studies may differ from the study in question as the intervention offered in this study was not repetitive as compared to the other studies and was provided in conjunction with physical rehabilitation where the patient is conscious in contrast to the study by Chen *et al.* (2015) where the intervention was given in the post-operative surgical waiting area where the patients may still be under the effect of anaesthesia. Hence the results of the above study show that even though there may be some immediate clinically significant difference in post-operative pain and anxiety with music, statistically significant difference was not obtained for a one time intervention.

Conclusion

In conclusion, this study showed that music has no statistically significant immediate effect on pain anxiety and physiological parameters on post-operative day 1 or 2 in total knee replacement patients', however the positive changes obtained in the experimental group may be clinically significant and has a potential to be studied further.

Scope for further study

- Effect of music can be measured by providing a longer duration of music, at repeated intervals throughout the post-operative recovery period.
- Effect of music can be measured on the functional mobility of the patients.
- Music which is individually selected by the patient can be used to check its effect on pain and anxiety.
- Music with varying characteristics i.e. beats, melody etc. can be used and its effect can be checked.

Acknowledgements

- I would like to thank all my subjects for participating in the study.
- I would like to thank Dr.Rachana Dabadghav & Dr.SurendraWani for the continuous support & encouragement throughout this study which lead to its successful completion.

REFERENCES

- American music therapy association. <http://www.musictherapy.org/about/history/>
- Allred K.D., Byers J.F., Sole M.L. 2010. The effect of music on post operative pain and anxiety. *Pain Management and Nursing*, 11(1):15-25.
- Chen H.J., Chen T.Y., Huang C.Y., Hsieh Y.M., Lai H.L. 2015. Effects of music on psycho physiological responses and opioid dosage in patients undergoing total knee replacement surgery. *Japan Journal of Nursing Sciences*, 12(4):109-19
- Kay E. and Juanita K. 2001. Music and the PACU environment. *Journal of Perianesthesia Nursing*, 16(2)90-102.
- Pellino T.A., Gordon D.B., Engelke Z.K., Busse K.L., Collins M.A., Silver C.E., Norcross N.J. 2005. Use of Nonpharmacologic Interventions for Pain and Anxiety After Total Hip and Total Knee Arthroplasty. *Orthopaedic Nursing*, 24(3)182-19

Appendix A

Consent form: Patient information sheet and Consent Form

- I. **Title of research –Immediate effect of music on pain and anxiety in post operative total knee replacement patients**
- II. **Introduction:** You are invited to participate in a research study. It is important that you read this description of the study and understand your role in it including the nature and risks of participation. Please give your consent to participate in this clinical study only if you have completely understood the nature and the course of this study and if you are aware of your rights as a participant.
- III. **Purpose of the study:** You are invited to participate in a research study that will assess the effect of music on your Pain, anxiety and vital parameters. This will help us develop a treatment alternate to pharmacological treatment. The person responsible for the study is Ms.Manasa Nair.

- IV. **Expected duration of the study and number of research participants:** You will be one of the approximately 54 people who will participate in the study. This is just a onetime evaluation.
- V. **Study procedures to be followed:** if you agree to participate in the study you will be assessed for your pain and anxiety and vital parameters. You will be required to listen to either 10 minutes of music or 10 minutes of silence. It is important that you comply with the instructions given to you.
- VI. **Risks and Discomfort-** There are no risks and discomfort.
- VII. **Possible benefits of the study:** by participating in the study you will help us understand if music has any effects on reducing pain and anxiety in post-operative total knee replacement patients. This may help us to develop a new technique of using music for management of pain and anxiety. However there is no guarantee that you will receive direct benefit from being in this study.
- VIII. **What happens when the research stops?**
Your involvement in this study is just 1 time. You can continue your regular activities immediately post assessment.
- IX. **Compensation for the participation:** you will not need to pay any amount for participation in this study. Neither will you be paid any reimbursement for your participation.
- X. **Treatment and compensation for study related injury:**
Kindly bring it to the notice of the assessor if you have any orthopedic, cardio respiratory or neurological problems. In event of any research related injury during your participation, no compensation shall be provided by the researcher. You will be provided medical treatment at this institute for any physical injury that occurs as a direct result of your participation in this study this medical treatment will be at no cost to you. You will not give up any of your legal rights by signing this form.
- XI. **Right to withdraw from the study:**
Participation in this study is entirely voluntary. You may choose not to take part or you may leave the study at any time. Your decision will not affect your further treatment at this or participation in this institute.
- XII. **Confidentiality:**
All the study records will be kept confidential at all times. Your identity will not be revealed except as required by law. The results of your intervention (photos, health related findings) may be published for scientific reasons. Your identity will not be revealed in these publications.
- XIII. **Contact for further information:**
 - Thank you for taking the time to read the information about this study. Before you sign this document, you should ask questions about anything that you do not understand. The study staff will answer the questions before during and after the study.
 - If you have any questions about this study or how it is being run, side effects or a possible research related illness or injury, you can contact prime researcher
 - Dr. Sachin Gawande (Assistant Professor of Neurosciences) between 9am to 5pm
 - Contact no.: 7709119974

- Email ID :doc.ashokshyam@gmail.com
- If you have any questions about the rights as a participant, or complaints regarding the research study, you should contact the Member Secretary of Institutional Ethics Committee, Sancheti Hospital on the following Tel. no.: 91 20 2553 3333, 2553 6666, (Monday to Friday- 9 am to 4pm; Saturday 9am to 1 pm)

- Institutional ethics committee authorities may wish to examine my medical records to verify the information collected. By signing this document, I give permission for review of my records.
- I understand that my identity will not be revealed in any report or publication.
- I agree to take part I the above study.

XIV. Consent:

By signing below, you confirm that

XV.I have read the information given in the informed consent document for this study titled **Immediate effect of music on pain and anxiety in post operative total knee replacement patients.**

- I have received an explanation of the nature, purpose, duration, foreseeable effects and risks of the study and what I will be expected to do. My questions have been answered satisfactorily.
- I understand that my participation in this study is voluntary and that I may refuse to participate or may withdraw at any time, without penalty or loss of benefit to which am otherwise entitled.
- I further understand that any information that becomes available during the course of the study that may affect my willingness to take part will be informed to me.

Name of participant: _____

Date : _____

Signature of the participant _____

Name of Impartial Witness: _____

Date : _____

Signature of the Impartial Witness

I have answered and confirmed all the necessary details related to the study to the above participant.

Name of the person Administering consent: Ms.Manasa Nair

Date: Signature of the person Administering consent
